Medtronic FOUNDATION

Every Second Counts. Every Action Matters.

A Community Response Planning Guide for Sudden Cardiac Arrest

HeartRescue PROJECT

Every second counts. Every action matters.

TABLE OF CONTENTS

SCA Facts

Sudden cardiac arrest is a public health crisis, striking an estimated 359,400 Americans each year. (Circulation,2013;127:e16.5)

- Nationally, 83.5 to 89% of those who suffer SCA die before reaching the hospital — a rate that hasn't changed significantly over several decades. (Circulation,2012;125:e2) (CARES,2012)
- SCA kills six times more Americans each year than breast cancer. And more than AIDS, lung, breast and prostate cancer combined.
- Your chances of survival fluctuate by as much as 500 percent, depending on where you live in the country. (JAMA,2008;300:1423)

SCA is a treatable disease. Improving survival rates requires measurement and a coordinated community response.

- Data collection standards currently exist to capture incidence and outcomes. Only through measurement can we make informed decisions and replicate best practices.
- Improving survival rates requires a collective community response by the general public, first responders, EMS services and in-hospital caregivers.
- Success begins with public bystanders. Communities with higher bystander CPR participation have higher SCA survival rates.
  - Eighty percent of SCA events occur in the home.
  - Everyone should recognize SCA and know how to call 911, start chest compressions and how to find and use an AED.

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A Community Response Planning Guide for Sudden Cardiac Arrest

A Medtronic Foundation Publication

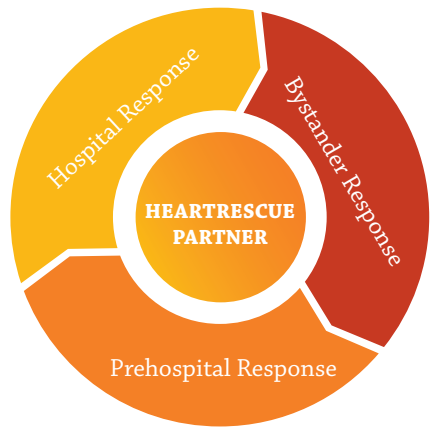
The Medtronic Foundation is pleased to provide you with this planning guide to assist your efforts to increase sudden cardiac arrest (SCA) survival rates within your community.

This guide was compiled by experts in resuscitation science and reviewed by HeartRescue Project Partners. It includes current information on many of the individual actions upon which SCA survival depends as well as valuable resources and references.

It is designed to provide a comprehensive, yet practical, step-by-step approach to improving SCA survival at each of three distinct levels of response and care.

About HeartRescue

The HeartRescue Project is an unprecedented, collaborative effort to increase sudden cardiac arrest (SCA) survival rates in the United States, improving how SCA is recognized, treated and measured.



Funded by the Medtronic Foundation and working with the country's leading emergency and resuscitation experts, the project is focused on systemically developing and expanding SCA community response systems.

The approach relies on the delivery of best practices at three critical levels of response: prompt action from bystanders, rapid response and quality care delivered by emergency medical services and first responders, and a coordinated approach to the provision of specialized post-arrest care in the hospital.

The vision is for every American who suffers SCA to receive lifesaving, state-of-the-art care at the scene, en route, and in the hospital.

About the Author

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The HeartRescue Partners

University of Arizona Sarver Heart Center, Arizona Department of Health Services

Arizona has a unique SCA reporting and education network called SHARE (Save Hearts in Arizona Research and Education), which includes the majority of Arizona residents. The SHARE network implements effective new SCA approaches statewide. On the research side, the University of Arizona Sarver Heart Center has developed a national reputation for its leadership in chest compression-only CPR. Strong partnerships between government agencies, hospitals, and research groups provide this organization with a solid backing.

The University of Minnesota, Cardiovascular Division

The University of Minnesota Medical School-Cardiovascular Division leads the Minnesota Resuscitation Consortium, a state-wide partnership of organizations and acute care physicians focused on providing a new platform of treatments and technologies to more rapidly deploy and evaluate advances in the treatment of sudden cardiac arrest.

Duke University, Wake County EMS, North Carolina Office of EMS

In North Carolina, the RACE CARS program (Regional Approach to Cardiovascular Emergencies Cardiac Arrest Resuscitation System) makes up the largest statewide system of emergency cardiovascular care, coordinating 119 hospitals and 540 EMS agencies to rapidly diagnose and provide emergency treatment for heart attacks and sudden cardiac arrest. Part of this strategy includes community education and reducing disparities in SCA treatment.

University of Pennsylvania Center for Resuscitation Science

The University of Pennsylvania is world renowned for its research and training in therapeutic hypothermia: the cooling of SCA patients to minimize brain and organ damage. Furthermore, Pennsylvania is tackling sudden cardiac arrest deaths through a statewide collaborative effort to increase SCA survival rates and patient outcomes through prompt bystander intervention and EMS response, and to improve data collection and implementation of best practices during post-arrest and in-hospital care.

University of Washington, Pacific Northwest HeartRescue Initiative

Seattle and surrounding King County both report one of the highest sudden cardiac arrest survival rates in the world thanks to longstanding work by dedicated emergency medical services (EMS) providers and physicians. Education has played a key role in this success. More than 70 percent of the region's populatio is trained in CPR. The program is an ongoing collaboration of King County Emergency Medical Services, Medic One Program of Seattle Fire Department, Harborview Paramedic Training Program, and University of Washington-Harborview Center for Prehospital Emergency Care. Most recently, the program has expanded with the addition of Alaska and Oregon. The goal is to strategically expand the geographic footprint to neighboring states, and in turn the positive influence of the initiative. Leadership and direction are provided by the Anchorage Fire Department in Alaska, and Oregon Health & Science University, Tualatin Valley Fire and Rescue, and Jackson County Ambulance and Fire Agencies in Oregon. Together, they aim to improve cardiac resuscitation care and outcome throughout the Pacific Northwest.

The HeartRescue Partners *continued*

American Medical Response

AMR is the single largest provider of EMS in the United States, covering almost 48 million people in 2,000 communitites in 39 states. The 17,000 AMR paramedics and EMTs provide care to 25,000 SCA victims each year. As a partner in the HeartRescue Project, AMR has the potential to influence and partner with citizens, dispatch centers, first responders, public health agencies and hospitals across the country.

The Illinois HeartRescue Collaborative

The Illinois HeartRescue Collaborative is a partnership between the University of Illinois Hospital and Health Service System, the Chicago Fire Department, Chicago EMS System and the Illinois Department of Public Health. They will work to develop a statewide network for cardiac arrest reporting and quality improvement. They will promote cultural competency strategies that encourage, expand and support community-initiated grassroots efforts aimed at improving SCA survivial rates.

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The Community Approach to Improving Survival from Sudden Cardiac Arrest

Community Initiatives to Improve Survival

Survival from out-of-hospital cardiac arrest is directly linked to the system of care that exists in the community. When the following events occur, the victim has the best possible chance for survival:

- A bystander recognizes SCA and activates the emergency response by calling 911.
- Chest compressions are initiated immediately.
- An AED is rapidly applied and a shock delivered as indicated.
- EMS professionals respond quickly and perform evidence-based resuscitation techniques.
- The receiving hospital is a cardiac center that provides state-of-the-art integrated post-cardiac arrest care.

Failure to provide any of these critical interventions will significantly decrease survival. To maximize survival, each of the steps described above must be comprehensively evaluated, tested, and improved.

Survival rates vary widely among communities, ranging from 0% to 52% for EMS-treated bystander witnessed ventricular fibrillation arrest.[1-3] The variation between communities is reduced through efforts to increase bystander CPR, ensure AED usage, and provide the highest quality EMS care. A cardiac arrest victim is twice as likely to live when bystanders give CPR, and survival can again be doubled when AEDs are used.[4-5]

***EMS-treated bystander-witnessed ventricular fibrillation** is the standard SCA survival statistic used in this document unless otherwise noted. These victims have the best chance of survival and serve as a sentinel measure for the system of care.*

Members of the general public can help improve survival from cardiac arrest in several ways. They can learn CPR or purchase an AED for their school, church, or business. They can ask their elected representatives how effectively their community's system of care for victims of cardiac arrest is functioning. Do you know what your community's survival rate is? The public must demand change when the system is failing SCA victims.

Bystander Action

The critical first step is recognition of out-of-hospital cardiac arrest (OHCA) and an appropriate response to the emergency. Most Americans are aware that they are expected to activate the EMS system in an emergency and are more than willing to dial 911. Taking the next step to actively intervene is challenging. Nationwide, only about 35 percent of OHCA victims receive any CPR prior to the arrival of a 911 responder, and only 3 percent receive the benefit of public access defibrillation.[5] The reasons for inaction are complex and may include lack of knowledge about what cardiac arrest looks like, a sense of incompetence in performing life-saving actions, a diffusion of responsibility when multiple potential rescuers are present, fear of hurting the victim, and concern about exposure to legal consequences.

Informing the Public

Data to quantify the effect that activities such as public service announcements or mass bystander CPR training have on bystander action are limited. Some communities have invested in these types of activities to encourage bystander action with promising results. A marketing campaign may inform potential rescuers about the opportunity to learn life-saving chest compressions. Marketing campaigns may also change the perception of bystanders from a fatalistic view to one that allows the potential for saving the victim, and can also educate about the lack of legal liability. A campaign can also help change the social expectations for action. Messaging should raise an expectation for action.

Enlisting Support for Community Awareness Activities

Raising public awareness around OHCA requires intensive messaging to the public. Identifying, educating and engaging allies from within the community requires an organized approach. Key allies include the local EMS and hospital leaders. Partnering with EMS facilitates getting buy-in from public officials and others.

To organize the approach, the following steps may be helpful:

1. Identify stakeholders and influential leaders in the community. Examples include:
    - Elected officials, including mayors, city councilors, and county commissioners
    - EMS administrators and medical directors
    - Health Department directors
    - Public Safety administrators, including police and fire chiefs
    - Public utility leadership: water companies, gas and electricity
    - Local radio, television, and media personalities
    - Community organizations and service club leaders for Rotary, Junior League, hospital auxiliaries, etc.
    - Health club and community recreations center directors
    - Businesses with ties to the community, including insurance agencies, auto dealers, grocery stores, beauticians, barbers, financial advisors, and attorneys
    - School administrators, health teachers, and coaches
    - Ministers, priests, rabbis, and other religious leaders
    - Neighborhood group leaders and staff
    - Professional, semi-professional or amateur sports team owners, coaches, and players
    - Youth activity leaders including Boy Scouts, Little League, and softball leagues
2. Research potential stakeholders' missions and what might motivate them to want to join forces with you.
3. Craft the message individually for each stakeholder with their mission and motivation in mind.

4. Tie the message for the stakeholder to a specific request; examples might include:
    - Sponsor an ordinance
    - Declare a CPR/AED awareness day
    - Produce a public service announcement
    - Request public reporting of SCA survival rates to the community
    - Identify local funding sources for equipment or activities
    - Assist in the organization of CPR/AED training sessions
    - Install an AED in a particular location
    - Require reporting of AED location to local EMS authority
    - Participate in an annual SCA Survivor Celebration
5. Communicate a specific message to the community using a variety of media techniques.
    - The more sources from which a message emanates, the more likely it is to be used in planning and decision making.
    - Convey information using flyers, mailings (water bill inserts), reports, websites, list servers, social media, conferences, hearings, sports scoreboard and half-time announcements, radio, TV, person-to person communications and networks.
6. Practice community building by empowering individuals and groups of people by providing them with the skills they need to effect change in their own communities. For example:
    - Provide train-the-trainer CPR skills to groups (scouts, service clubs) and assist them to implement a program to provide compression-only CPR/AED training.
    - Create a local SCA Survivor group linked to a national organization and assist them in supporting new survivors and families as well as empowering them to demand system improvement.

Bystander CPR Training in the Community

Training in CPR is the most important component of optimizing the community response. People who have been trained in CPR during the preceding five years are much more likely to help than are those who were never trained or who were last trained more than five years ago.[6]

Traditional Approaches

Traditional certificate-based CPR courses designed for lay rescuers often entail a several-hour time commitment and cost approximately $50. They are useful for individuals who wish to receive additional training or whose jobs require certification.

In 2010, about a quarter of SCA victims in the CARES registry (Cardiac Arrest Registry to Enhance Survival) received CPR prior to arrival of EMS. That proportion is consistent with training data suggesting 20% of the population had been trained in CPR in the previous five years. CPR is a psychomotor skill which requires practice to create muscle memory, but even a few minutes of practice may be sufficient to perform effective chest compressions in an emergency.[7] Training enough people in CPR to ensure that the lifesaving procedure will be provided for at least half of the witnessed OHCA cases in a community requires reaching a very significant portion of the population. However, with the introduction of short skills training, such as compression-only CPR in 10 minutes or less, the task may not be as daunting as it appears.

Attempts to train many community members using traditional methods have had limited impact in most communities. This clearly requires a concerted effort. The menu of activities used to accomplish this training may include:

- Integration into the curriculum of local schools
- Encouragement of businesses to provide CPR training for their employees
- Offering short training sessions at health fairs, and ongoing training at local fire stations or other health or training facilities
- Ensuring that high-risk patients and their families are trained in CPR before discharge from the hospital

One way to get significant media exposure is to hold a mass CPR training event. While these events require extensive planning relative to the number of people trained, many more people are made aware of CPR through the media coverage. Involvement of celebrities and cardiac arrest survivors with compelling stories can facilitate media coverage. Typical events require planning up to a year in advance. Large scale CPR/AED training activities can involve a few or many local groups such as:

- Local celebrities, media and politicians
- Local champions, medical professionals and survivors
- Sports teams
- Churches
- Clubs, community organizations, hospital initiatives
- Colleges and universities, local school groups

Training efforts need to be ongoing and sustainable, necessitating commitment from community institutions such as churches and schools. Large and small organizations and companies can offer CPR training as a part of the company's human resources orientation program so that new employees can be trained as they are hired and existing employees can obtain refresher training on a regular basis. This level of effort requires both personnel and resources and takes a significant commitment.

Non-Traditional Approaches to Increasing Bystander CPR in a Community

Reframing the CPR/AED Training Message

The relatively simple compression-only CPR technique has reduced barriers to training. Potential rescuers only need to learn the "3 Cs":

- Check the victim
- Call 911 and get an AED if one is available
- Compress the chest by pushing hard and fast

Expecting everyone to provide compression-only CPR for adults who suddenly collapse is more practical than the previous approach of recalling a complicated dance involving positioning the victim, counting compressions and changing rescuer positions to deliver a prescribed, but often forgotten, number of breaths. While many healthcare professionals believed that bystanders were reluctant to provide CPR because of fears of disease, we have learned that the reasons for non-performance were much more about the fear of performing the skills incorrectly, which bystanders thought might be harmful to the victim.[6, 8-9]

The simpler CPR approach offers an opportunity to reframe the message to the public. Establishing the expectation that citizens must help is critical. The CPR message is active and essential as opposed to passive and optional. Many individuals believe that their actions are not needed and that only professionals can be of help. They also believe that someone else will step up and act. Each person in the community must understand that their individual actions are required to ensure that the efforts of EMS and hospital personnel are successful.

The Message

- CPR is essential in order to maximize the victim's chance of survival.
- If CPR is not provided to a SCA victim within a few minutes, they will likely die.
- No advanced therapy is more important than CPR. Waiting for help to arrive will decrease the chances of survival.

Training Resources

Both the American Red Cross and the American Heart Association offer compression-only CPR training in addition to traditional CPR instruction.

The Red Cross uses a program called "CPR Made Simple" which takes about one hour and costs $20. Information about classes and times can be obtained through your local Red Cross chapter. Many locations will arrange group training sessions with advanced notice. www.redcross.org

CPR Anytime

Many people who receive training in CPR do so as a part of employment training. On average, they are younger than the typical witness to a OHCA. To address the challenge of training adults who are in the age group of interest, the American Heart Association, in association with Laerdal Medical Corporation, produced the CPR Anytime kit which sells for around $40 and can be used for training individuals or groups. Purchasing information can be found on the Internet.

The kit includes a small inflatable manikin (light skinned or dark skinned) and a DVD (Spanish and English) with a do-along demonstration of compression-only CPR as well as instructions for using an AED. The training does not have to be delivered by an official instructor, but it does require the availability of a DVD player. The compression-only CPR self-instructional program can be completed in as few as 10 minutes. If the student wants to learn more, such as providing rescue breathing for children, the DVD has additional chapters available.

This product was designed to be shared with the learner's family members and friends, multiplying the number of individuals trained with one kit and reducing the cost per person of the training. If students use the kits in school, they can be asked to train their parents and grandparents, thereby reaching adults who are most likely to witness cardiac arrest.

While the kits are readily accepted by individuals, they may often be shelved, and unused unless a training session is scheduled. Scheduling a training session using a leader, in a setting such as a brown bag lunch at work, before dinner at home, or after church services, is one strategy for ensuring that the box does get used.

Using the kits to train a large number of individuals may not be feasible due to cost restraints. Some communities have found that reusing more durable manikins is more economical.

Adult/Child 5-Pack CPR Manikins

Reusable, Portable Torso Manikins

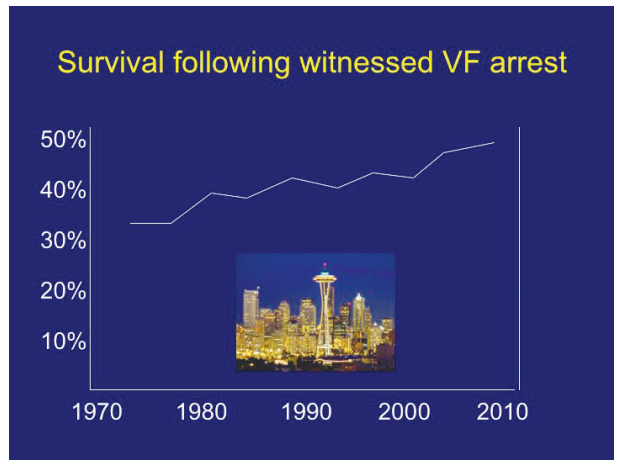
While it is not essential to use CPR manikins to teach compression-only CPR to lay rescuers, having a realistic chest upon which they can practice the skill is helpful. The type of manikin shown at right provides an excellent, reusable training platform, is easy to clean, and is simple to package for travel.

The cost may be a barrier for some programs, but if a community group is providing a fair number of classes per year, these "dummies" may work well. Your training group may find that they are able to recoup the cost through donations or a small fee charged for the training. Information on obtaining these manikins can be found by searching the Internet.

Development of Community CPR Training Programs

Seattle Medic Two CPR Training

In Seattle, Washington, the 2011 survival rates for EMS-treated witnessed VF have reached 52%, according to Tom Rea, MD, Medical Director of King County Medic One. For decades, the activities of the EMS programs in Seattle and surrounding King County have served as the role models for communities and EMS systems who work to improve their SCA survival rates. Their commitment to excellence has driven a multitude of quality improvement initiatives designed to evaluate the system. To reach a 52% survival rate among witnessed VF SCA victims, Seattle Fire Department, www.seattle.gov/fire/medics/medicOne.htm, a fire department-based EMS system, has been measuring all aspects of their community's response to out-of-hospital cardiac arrest (OHCA) since the early 1970s.[10] Using the measurements to identify opportunities, the system has made continual improvements in survival over more than three decades.



Survival to discharge from the hospital following OHCA improved in Seattle over 35 years.

In 1971, to improve a victim's chances of receiving bystander CPR, Dr. Leonard Cobb organized Medic II, the public training arm of the Seattle Fire Department. Over the next two years, the program trained more than 100,000 citizens in CPR. The Medic II Program (http://www.seattle.gov/fire/medics/medicTwo.htm) taught CPR to more than 771,000 people through 2009, and it continues to provide CPR training for about 13,000 Seattle/King County residents each year. Over time, more than half of the 1.3 million residents of the Seattle and surrounding King County area have received CPR training. During 2008, bystanders initiated CPR for 58% of victims who were in cardiac arrest when EMS arrived, a figure considerably higher than most other communities.[11]

911 Dispatchers Are Critical

All communities should provide CPR instructions over the telephone when someone calls 911 to request assistance for a sudden cardiac arrest. Dispatchers who assertively provide CPR instructions to the caller at the time of the emergency significantly increase CPR rates, and that saves lives. Providing dispatcher-assisted CPR instructions requires meticulous training of the defined group of 911 dispatchers and call takers, but they are an accessible group to train. Since the number of 911 call takers is a small fraction of the community's population, this strategy provides a very effective approach for increasing the rate of bystander CPR. The EMS Medical Director can tell you more about your community's plan to increase bystander CPR using telephone CPR instructions.

The Seattle & King County Experience

Dispatcher-assisted CPR instructions were first implemented in Seattle in 1981. The original goal was to provide CPR instructions over the telephone to bystanders while waiting for EMS help to arrive. In recent years, the instructions have evolved to consist of a very quick assessment of whether CPR is required followed by especially assertive instructions to motivate the caller to start CPR as quickly as humanly possible.

The program is successful. In 2010 in Seattle and surrounding King County, the overall rate of bystander CPR is above 50%. Among all victims who receive bystander CPR in these communities, 60% is provided by citizens who know CPR, and 40% is provided by citizens who are directed by the 911 dispatchers. The Seattle and King County programs includes comprehensive quality improvement activities, with targeted training for the dispatchers and routine review of all 911 calls possibly related to OHCA. The time it takes to get CPR started as well as other benchmarks are routinely shared with the dispatchers to improve their performance.

Improving Bystander CPR in a Community: Examples

Communities outside of Seattle and King County also have noteworthy approaches to CPR training. Some use marketing messages to encourage prompt action. Others use cardiac arrest survivors to facilitate CPR training classes.

Arizona SHARE Bystander CPR Initiative

The Arizona SHARE (Save Hearts in Arizona Registry & Education) Program promotes a comprehensive, standardized system of out-of-hospital cardiac arrest care throughout Arizona encompassing all "links" in the "chain of survival"—bystander response, emergency medical dispatcher CPR instruction, Emergency Medical Services provider resuscitation, and standardized care at hospitals.

The AZ SHARE website, www.azshare.gov, offers a large number of resources and tools targeted for SCA survivors, the general public, and other groups (businesses, schools, hospitals) that can be used to improve awareness of SCA and to encourage bystander CPR training.

Since 2005, the SHARE program focused on raising bystander CPR rates. It was the first program to train lay persons to deliver compression-only CPR. By using a variety of methods, the Arizona SHARE program reached over 500,000 individuals in the state through training classes, video viewing, and other marketing methods.

Audio and video messages promoting bystander CPR include a one-minute podcast that discusses the rationale for using compression-only CPR. Available YouTube videos include a six-minute video on compression-only CPR and a five-minute video showing how to use an AED. Visit www.azshare.gov for links to YouTube videos.

The SHARE program tracked the bystander CPR rates across the state. The multiple efforts paid off. Bystander CPR increased from 28% of cardiac arrests in 2005 to 40% in 2009. The increase in bystander CPR was associated with increased survival, as well.[12]

Chest Compression-Only CPR Campaign in Arizona

- Website (www.azshare.gov)
- Brief online video training
- In-person, free training in many locations throughout the state, primarily sponsored by fire departments
- Free training kits sent to schools with 6th – 12th grades—students were encouraged to teach family members
- Public service announcements made by the Governor and local sports celebrities
- Inserts mailed in utility bills
- Tables at health and safety fairs by Boy Scouts, fire departments, schools, etc.
- Newspaper articles and editorials
- Training video looped on public access cable channels
- Summer youth classes taught by youth corps volunteers
- Local radio spots and interviews
- Special features on local and national TV
- Frequent email updates distributed to stakeholders

Minnesota Bystander CPR Training

Using the American Heart Association's Family and Friends CPR Anytime® Kit, the Minnesota SCA Survivor Network, http://www.mnscasurvivor.org/, conducts school and community CPR and AED training throughout the state. When there is a need for a bystander CPR class, the survivors travel to the location to teach the class. The survivors are a dedicated group of volunteers that spend hundreds of hours every year making sure citizens of Minnesota are trained. Because the survivors tell their stories, learning CPR has a memorable impact on the participants.

SCA survivors and their families help to increase public awareness of SCA as well as to provide CPR training for bystanders. The Minnesota survivors are among the most active advocates of CPR training and SCA awareness in any area of the country.

Survivors wear bright orange Survivor t-shirts when teaching CPR classes and pulling wheeled duffle bags embroidered with the MN SCA Survivor Network logo. The MN survivors have 10-15 CPR manikins in each bag, along with a DVD player and AED trainer.

Impact of Optimizing Bystander CPR

Overall, survivors comprise only about 8% of the nearly 200,000 people for whom EMS attempts resuscitation each year in the United States and Canada.[13] This leaves much room for improvement. Improving the survival rate by just 2 percentage points across the country, from 8% to 10%, would save 4,000 additional lives each year.

Incremental Benefit of Improving OHCA Survival Rates in the U.S. and Canada*

Survival Rate	Number of Lives Saved	ADDITIONAL Lives Saved
8%	16,000	0
10%	20,000	4,000
12%	24,000	8,000
15%	30,000	14,000
20%	40,000	24,000

**200,000 estimated resuscitations annually*

To extend survival rates into excellent territory requires choreography of the care provided for OHCA victims. This begins with bystander CPR, and must involve clear and direct EMS dispatch CPR instructions, as well as the effective efforts of EMS professionals and hospital personnel. Because of the interdependence of each of layer of care, it is essential that participants at all levels understand the necessity of a continuous commitment to success. OHCA survival can be substantially improved, and stakeholders must ensure that programs and initiatives in their communities are successful.

Checklist of Community Involvement Activities

Each community must assess both its strengths and limitations when generating an action plan for improving survival from sudden cardiac arrest. The following activities and steps to encourage community involvement have been successfully implemented across the country.

✓ Ensure that there is committed leadership with physician involvement.

- Physician leadership can bring together citizen, government, EMS system, and hospital stakeholders to ensure a comprehensive, iterative system for improving SCA survival.

✓ Measure and publicly report OHCA survival to hospital discharge rates annually.

- Continuous quality improvement efforts must be linked to clinical outcomes and reported accurately to the community.

✓ Educate community leaders and stakeholders about cardiac arrest survival in their community.

- This may be best accomplished in person. Go armed with **fact sheets** emphasizing the details you want to be remembered.
- Visit stakeholders from local government, public safety, school systems, faith-based organizations, service organizations and businesses. Involve them in your efforts by harnessing the people-power they represent to provide education and training to their constituents.

- ✓ Obtain written commitment from local stakeholders to use toward building a true community partnership.
  - Examples of "asks":
    - Generic letters of support for later use as documentation for funding or other support
    - Letters of commitment to a particular activity, such as CPR/AED training
    - Letters of commitment to a particular resource, such as the provision of space, advertising or public service announcements
  - Community groups can raise funds to purchase and place AEDs in locations that matter to the community, such as a local church, a community sports field, or other community gathering place.
  - Sports teams can sponsor mass CPR training events at their stadiums or arenas.
- ✓ Build a strong partnership with EMS leaders and providers in your community. Enlist EMS to assist in encouraging and providing CPR and AED training, and to assist in coordinating survivor events.
- ✓ Establish an annual survivor celebration event to honor the 911 call takers, EMS professionals, and bystanders who helped save a life.
  - Survivors are generally interested in relating their stories. These events can bring survivors together and may stimulate the development of local advocacy and support groups among survivors.
  - EMS Week during May is a popular time to hold these annual events, as is Heart Month in February.
  - While the focus will be on the survivors over the preceding year, inviting survivors and families from previous years can help the event have greater impact.
- ✓ Involve and educate local celebrities who may help to serve as masters of ceremony for OHCA survivor celebrations and training events.
  - Sports stars, local media personalities, and well-known community leaders have contributed in many cities.
- ✓ Establish a system/clearinghouse for handling requests for public appearances, training sessions, and media opportunities in your community.
- ✓ Establish a web presence with up-to-date national and local facts about OHCA that individuals (media, advocates, laypersons) can refer to for reliable information. Visit the website GallatinHeartRescue.com to view an excellent example. Be sure to include a training session calendar and links to related resources such as the Medtronic Foundation HeartRescue program (www.TheHeartRescueProgram.org).
- ✓ Create a local chapter of a national group of survivors such as the Sudden Cardiac Arrest Association (www.SuddenCardiacArrest.org).
  - Local survivor chapter members can be powerful allies in advocacy. They can also help with survivor events and serve as a resource to "new" survivors.

✓ Train and empower local groups to provide CPR training. Facilitate their efforts by providing needed supplies, encouragement, support, and reporting of number of people trained.

Gallatin HeartRescue "CPR in a Box"

Supplies needed at site:

- Equipment to project DVD picture and sound
- Projection screen (or wall)
- Floor space for participants to practice compressions

Each tote box contains:

- 10 inflatable manikins
- 2 CPR video DVDs
- Survivor DVD containing three survivor stories
- Bicycle pump to inflate manikins
- Cleaning wipes (can use alcohol wipes)
- Facilitator guide
- Instructor's guide
- Participant log

CPR in a box kits can be loaned to interested community groups or schools.

Tips for Developing OHCA Fact Sheets

Fact sheets are one-page documents (can be two-sided, if needed) that provide basic information in an easy-to-read format. They are particularly useful to policymakers who need clear and concise information to help them make decisions. These can be distributed in person, via email, or reprinted in newsletters, and they can be adjusted easily to accommodate different audiences.

Content

- Use a short but compelling title.
- Ensure that the fact sheet can stand alone.
- Keep text brief, use present tense and active language understandable to non-medical people.
- Do not bury the headline. Put the most important information in the first paragraph. For example: "100 people died in the City of Metropolis last year who should have lived." Use highlighting or text boxes to emphasize information.
- Contact information should be visible on the front page.

Layout

- Using 10-14 point font and a two column format often works well for quick readability.
- Begin the document with the words "Fact Sheet" followed by a brief headline explaining the subject in lay terms.

- List the date the fact sheet was produced.
- Use one or two key graphs in color.
- Ensure that there is adequate white space, headings, and subheadings to keep content clear and easy to read.
- Provide references and electronic links for more information.
- Print on heavier stock paper.
- Make sure electronic copies are readily available to allow users to share and access information quickly.

Related Links with Community Resources

The Heart Rhythm Society: www.hrsonline.org/PatientInfo

The Sudden Cardiac Arrest Foundation: www.sca-aware.org

The Sudden Cardiac Arrest Association: www.suddencardiacarrest.org

Essential Reading

Rea TD, Page RL: Community Approaches to Improve Resuscitation after Out-of-Hospital Sudden Cardiac Arrest. *Circulation* 2010;121;1134-1140.[10]

Resuscitate! How Your Community Can Improve Survival from Sudden Cardiac Arrest, Mickey S. Eisenberg 2009, Seattle: The University of Washington Press.[14]

Public Access Defibrillation Programs in the Community

Automated external defibrillators (AEDs) are safe and effective for treating ventricular fibrillation when used by professional rescuers [15] and trained volunteers in community public access defibrillation (PAD) programs.[16] The Public Access Defibrillation Trial included 1900 volunteer responders from 993 community units in 24 North American regions. In this study, volunteers trained and equipped to provide early defibrillation in a structured response system increased the number of survivors to hospital discharge after out-of-hospital cardiac arrest in public locations.[16] While PAD programs can improve survival for out-of-hospital cardiac arrest caused by ventricular fibrillation, the effectiveness of defibrillation does diminish over time, making the availability of the device and the time it takes to bring it to the side of the patient very important considerations when establishing PAD programs.[17]

Why AEDs Are Needed

While EMS providers will bring a defibrillator to the scene of the emergency, they may not always be able to reach the patient quickly enough. The cardiac arrest victim's chances of survival decrease by 5 to 10% with every passing minute between the beginning of VF and arrival of EMS. In most communities, the time interval between

placing the phone call to 911 and arrival of EMS at the side of the victim is 7 minutes or longer. If you do the math, you can easily see why so many victims die. Help simply did not arrive in time.

Because early defibrillation can be lifesaving, modern defibrillators have been designed specifically for use by the public. Anyone can successfully save lives with use of an AED simply by following the voice prompts from the machine. AEDs can be found in many locations in your community including grocery stores, airports, shopping malls, and public buildings. The devices are most useful if they are conspicuously placed in the open, much the same as fire extinguishers.

It's Not Just About the Box

The challenge with public access defibrillation programs lies in ensuring that potential rescuers are aware of AED locations and understand their role in using the devices. Having an action plan is critically important to the successful use of AEDs. That action plan should be tailor-made for the area it serves. For example, security guards at the entrance to a public building should know the location of the closest AED and respond with it when an emergency occurs within the premises. The designated responder at the location should be trained in CPR regularly and be familiar with the basics of the AED at that site. Without designated responders, the victim may not receive necessary aid in time.

A PAD program can be directed by any responsible party. Some programs are overseen by the local EMS Director. In others, the employee health or building security service take the lead. Often there are not enough AEDs in public places to ensure they are available quickly when needed. Optimally, AEDs must be distributed so that the AED can be retrieved and placed on the victim within the first three minutes following collapse. The AED Implementation Guide (available at www.heartrescueproject.com) for business and industry contains many helpful tips including how to estimate the number of AEDs needed, where to place AEDs, how to address legal and training activities and how to promote your program.

Local EMS can pinpoint good locations for AEDs in conjunction with health departments, schools, local governments, churches, and local businesses. Church groups can purchase AEDs for their congregations. Business owners should invest in the devices for their offices and stores. Each of these groups should have a PAD program with designated responders and should report the location of the AEDs to local EMS providers.

Successful PAD programs include:

- EMS leadership
- Community support
- Designated responders
- Prominent placement
- Clear signage
- Registration with EMS
- Public education

Examples of successful programs can be seen at airports across the country.

Creating a PAD Program in Your Community

Talking Points and Facts

To begin a PAD program, EMS leaders should inform the community about cardiac arrest survival rates and goals for improving survival. Advocates should stress the importance of bystander CPR and early defibrillation with an AED while awaiting the arrival of EMS. Time is of the essence as each minute of delay in treatment represents a major drop in the chance of survival. Promoters should teach citizens to find

an AED and provide a shock while waiting for EMS to arrive.

In the U.S. and Canada, the public uses an AED for only about 2-5% of the arrests they witness. Since 20-25% of cardiac arrests happen in public places, widespread PAD programs will make a significant difference in overall survival rates.

The price of an AED ranges from about $1,500 to $2,000. Pads are about $50 and last 2 years. Batteries are about $100 and last 1 to 5 years. Wall mounts cost an additional $200 to $500. Many specialty businesses now exist to place and maintain AEDs for a fee.

Tools

Letter of Support for Participating in the Community PAD Program

PAD programs are generally administered in cooperation with local EMS oversight. Community members can advocate for the implementation of an organized program in their communities. See the letter of support sample.

SAMPLE LETTER FOR COMMUNITY PARTNERSHIP IN PAD PROGRAM

Dear _____,

YOUR COMMUNITY NAME has begun a campaign to increase public awareness about the importance of early defibrillation in the event of sudden cardiac arrest. Sudden cardiac arrest is a condition where the heart suddenly stops working and a person becomes unconscious. The heart can be restarted with a shock from an automated external defibrillator, also called an AED.

Our challenge is to deliver the shock as soon as possible. Unfortunately, in most instances, the shock comes too late. In most communities, survival is only 8% from cardiac arrest. Although survival in ***YOUR COMMUNITY NAME*** is better than average due to the excellent care by citizens and paramedics, there are still important opportunities to save more lives from cardiac arrest.

Because an early shock soon after collapse is so important, some businesses/exercise centers/casinos (be specific) in ***YOUR COMMUNITY NAME*** have equipped their location with an AED. We know that when an AED from the community is used to provide a shock, the shock can occur very early even before the paramedics are able to arrive. This can translate into even more survivors here in ***YOUR COMMUNITY NAME***.

As a community partner, you can help achieve even higher survival rates here in ***YOUR COMMUNITY NAME***. As part of this campaign, a representative from ***YOUR PROGRAM*** will be calling you in the next couple of weeks to ask you some brief questions regarding your access to an AED at your business or institution (**be specific**). Your participation in this 5 minute phone contact will be much appreciated.

To learn more about the Public Access Defibrillation program, please see the enclosed brochure. Should you have any questions regarding this notice, or if you have placed an AED at your business/institution, please contact _____, Program Coordinator, at (__) ___-____.

Sincerely,

Brochure

A generic brochure for use to encourage community buy-in and site participation is very useful and can be tailored to meet your community's needs. An example of a PAD program brochure developed for the community by a local woman's club can be found at www.heartrescueproject.com.

Public Access Defibrillator (PAD) Program

A Special Bulletin from the Vice President of Student Affairs

November 17, 2010

Dear University Community,

Our University announces a Defibrillation Program with the installation of Automated External Defibrillators (AEDs) at key locations throughout the campus. Employees, students, and University visitors will have a better chance of surviving a cardiac arrest because of the newly installed AEDs.

Please click here to review the brochure and AED Campus Locator. If you have any questions or concerns, contact Student Health Services at xxx.xxx.xxxx.

Sincerely,

Vice President of Student Affairs

Registration Postcard

A postcard or website can be used to encourage lay persons to report the location of any community based AEDs. Location reporting can often assist local EMS systems in notifying a 911 caller of a nearby AED and can help in determining where to place additional

AEDs in the community. It is believed that the locations of a majority of the AEDs in a community are unknown.[18] An email or postcard can remind participants to replace batteries and pads before expiration and can request updated information on AED locations and any new AEDs that may have been added.

Community Training

AEDs are easy to use by simply following the voice prompts. Citizens needs to know how to recognize cardiac arrest, call 911, and to retrieve the device, turn it on, follow directions and place pads. AED training does not have to be formal or lengthy. Alternative methods to traditional classroom training are available. Your local EMS medical director will be able to help you locate appropriate training resources.

Registration of the AED Devices

Any AEDs placed in a community should be reported to the local EMS system, regardless of lack of a requirement to do so. By placing an AED in your community, you are partnering with your EMS agency. That agency can provide you with guidance, as needed. As 911 dispatch systems continue to evolve, technology will allow dispatchers to direct bystanders to a nearby AED while waiting for EMS to arrive. This approach only works if the 911 center knows where the AEDs are.

AEDs are sophisticated devices with built in safety measures to ensure that the device will not shock anyone unless they need it. The sophistication extends to the devices ability to capture and store event data, which may be useful to healthcare providers as well as the patient. Your local EMS providers may wish to capture information from the AED following its use.

Placement

AEDs can be most effective when placed in an area with a large concentration of individuals. One guideline suggests an AED be present if more than 250 people spend at least 8 hours a day at the site. Some very common places include: airports, shopping malls, public sports stadiums or arenas, public transportation locations (train, bus station, ferry terminal), health clubs, gyms, community centers, golf courses, tennis courts, and large industrial sites. Effective placement of AEDs will allow the rescuer to retrieve the machine and deliver a shock to a victim within 3 minutes of collapse. When deciding where to place AEDs, use this 3 minute rule as a guideline to help you determine how many AEDs you need and where to place them.

Companies should determine if there are places on-site where the incidence of sudden cardiac arrest may be higher, such as corporate health clubs, and identify locations that are hard to reach quickly. These may be good locations for AEDs. Areas where many people gather, such as cafeterias, often make sensible locations for the devices. It is imperative, when at all possible, to place AEDs within plain view in any unsecured location. Often used hallways and near elevators or building entrances are common locations.

AEDs should never be locked or placed out of sight. Giant Eagle foodstores, located throughout the Midwest, have an AED available at their customer service counters.

The Neighborhood Watch Model

Several communities around the country have established their own neighborhood PAD programs. Naperville, IL is one community that is exploring the installation of AEDs at the

neighborhood level. City officials say they're working with the Naperville Area Homeowners Confederation to promote the installation of automated external defibrillators in residential neighborhoods throughout the city. Many neighborhoods have a central location well known to residents, such as a small park, which could make a sensible location for the placement of a neighborhood AED.

Signage

While most of America is more familiar with the red AED sign, recently, the International Liaison Committee on Resuscitation (ILCOR) has approved a bright green universal sign indicating the presence of an automated external defibrillator. There is also a red version of this newer logo designed for use in North America.

Both signs are intended to indicate the presence of an AED, the location of an AED in a room, a container with an AED for public use, or to indicate the direction to follow in order to reach the AED.

Incentives

Committed community groups, citizens, or business owners can implement an AED matching program. When equipping their own locations, business owners could donate an extra defibrillator to a local group such as a church or small business. Community service clubs may wish to participate and/or partner in this type of program to improve SCA survival in the local community.

Legislation and Liability

Good Samaritan laws

Good Samaritan laws can protect those who use an AED to help a victim. These laws are intended to reduce a bystander's hesitation to act for fear of being prosecuted for unintentional injury. These laws vary by area, but there are three elements that make up the Good Samaritan doctrine: (1) the care given was performed as the result of the emergency, (2) the initial emergency was not caused by the person providing assistance, and (3) the care was not given in a grossly negligent or reckless manner.

Good Samaritan laws vary by jurisdiction, but all 50 states and the District of Columbia have enacted some form of the Good Samaritan law.

In addition to the Good Samaritan doctrine, states also have AED Laws which can serve to empower people to train and be prepared to use an automated external defibrillator to save lives. State legislation and mandates may exist for installing automated external defibrillators in public places like schools, sports stadiums, shopping malls, airports, and hotels.

You can check on laws related to AED use in your state using either of the following sites:

The Sudden Cardiac Arrest foundation http://www.sca-aware.org/aed-#laws3 (www.sca-aware.org)

National Conference of State Legislatures (http://www.ncsl.org/default.aspx?tabid=14506)

FACTS

In the U.S. and Canada it is estimated that the public uses AEDs for about 2-5% of the arrests they witness. Based on estimates from communities with data, it is believed that public access defibrillation, even used only 2-5% of the time, has saved about 474 lives per year in the U.S. and Canada.[5]

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Notes

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Strategies for Improving Survival from Sudden Cardiac Arrest: The Prehospital Level of Care

Out-of-Hospital Cardiac Arrest Survival

Organizing the emergency medical services (EMS) system to improve survival from out-of-hospital cardiac arrest (OHCA) is absolutely essential. EMS, unlike other aspects of care for victims of OHCA, may be both measured and controlled. While the treatment of out-of-hospital sudden cardiac arrest has remained relatively stable over the past few decades, new measurement technology has opened a window onto the details of resuscitation which was largely unavailable prior to 2000.

Technology has allowed measurement of the precise time intervals elapsing between different aspects of attempted resuscitations and fostered an enhanced attentiveness to the importance of continuous high-quality chest compressions in addition to early defibrillation and appropriate drug therapy. Awareness that survival rates as high as 50% are possible for victims with witnessed VF has sparked an interest in improving OHCA survival across North America and around the world.[3] This renewed interest has led to the development of several new approaches to treatment as well as strategies for enhancing proven existing therapies.

Animal research emphasizing the benefits of continuous delivery of quality compressions,[3] as well as research showing that many health professionals provided poor quality CPR,[4-6] led to the 2005 changes in the recommended compression/ventilation ratio from 15:2 to 30:2.[7] Research studies quantified the detrimental effects of excessive assisted ventilation [8] and catalyzed efforts to control ventilations more precisely.[9] Several studies highlighted a lack of efficacy of several resuscitation drugs [7] and directed prehospital therapy toward a back to the basics approach. These recent updates to the care of the SCA victim have improved survival.

The 2010 American Heart Association Guidelines for CPR and Emergency Cardiovascular Care (ECC) updated recommendations for care for SCA victims.[10-12]

Recommendations for EMS systems include:

- Improving the recognition of SCA by 911 call takers and urging 911 call takers to instruct callers to begin chest compressions while awaiting EMS arrival.
- Providing high-quality CPR with minimal interruptions in chest compressions and with controlled ventilations. Beginning CPR with compressions rather than ventilations (C-A-B instead of A-B-C) to emphasize the primary importance of chest compressions and to decrease barriers to starting CPR.
- Establishing OHCA Systems of Care including linking with community AED programs, coordinating with receiving hospitals to optimize post-cardiac arrest care, and measuring survival to hospital discharge.
- Implementing quantitative waveform capnography for intubated patients to monitor endotracheal tube placement and the quality of the resuscitation.
- Working as a team during resuscitation with defined roles and clear communication.

The American Heart Association Guidelines for CPR & ECC are available online at static.heart.org/eccguidelines. A particularly useful document is the *Guidelines Highlights* document at static.heart.org/eccguidelines/guidelines-highlights.html, which summarizes the major changes for 2010.

Using Cardiac Arrest Registry Data to Improve Survival for Victims of Out-of-Hospital Cardiac Arrest

EMS systems were originally designed to provide rapid medical care to the victims of sudden cardiac arrest and major injury.[13] This is the patient population with the most to gain from a high-performing EMS system. How well the EMS system performs for these most challenging patients is an indication of how well the system performs for all patients, even those with minor illness and injury. Tracking survival to hospital discharge for SCA victims is essential to inform the quality improvement process. Careful monitoring of the processes of care such as: the time to first defibrillation; CPR fraction; and the effectiveness of dispatcher CPR instructions, is necessary to allow a critical appraisal of the system. Knowledge of how these and other important system components perform informs the quality improvement process and allows the implementation of strategies for improving underperforming components.

Collecting Data for a Registry

The first step is to begin methodically collecting a minimum set of SCA data in a registry to measure survival rates and system characteristics related to SCA response. Tracking the performance of the EMS system and the victim's outcome requires the EMS agency to collaborate with receiving hospitals to obtain information about survival to hospital discharge for each case. When the information is used for quality improvement measures, hospitals should enthusiastically provide outcome information to the EMS system on an ongoing basis. Receiving hospitals may require a simple data sharing agreement with the EMS agency.

Every EMS system should measure, evaluate, and report its SCA survival rate to the community annually.

EMS systems, with the resources to do so, should maintain more comprehensive data registries to better inform their quality initiatives.

Maintaining an ongoing, accurate, and complete registry for SCA QI requires a minimum of 1 FTE per 1,000,000 population dedicated to the task.[1]

Sources of Data for the Registry

EMS systems often collect a multitude of patient-level information. Determining which pieces of information to use may appear daunting at first. Early adopters of cardiac arrest registries developed a list of essential and optional data elements called the Utstein style, named for the historic abbey in Norway where these pioneers first met.[14] Data for an SCA registry can be obtained from:

1. EMS patient care records
    a. Patient fields: demographic data, location of arrest, witnessed status, bystander CPR
    b. Treatment fields: defibrillation, CPR, medications, IVs, ventilation methods, therapeutic hypothermia
    c. Time fields: restoration of spontaneous circulation, arrival at hospital

2. 911 dispatch information
    a. Treatment fields: dispatcher assisted CPR
    b. Time fields: time of initial 911 call, time EMS/first responders dispatched, time EMS/first responders arrived at location
3. EMS equipment (heart monitor/defibrillators, AEDs, end tidal CO2 monitors)
    a. Patient fields: complete ECG recording including initial rhythm
    b. Treatment fields: time of first defibrillation, CPR quality metrics, ventilation rates, end-tidal CO2 values
4. Hospital medical records
    a. Patient fields: therapeutic hypothermia, emergent diagnostic heart catheterization, emergent percutaneous coronary intervention, emergent coronary artery bypass grafting, implantable cardiovertor defibrillator placement
    b. Patient outcome: admit to hospital, discharge alive, cerebral performance category (CPC) score
    c. Discharge disposition: died, discharge alive to home, discharge alive to rehabilitation, discharge alive to extended care facility (ECF)

Several of the variables noted above may be recorded in multiple locations. When this is so, the most accurate source of data should be used consistently to populate the registry. A complete list of suggested data fields is available online at www.heartrescueproject.org and in the Appendix section of this guide.

Maintain a Consistent Case Definition

The precise definition of a "case" included in the registry is very important. Included cases should follow a standard cardiac arrest case definition to allow benchmarking across systems. Selection criteria for cases that are included in the registry must remain the same over time to allow improvements in survival rates to be tracked accurately.

Historically, cases were excluded from the registry if thorough review of the available medical information revealed a primary cause of the event in a body system outside of the heart.[14] For example, cardiac arrest may be caused by drowning. Cases remaining were most likely due to a primary heart problem; they were of presumed cardiac etiology.

Case Definition for a Prehospital SCA Registry

Cases meeting these criteria should be entered into the registry:

- Out-of-hospital non-traumatic cardiac arrest
- Victim assessed by organized EMS personnel
- Victim received either
    - External defibrillation by lay responders or emergency personnel, or
    - Chest compressions by EMS personnel

There is considerable variation in classification of the cause of OHCA depending upon the resources available to review hospital records and upon the training of the abstractors of the information. For example, with the need to elicit voluntary cooperation from receiving hospital

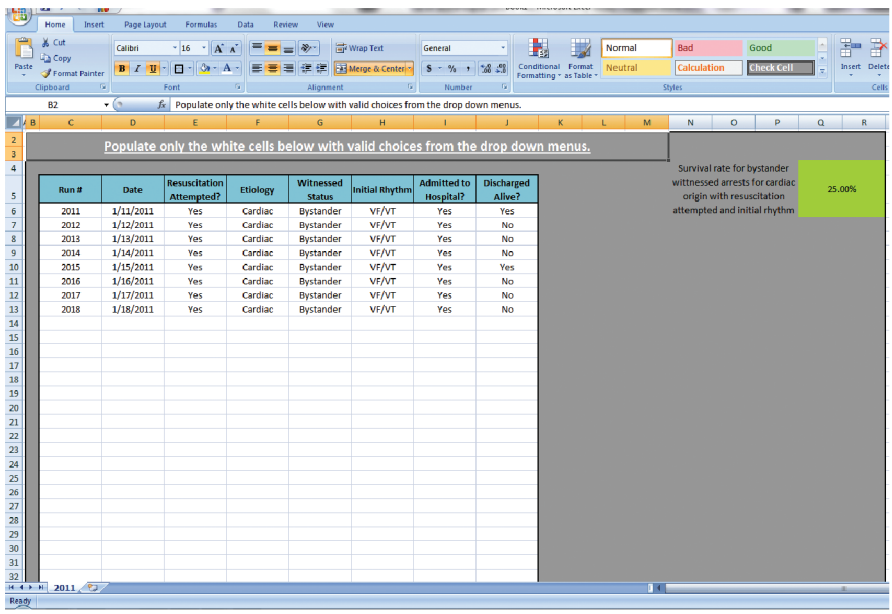
employees, EMS systems may not be able to request thorough hospital chart review to determine the most likely cause of the event. It may be simpler and more consistent to include all cases except those obviously caused by external injury.

A Basic Data Collection Plan

Evaluation of OHCA survival can begin with tracking of just a few critical pieces of information. The most meaningful performance measurement is the rate of survival to hospital discharge for bystander-witnessed, out-of-hospital cardiac arrests that occurred prior to the arrival of EMS, and for which the first recorded cardiac rhythm is ventricular fibrillation. This group of patients serves as the benchmark. They generally have well-documented times of collapse and hearts with an opportunity to respond to rapid defibrillation. They are most likely to survive if the system is working optimally.

Minimum Data Elements Needed to Calculate Witnessed VF Survival Rates

- Cases of bystander-witnessed sudden cardiac arrest, prior to EMS arrival
- Cases with the first recorded rhythm ventricular fibrillation (VF)
- Hospital outcome data to indicate survival status at hospital discharge
- Patient care identifiers to allow linkage of prehospital data and hospital outcome: name, date of birth, EMS call identifier, date of incident, hospital name



Run #	Date	Resuscitation Attempted?	Etiology	Witnessed Status	Initial Rhythm	Admitted to Hospital?	Discharged Alive?
2011	1/11/2011	Yes	Cardiac	Bystander	VF/VT	Yes	Yes
2012	1/12/2011	Yes	Cardiac	Bystander	VF/VT	Yes	No
2013	1/13/2011	Yes	Cardiac	Bystander	VF/VT	Yes	No
2014	1/14/2011	Yes	Cardiac	Bystander	VF/VT	Yes	No
2015	1/15/2011	Yes	Cardiac	Bystander	VF/VT	Yes	Yes
2016	1/16/2011	Yes	Cardiac	Bystander	VF/VT	Yes	No
2017	1/17/2011	Yes	Cardiac	Bystander	VF/VT	Yes	No
2018	1/18/2011	Yes	Cardiac	Bystander	VF/VT	Yes	No

If your EMS system serves a population of 50,000 or less, there are likely fewer than 25 cardiac arrests per year in your system and fewer than 10 bystander-witnessed VF events.

In this case, it may be feasible to enter basic registry items in a spreadsheet format. Go to www.heartrescueproject.com for a link to the VF spreadsheet you can download from the website.

A Registry Plan for Larger Systems

Systems with resources available to assist in collection and evaluation of a moderate amount of data can include additional data elements in their registries. A more comprehensive data collection plan is suggested to enable evaluation of care and implementation of improvements to any system. The HeartRescue program has developed a list of data elements which is available online at www.heartrescueproject.com and in the Appendix.

Hospital Information:

- Receiving hospitals should provide outcome information including survival to admission (yes or no), survival to hospital discharge (yes or no), and if discharged alive, an indication of neurologic status at discharge. The most commonly used scale for measuring neurologic outcome in this population is the cerebral performance category or CPC score (see box). It is widely used because it is relatively simple and can be calculated from information available in the medical record of the patient.

Glasgow-Pittsburgh Cerebral Performance Categories

1. **Good Cerebral Performance**
   Conscious: Alert, able to work and lead a normal life. May have minor psychological or neurological deficits.
2. **Moderate Cerebral Disability**
   Conscious. Sufficient cerebral function for part-time work in sheltered environment or independent activities of daily life.
3. **Severe Cerebral Disability**
   Conscious. Dependent on others for daily support because of impaired brain function (in an institution or at home with exceptional family effort).
4. **Coma, Vegetative State**
   Not conscious. Unaware of surroundings, no cognition. No verbal or psychological interactions with environment.
5. **Death**
   Certified brain dead or dead by traditional criteria.[2]

- Hospitals should also provide information about the process of caring for the patient. They should be asked if therapeutic hypothermia was used as well as if the patient received emergency heart catheterization and intervention. Obtaining these measures allows EMS to provide feedback to hospitals to ensure that they are providing optimal care for the patients they receive.

Ensuring Data Accuracy

One of the major challenges is ensuring that accurate and complete data are collected. There are opportunities to audit information to enhance the reliability of the measurements.

- **Using Incidence to Help Determine Case Ascertainment:** One way to determine whether you have been able to collect all the cardiac arrest cases that have occurred in your geography is to calculate incidence figures. Cardiac arrest incidence is a measure of the risk of developing cardiac arrest within a specified period of time, generally a year. It is commonly expressed as a proportion or a rate per 100,000 population.

  Incidence for SCA has been considered to fluctuate slightly around 55 cases per 100,000 population.

- For example, the incidence reported in the Resuscitation Consortium agencies in 2008 was 52 per 100,000. (*Nichol G, Calloway TE, Hedges J: Regional variation in out-of-hospital cardiac arrest incidence and outcome.* JAMA 2008 Sep 24;300(12):1423-31.)
- The most reasonable way to measure incidence in this case is to use *EMS-treated* out of hospital cardiac arrests.
- If your EMS system serves a population of 100,000, and you have record of 55 cardiac arrests that year, your incidence is 55/100,000.
- If in that same system of 100,000 population, only 25 arrests are recorded, the incidence of 25/100,000 would alert you that you are likely missing many cases in your reporting.

- **Case Ascertainment:** All cases must be accounted for when tracking SCA survival rates. Patients who may be defibrillated once and awaken quickly are sometimes missed in data collection systems. Often, identifying victims who die early is easier than tracking survivors. However, every effort should be used to ensure that there is an outcome (Alive/Dead at hospital discharge) for each individual in the database. Several resources available on the Internet allow such searches including the Social Security Death Index (www.deathindexes.com).
- **Effect of Missing Data**
  - If survivors are missed, the calculated survival rate will be falsely low.
  - If there are many cases missing outcomes, an accurate survival rate cannot be calculated.

Evaluating Survival Data

The Utstein Guidelines provide useful templates for measurement of key aspects of resuscitation care and outcome.[14] The appendix contains 3 templates in the Utstein style for the reporting of annual SCA statistics, which can be completed on an annual basis to calculate a baseline survival rate and which can then be used to compare survival rates for subsequent years.

In addition to using the Utstein template to help determine survival rates, systems can perform the calculations described in **Calculating Annual System Statistics (see page 34)** to obtain additional information pertinent to the care of SCA victims.

Quality Improvement Overview

The quality improvement process relies on valid measurements of resuscitation performance and patient outcome. Examples of core performance measures that can be evaluated in a SCA quality improvement plan include:

- **Response times:** The time required from receipt of the 911 call until the arrival to the patient.
  - This is a measure that can be improved within the agency. Decreasing the time it takes to dispatch a crew to the scene can directly improve survival rates. *All components of the response time should be reviewed.* A plan to decrease delays should be developed and tested.

- **Rate of bystander CPR**
  - Bystander CPR rates can be improved by implementing effective dispatcher CPR instruction programs, and by addressing community awareness and expectations regarding SCA and CPR through media campaigns or educational activities and training.
- **Time from the 911 call to first defibrillation**
  - Once dispatch issues have been addressed as previously described, team configuration and skills training designed to emphasize the importance of early defibrillation can be implemented.
- **Interruptions to chest compression during CPR**
  - The CPR fraction is the percentage of time that compressions are being delivered during the resuscitation. This parameter should reach into the 90% range. Team skills training designed to minimize interruptions to compressions can be implemented using SCA scenarios. Airway and IV placement should be accomplished without major delays in compressions. The CPR fraction can be measured using downloads from the monitor/defibrillator as well as data from skills training sessions using manikins that document these parameters.

Calculating Annual System Statistics from Registry Data

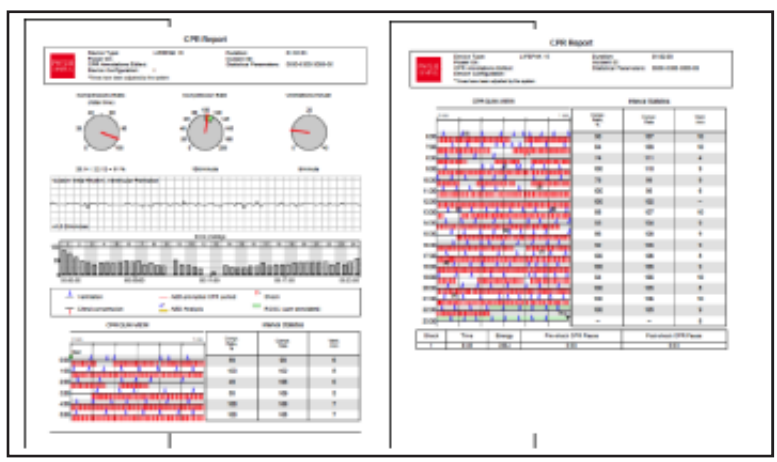
1. **Total Out-of-Hospital Cardiac Arrest (OHCA) Incidence** (#/100,000)
   a. (Cases per 100,000 population)
2. **Population of the area served by the EMS system** (#)
   a. (To enable incidence calculation)
3. **Total (all cases) OHCA Survival to Hospital Discharge** (%)
4. **Presumed OHCA etiology** (%)
   a. (% cardiac, % trauma, % respiratory, % drowning, % electrocution, % other)
5. **VF Incidence** (#/100,000)
   a. (VF cases per 100,000 population)
6. **VF Survival-to-Hospital Discharge** (%)
   a. (# VF survivors/# cases presenting in VF)
7. **CPR response** (%)
   a. (Bystander, family member, fire/police, EMS, medical provider, other)
8. **AED used** (%)
   a. (Yes, No, Present but not used, AED malfunctioned) (%)
9. **ROSC in the prehospital setting** (time, %)
   a. (Time ROSC began or No ROSC) ROSC upon hospital arrival (%)
10. **EMS Induced Hypothermia** (Yes, No) (%)
    a. (Number of patients eligible for the prehospital therapeutic hypothermia (TH) therapy divided by the number of patients who received prehospital TH).
    b. Definition: Prehospital TH eligible patients are those who have achieved sustained ROSC but who remain unconscious in the prehospital setting.
11. **Hospital induced hypothermia** (Yes, No) (%)
    a. (Number of patients eligible for in-hospital TH therapy divided by number receiving in-hospital TH) In-hospital eligible patients = those remaining unconscious but who have achieved ROSC and do not have contraindications to TH therapy).
12. **Overall Cerebral Performance Category score of 1-2** (%)

- **CPR quality and ventilation rate**
  - If these parameters are not collected in the field, skills manikins and/or defibrillators/monitors with CPR accelerometers are available to allow evaluation and improvement in the practice of high quality CPR.
- **Airway management**
  - Success of airway management procedures should be documented and reviewed. Confirmation of airway placement should be confirmed at intubation, upon transport and upon arrival to the emergency department. Skills training using SCA scenarios can be used to address airway management issues.
- **Documentation**
  - Complete documentation of events that occur during the resuscitation should be monitored.
- **Survival to hospital discharge**
  - Hospital discharge is the significant outcome measure and should be evaluated and reported on an annual basis.

Using Electronically Captured Data to Provide Feedback to Rescuers

Monitor/defibrillators now allow documentation of real-time CPR quality indicators, including compression rate and depth (when used with an accelerometer). In addition, ventilation rate can often be assessed; and end-tidal C02 values can be captured when monitor capabilities allow. When the electronic ECG file is downloaded and the data are evaluated using report software, they can calculate the hands-on time (CPR fraction) throughout the resuscitation with some annotation to ensure that the data are correct. Pauses around shocks and other interventions can also be quantified and visualized using the report tool.

While monitor/defibrillators do have the option to allow voice recording, this is a feature that must be added onto the device. Audio files are large, and can be difficult to transfer due to their size. In addition, to fully use them to their advantage, someone must be available to listen to them in real time. Few systems across the US have the capability to do this on an ongoing basis unless they have research or other funding to support the position.



Example of CPR Analytic Report from CodeStat

Examples of some of these programs can be found at the following websites:

- CodeStat Review Software with Advanced CPR Analytics: www.physio-control.com
- RescueNet ePCR: www.zolldata.com/resucenet-epcr/
- Q-CPR Measurement and Feedback Tool: www.healthcare.philips.com

Use of these technologies allows a timely review of CPR metrics with the rescuers. They are useful to quantify interruptions in chest compressions which are frequently encountered while waiting for the defibrillator to charge, and after a shock, when changing rescuers, or when providing other interventions such as intubation or IV placement. Addressing all sources of pauses during a complete review of the case using these available tools can highlight areas for improvement.

While new technologies help us to understand the overall quality of the resuscitation, there are few, if any, controlled studies to inform the precise value of each component. In the near future, as the literature in this field grows, it will be evaluated and translated into informed guidelines to help in decision making regarding technology investments for individual systems.

Among the American Heart Association's 2010 Guidelines for CPR and ECC, there is a new recommendation which states *"Resuscitation systems should establish ongoing systems of care assessment and improvement."* The rational from the AHA on this topic focuses around the lack of understanding about the causes of such extremely divergent regional variation in both the incidence and outcome for SCA. A plea is made for both EMS systems and hospitals to systematically monitor cardiac arrests and outcome and to employ quality improvement measures including feedback, and benchmarking in order to improve performance.

Benchmarking

Benchmarking of SCA survival should be performed internally, using comparisons to prior performance on an annual basis, and externally comparing the system's survival rates to those of similar systems. Ensure that your measurements are made using the standard case definition, and that the other systems, to which you will be compared, use the same standard case definition. Benchmarking results should be shared with all stakeholders in your community.

Because so many factors influence survival outcomes in an EMS system, it is challenging to determine precisely how each affects the resuscitation care process and how they may influence survival in your community. If your system is just beginning to systematically improve SCA survival, take care NOT to benchmark your system immediately against systems like Seattle and Rochester that have reached their excellent survival rates by making incremental improvements steadily for decades. Although these organized and dedicated systems have pushed their survival for witnessed VF cases near to 50%,[15] resuscitation experts agree that improving survival is an iterative process. Any improvements over your systems baseline survival rates will result in additional survivors each year, and will serve as a stepping stone to the next improvement.

Existing Cardiac Arrest Survival Data

Much work has been done to standardize cardiac arrest outcome measures in an effort to facilitate comparisons across EMS systems, states, and regions.[14, 16] Although an SCA registry can be built using proprietary database programs such as Microsoft Access, this requires time and some degree of database development skill. A number of existing EMS data collection systems are in use throughout the U.S. and Canada designed for similar purposes, also adhere to these definitions. Among the most well known are: NEMSIS, ARIZONA SHARE, CARES, and ROC EPISTRY.

The majority of the registries mentioned here have been developed for a specific geographic area or for research. As such, they may not be accepting data. NEMSIS is in use in various degrees of functionality for data collection in most states.

Some EMS systems have anticipated the importance of the SCA registry and have either designed their own database or use a proprietary system. Whichever method is used, it is important that data be collected using standardized methods. There must also be documented, precise definitions for all elements included in the data dictionary. See the Appendix for the HeartRescue Partners data dictionary.

Snapshot of Cardiac Arrest Registries

NEMSIS: National EMS Information System, est. 2001
GOAL: A standardized data submission process useful for improving patient outcomes
NEMSIS DATA: Contains over 400 standardized data elements
WEBSITE: www.nemsis.org

SHARE: Save Hearts in Arizona Registry and Education, est. 2005
GOAL: A statewide quality improvement registry
SHARE DATA: Prehospital and outcome data elements
WEBSITE: www.azshare.gov

CARES: Cardiac Arrest Registry to Enhance Survival, est. 2004
GOAL: Essential data elements for prehospital cardiac arrest
CARES DATA: Documents about 30 data elements and allows reporting and benchmarking
WEBSITE: http://mycares.net

ROC EPISTRY: Resuscitation Outcomes Consortium Epidemiologic Data Registry, est. 2005
GOAL: Data infrastructure for design & implementation of ROC trials
EPISTRY DATA: 17,500 prehospital cardiac arrest cases each year including outcome data
WEBSITE: https://roc.uwctc.org

Public Reporting of Survival Rates to the Community

When an annual survival rate is calculated, it is important to take the crucial step of reporting the results publicly to the community. This provides an excellent opportunity to enlist community members in joining the initiative to improve survival. The method by which communities choose to report their survival data varies, but could include one or more of the following methods: a press release; a written report to the community; publication of survival rates by year in the EMS system's annual report to the city; or by informing the city government leaders.

High-Quality CPR

Training and dedication to quality improvement goals regarding the provision of excellent BLS care are essential for establishing a baseline from which survival can continue to be improved. When excellent basic care is provided by all systems, the wide variations in survival that now exist may be reduced. This will allow a clearer baseline from which the survival impact of additional therapies can be evaluated in the future. Ensuring that high-quality CPR is provided in an EMS system can be approached in a number of ways.

Ongoing evaluation of CPR metrics from SCA cases can provide a quality check on interruptions to compressions, pause times around defibrillation, and other CPR metrics. Implementation of regular training scenarios using manikins that provide feedback on the rate and depth of compressions can be used to improve skills and reduce pause times. Each system should establish a method for ensuring that high-quality CPR is provided as a basic requisite. The Appendix contains a sample review form for CPR Metrics.

While drugs and devices have a place in resuscitation, there is no substitute for excellent basic care. [17] High-quality CPR and early defibrillation are the best tools EMS owns, and the important role of the first responder in delivering this important treatment must also be recognized.

Pit Crew Resuscitation

There has been a fair amount of enthusiasm generated around the concept of *Pit Crew Resuscitation*.

Popularized by Wake County EMS and Austin Travis County's charismatic EMS medical directors, Pit Crew Resuscitation is a highly coordinated, well-rehearsed delivery of excellent basic resuscitation care, accounting for human factors principles and emphasizing the attention to all details of good basic resuscitation skills.

While several configurations have been suggested for choreographing the care of the SCA victim, it is important to remember that the goal is to provide excellent basic care in a consistent manner.

Having a blueprint of predetermined responsibilities for each crew, complete with instructions about where to position oneself can be very useful. But it is not only about assigning roles and expecting performance from the pit crew. EMS professionals recognize that there are unending possible configurations of response to out of hospital arrests, and that the nature of these calls is always highly chaotic and rarely the same as the previous case.

There is a need for flexibility, and a necessary ability to work with whatever resources turn up. Cooperation between agencies is a key concept, the best interests of the patient are only served when territory is not an issue between responding agencies. The ability to work and train with other providers in an effective and efficient manner is the skill that distinguishes EMTs, paramedics, and their agencies in this environment.

Goals

Remember that the goal of having a pit crew approach is to ensure that all priorities are focused upon. The system used should be continuously reassessed and changes made when necessary.

- Limit interruptions to compressions
- Control ventilations
- Defibrillate in a timely manner
- Ensure that compressions are not being given by someone who is fatigued

Training

Training with other responder agencies is essential to ensure that all providers are prepared to work together effectively. In Austin, EMS providers went to the simulation lab to work out the best way to work with their resources.

Below is one pit crew configuration incorporating 5 leaders:

Pit Crew Leader: One who supervises and assigns roles, monitors time, manages crowd control and does not perform patient care duties.

Airway Leader: One who makes airway decisions, performs appropriate airway procedures, communicates with family as needed completes PCR at the hospital.

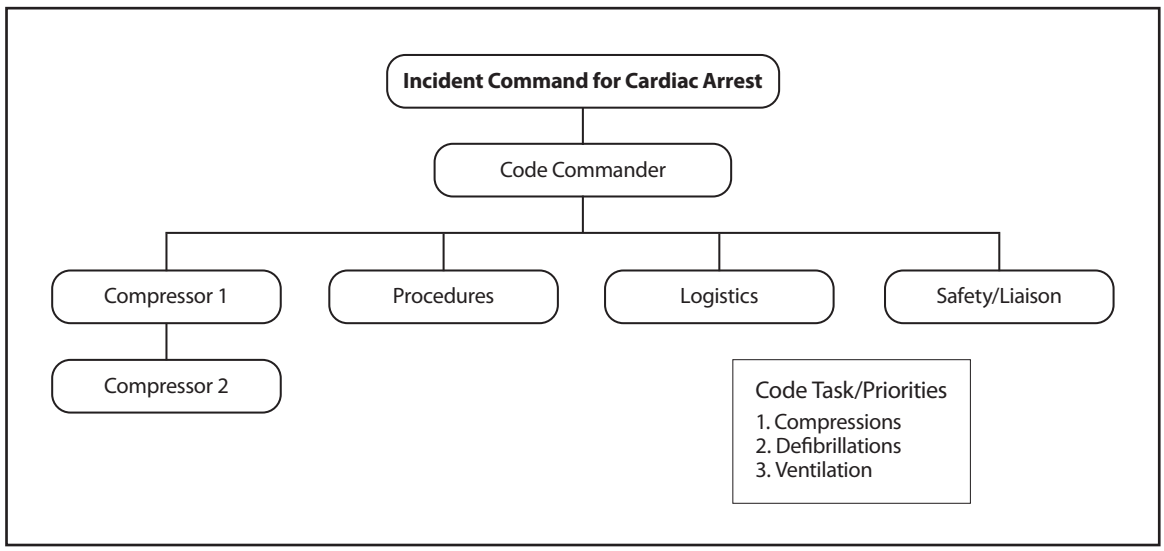
Medication Leader: One who defibrillates, inserts IV or IO, administers or supervises medication delivery, tracks monitor changes.

CPR Chief: One who supervises and performs CPR, assists with medication and equipment setup and performs communications.

Team Assistant: Assists with CPR, communications and equipment setup.

The Chicago EMS and Chicago Fire Department – Incident Command System in Cardiac Arrest Care

The Illinois HeartRescue partners have instituted an incident command system as a tool to address leadership, teamwork and communication challenges in out-of-hospital cardiac arrest care. Incident command systems can provide accountability, improved communication, an orderly planning process, a flexible yet predesigned management structure, as well as a method to integrate interagency requirements into management structure. These are all qualities needed during a well-run resuscitation call.



The Illinois Incident Command for Cardiac Arrest (ICCA) model is adaptable to various compliments of manpower and works with a multi-agency response. The versatility of the ICCA model is guides all providers to focus on key code task/priorities that are all al the BLS level. Role assignments are given based on available manpower present in order of code tasks/priorities, regardless of the level of training or certification.

Roles

In this model, the following roles are established by first arriving personnel in order to ensure code priorities:

Code Commander: The person in charge, usually one of the first on scene. May also be needed to complete code tasks, and as more providers arrive, may remain in command and delegate tasks. Code Commander assesses scene and requests additional resources as needed.

Compressor #1: Charged with performing the first 2 minutes of uninterrupted high-quality chest compressions; may provide early defibrillation as indicated.

Compressor #2: Acts as a coach for Compressor #1 using available monitor data, PETCO2 levels and relieves Compressor #1 after 2 minutes of CPR.

Logistics: This position can be added if there is additional manpower on scene; responsible for medications and equipment, including cot preparation for transport when indicated.

Liaison/Safety: Responsible for controlling the scene. Interfaces with bystanders, documents code record and assists with family need.

Tasks

The code tasks/priorities include:

1. Provision of uninterrupted, high-quality chest compressions at a rate of 100 beats per minute, sharing this responsibility to prevent rescuer fatigue.
2. Provision of early defibrillation without interrupting or delaying CPR during application of pads or charging.
3. Provision of controlled ventilatory management during cardiac arrest. Advanced airway placement is deferred until chest compressions (priority #1) and defibrillation (priority #2) are satisfied. Ventilation rate is 8 per minute. ETCO2 is mandatory for confirmation of tube placement, monitoring chest compression quality and for watching for ROSC.

Training

In Chicago, the training for the ICCA session includes a one hour didactic and video session. A separate three-hour hands-on rotation through the CFD simulation training center allows small group scenarios to be enacted. Video debriefing is used for performance improvement. A companion ICCA course for dispatchers, ICCA-EMD, emphasizes the importance of rapid recognition of cardiac arrest, pre-arrival instructions on chest compression-only CPR and increased awareness of manpower and resources for in-field EMS providers delivering cardiac arrest care. This course also provides strategies and techniques to help address bystander uncertainty, panic, fear, poor confidence, concern for liability or causing harm, and reluctance to perform mouth-to-mouth. Through video, audio and simulation, ICCA-EMD emphasizes the critical role emergency telecommunicators have though the bystander and EMS links in the chain of survival. A CQI component is currently underway using monitor defibrillator software, capnography and cardiac arrest survival statistics including survival to hospital discharge.

EMS Use of CPR Devices

The American Heart Association has published *Highlights of the 2010 AHA Guidelines for CPR and Emergency Cardiovascular Care*, which includes statements addressing the use of CPR devices. The statements can be read in their entirety in the highlights document available at static.heart.org/eccguidelines/guidelines-highlights.html. Regarding the use of CPR devices, the summary statement from the AHA 2010 Guidelines Part 7. CPR Techniques and Devices states "To date, no adjunct has consistently been shown to be superior to standard conventional (manual) CPR for out-of-hospital basic life support, and no device other than a defibrillator has consistently improved long-term survival from out-of-hospital cardiac arrest. A variety of CPR techniques and devices may improve hemodynamics or short-term survival when used by well-trained providers in selected patients. All of these techniques and devices have the potential to delay chest compressions and defibrillation. In order to prevent delays and maximize efficiency, initial training, ongoing monitoring, and retraining programs should be offered to providers on a frequent and ongoing basis".

Dispatcher Assisted CPR Instructions

EMS systems that have carefully reviewed their survival data in relation to the time it takes to reach the patient have rediscovered the important influence of starting CPR early. Implementing system changes that shave seconds from the dispatch process in order to get EMS to the patient faster and which result in a shorter time to defibrillation, can improve survival from cardiac arrest.

When 911 call takers are trained to provide assertive compression-only CPR telephone instructions, victims benefit from improved survival in large part due to this bystander CPR. A well-monitored program of dispatcher-assisted CPR can significantly raise bystander CPR rates is your community. [18-19] These changes are easily measured and monitored, and can be implemented by any system with few resources. An example of a quality improvement review that can be used to evaluate and improve dispatcher assisted CPR effectiveness is provided in the Appendix.

Providing effective dispatcher CPR instructions is the most effective way to increase bystander CPR rates which can subsequently improve survival rates. While providing community training is a good activity, and is a major avenue for promoting awareness of cardiac arrest, training a majority of individuals in your community is expensive, time consuming and it is a long shot that they will ever need the skill.

911 dispatchers can effectively coach bystanders through CPR, particularly now that compression-only CPR is encouraged. Many resources are available to both educate and evaluate dispatcher assisted CPR programs, and some of the best can be found at the Arizona Share website: http://www.azdhs.gov/azshare/911/academy.htm. The Arizona Share program offers "Dispatch Academies" designed to deliver a sound introduction to SHARE's 9-1-1 CPR Program through presentations and workshops. Registration is free and courses are held regularly at the Arizona State Laboratory in Phoenix.

Risks of Receiving Unneeded CPR

Understandably, the aggressive use of dispatcher assisted CPR can result in the provision of CPR to some victims who did not need it. Because the risks to a patient from unnecessary CPR were unknown, Dr. Tom Rea and his colleagues in King County studied this issue and subsequently published an excellent article in Circulation in 2010. The study demonstrated that the frequency of serious injury related to dispatcher-assisted bystander CPR among non-arrest patients was very low. When coupled with the established benefits of bystander CPR among those with arrest, these results support an assertive program of dispatcher-assisted CPR.

In the study, among 1700 patients who received dispatcher-assisted CPR instructions, 18% (313 of 1700) were not in arrest but received bystander chest compressions. Among those with complete outcomes available (297), 12% (29 of 247) experienced discomfort, and 2% (6 of 247) sustained injuries likely or possibly caused by bystander CPR. Only 2% (5 of 247) suffered a fracture, and no patients suffered visceral organ injury. [19]

Therapeutic Hypothermia (Targeted Temperature Management)

The use of mild therapeutic hypothermia, also called Targeted Temperature Management (TTM) for victims of SCA who have been resuscitated but who remain unresponsive has been recommended since 2002.[20-22] TTM is defined as cooling the body to 32-34 degrees C for 12-24 hours after resuscitation from SCA. Mild hypothermia has been shown to confer a survival benefit for patients who first presented in VF when provided up to six hours after the arrest.[21] In addition, there is now a small amount of evidence that SCA victims with other presenting rhythms may also benefit.[7]

Existing knowledge of reanimation [23] demonstrated higher survival and better neurologic outcome.[21] This result along with studies demonstrating the feasibility of providing TTM in the prehospital setting [20, 24] prompted TTM use by a few EMS systems. Recent clinical studies show that prehospital cooling using ice-cold saline can lower core temperatures by 0.8 to 1.0 degree C on emergency department arrival, but these studies did not find any survival benefit from initiation of TTM in the field.[24-25] Initiating TTM prior to ED arrival has served as an impetus for hospitals to develop TTM protocols, and as a reminder to hospital personnel to consider continuing the therapy.

While it would seem logical that providing hypothermia therapy as early as possible following ROSC would improve neurological outcome, available data suggest that there is not a large clinical effect from instituting cooling in the prehospital setting following restoration of circulation.[26] Additional clinical studies may improve current strategies for delivering hypothermia and better define the optimal rate of cooling induction, duration of cooling, determination of appropriate target temperatures, and perhaps, individual patient variables.[24-25, 27]

Cooling Methods

In the prehospital setting, core temperatures can be reduced by 0.8 to 1.0 degree C with the rapid infusion of cold saline following ROSC.[25] Using either interossious infusion or a large bore IV, a large amount of fluid, 30-40 ml/kg, can be infused in a short time. Saline can be kept cold in the ambulance using low tech methods such as storage in a cooler packed with ice. An inexpensive "plug in" cooler can also be used to ensure that the saline is always cold.

Prehospital protocols sometimes recommend the use of a paralytic during infusion. Paralytic agents are considered during the provision of in-hospital TTM if the patient is counteracting the cooling process by excessive shivering during the induction phase. Due to the usually short transport times to the hospital, and the added complexity of managing and monitoring a paralyzed patient, it is not necessary to use a paralytic for the induction of prehospital therapeutic hypothermia.

There may be other methods of cooling currently used in the prehospital setting. Cooling blankets and ice packs have been used, however, these are slow to produce a change in body temperature and, therefore, not very useful in the prehospital setting. More complex devices such as body cooling bags may be available, however, they are not widely used. Rapid infusion with cold saline provides a quick, safe, and simple method of decreasing core temperature in the prehospital setting.

It is essential that the EMS system providing TTM has predetermined that the destination hospital has adequate resources to continue the hypothermia therapy begun in the field as well as the other supportive care needed during the post-resuscitation phase.[7]

While still considered controversial, there are EMS systems that provide intra-arrest cooling for all cardiac arrest resuscitations. This simplifies decision-making about who is eligible and increases the chance that an eligible subject will receive the treatment. To do this simply, some systems have opted to use cold saline as their primary resuscitation fluid.

Therapeutic Hypothermia Resources

The University of Pennsylvania has maintained a resource packed website with regard to many aspects of both in-hospital and out-of-hospital hypothermia therapy. Multiple examples of prehospital protocols and references are available at http://www.med.upenn.edu/resuscitation/hypothermia/. The University of Pennsylvania resuscitation experts have been offering workshops at various locations around the country to help both EMS and hospital personnel to establish targeted temperature management programs.

Order sets and algorithms for Minnesota Heart Institute partner hospital are available on the website maintained by the Abbott Northwest Hospital Minneapolis Heart Institute and can be found at http://www.mplsheart.com/Professionals/EmergencyProtocols/TherapeuticHypoCardiacArrest.aspx.

EMS Support and Direction for Community Initiatives

CPR and AED Programs and Training

Most EMS systems serve as a point of contact for members of the public who request CPR training. EMS systems with systems in place to offer this training have the opportunity to step up their offerings to the community by providing more frequent training sessions, and by incorporating compression-only CPR and AED training.

Automated External Defibrillators

The 2010 AHA Guidelines for CPR and ECC recommend the establishment of AED programs in public locations where there is a relatively high likelihood of witnessed cardiac arrest (airports, casinos, sports facilities). To maximize the effectiveness of these programs, it is important that programs include a high degree of organizing, planning, and training as well as establishment of a link with the EMS system.

The local EMS Medical Director is often the primary resource consulted about the feasibility and implementation details of community AED programs. As the medical director, there are several things that you can do to facilitate community programs. Many useful resources can be found at http://www.physio-control.com/learning/pad/how-to.aspx?id=2260&terms=AED%20program%20implementation.

- Provide information to community members about what an AED plan should entail.
- Encourage the reporting of AED placements and their use to EMS, and put a system in place for management of this information.
- Provide information about how to purchase and how to place an AED for public use.
- Incorporate AED location documentation in Fire Department building inspections.
- Celebrate survival successes annually and encourage support groups, EMS Week celebrations or on Valentine's Day. Go Red for Women Day (goredforwomen.org) and Heart Month are all good times for getting the message out about SCA awareness, AED placement, and CPR training.
- Collaborate with other agencies in your community (police departments, shopping mall security, schools and universities) to serve as a resource and ensure that a consistent public access defibrillation plan is followed by all in the community.

Appendix

HeartRescue Partners Program Evaluation Case Definition and Data Elements

This list is not exclusive. States participating in the HeartRescue Project Partners program are encouraged to collect additional information with the goal of improving cardiac arrest survival. Some of these additional data elements are included as optional items on this list.

Case Inclusion Criteria

- Out-of-hospital **non-traumatic** cardiac arrest
- Patient assessed by organized EMS personnel
- Patient received either:
  - External defibrillation by lay responders or emergency personnel
  - Chest compressions by EMS personnel (includes all levels of EMS: Basic EMT, Fire, ALS, and Police that are asked by the 911 center to respond to the cardiac arrest)

Case Data Elements

Table of system level data elements

Item	Element
1	Population of the area served by the EMS systems participating in the Medtronic Flagship Program (2010 census most likely source)

Table of case level data elements

Item	Element
2	Unique case identifier
3	Census tract ID
4	Date and time of initial 911 dispatch (dd/mm/yyyy hh:mm)
5	Presumed arrest etiology
	Cardiac
	Drowning
	Electrocution
	Respiratory
	Trauma
	Other
6	Age in years
7	Year of arrest event

Item	Element
8	Incident state
	AZ
	CA
	MN
	NC
	PA
	SD
	WA
9	Incident county
10	Witnessed arrest
	Yes
	No
	Unknown
11	Arrest after 911 arrival
	Yes
	No
	Unknown
12	Resuscitation attempted by 911 responder and/or shock delivered by an AED before 911 responder arrival
	Yes
	No
	Unknown
13	Bystander CPR provided
	Yes
	No
	Unknown
14	Dispatcher CPR instructions provided
	Yes
	No
	Unknown
15	Who initiated CPR
	EMS
	Family member
	First responder (Fire/Police)
	Lay medical provider
	Other
	Unknown

Item	Element
16	Date and time of first CPR (dd/mm/yyyy hh:mm)
17	Bystander CPR type
	Compression and ventilation
	Compression-only
	Ventilation only
	Unknown
18	AED or manual defibrillator applied prior to EMS arrival
	Yes, with defibrillation
	Yes, without defibrillation
	No
	Unknown
19	AED used at any time
	Yes
	No
	Present, but not used
	AED malfunctioned
	Unknown
20	Who first defibrillated the patient?
	Bystander, not family member
	EMS
	Family member
	First responder (Fire/Police)
	Lay medical provider
	Not applicable
	Unknown
21	If first responder defibrillated the patient, was that responder a police officer?
	Yes
	No
	Unknown
22	Date and time of first EMS personnel arrival at scene (dd/mm/yyyy hh:mm)
23	Date and time of ALS arrival at scene (dd/mm/yyyy hh:mm)
24	Date and time of first 911 responder shock (dd/mm/yyyy hh:mm)

Item	Element
25	Initial arrest rhythm of patient
	Ventricular fibrillation
	Ventricular tachycardia without pulse
	Pulseless electrical activity (PEA)
	Asystole
	Unknown shockable
	Unknown not shockable
	Missing
26	Type of EMS resuscitation protocol used
	2005 AHA Guidelines
	2010 AHA Guidelines
	Cardiocerebral resuscitation
	Other
	Unknown
27	Any prehospital ROSC for at least 30 seconds
	Yes
	No
	Unknown
28	Return of spontaneous circulation (ROSC) upon ED arrival
	Yes
	No
	Unknown
29	EMS induced hypothermia
	Yes
	No
	Unknown
30	Prehospital 12-lead ECG acquired
	Yes
	No
	Unknown
31	Prehospital 12-lead ECG has STEMI
	Yes
	No
	Unknown

Item	Element
32	ITD used
	Yes
	No
	Unknown
	If yes, select how:
	Face mask
	Endotracheal tube
33	Mechanical CPR device used
	Yes
	No
	If yes, please specify:
	a. Active Compression Decompression (LUCAS)
	b. Load-Distributing Band (AutoPulse)
	c. Mechanical Piston (Thumper)
	d. Other
34	Out-of-hospital disposition
	911 did not attempt resuscitation
	Resuscitation terminated at scene
	Transported to hospital
35	Date and time of ED arrival (dd/mm/yyyy hh:mm)
36	Hospital 12-lead ECG has STEMI or STEMI equivalent
	Yes
	No
	Unknown
37	Did the patient undergo coronary angiography?
	Yes
	No
	Unknown
38	Date and time of angiography (dd/mm/yyyy hh:mm)
39	Admitted to hospital
	Yes
	No
	Unknown
40	Was hypothermia care initiated or continued in the hospital?
	Yes
	No
	Unknown

Item	Element
41	Percutaneous coronary intervention (PCI) performed?
	Yes
	No
	Unknown
42	Coronary artery bypass graft surgery (CABG) performed?
	Yes
	No
	Unknown
43	ICD placement
	Yes, implanted during initial hospitalization
	Not yet, but documented plan for ICD placement after initial hospital discharge
	No
	Unknown
44	Was a DNR order initiated for the patient?
	Yes
	No
	Unknown
45	Date and time of first DNR order (dd/mm/yyyy hh:mm)
46	Final hospital diagnosis of acute myocardial infarction
	Yes
	No
	Unknown
47	Survival to hospital discharge
	Yes
	No
	Unknown
48	Overall Cerebral Performance Category score at hospital discharge
	1
	2
	3
	4
	5
	Unknown

SCA Registry Documentation

The purpose of these forms is to track progress of data entry into the registry, and to provide both a summary and a mechanism for checking case ascertainment and progress of QI review.

SCA Volume by Month (Useful for ensuring all cases are included)

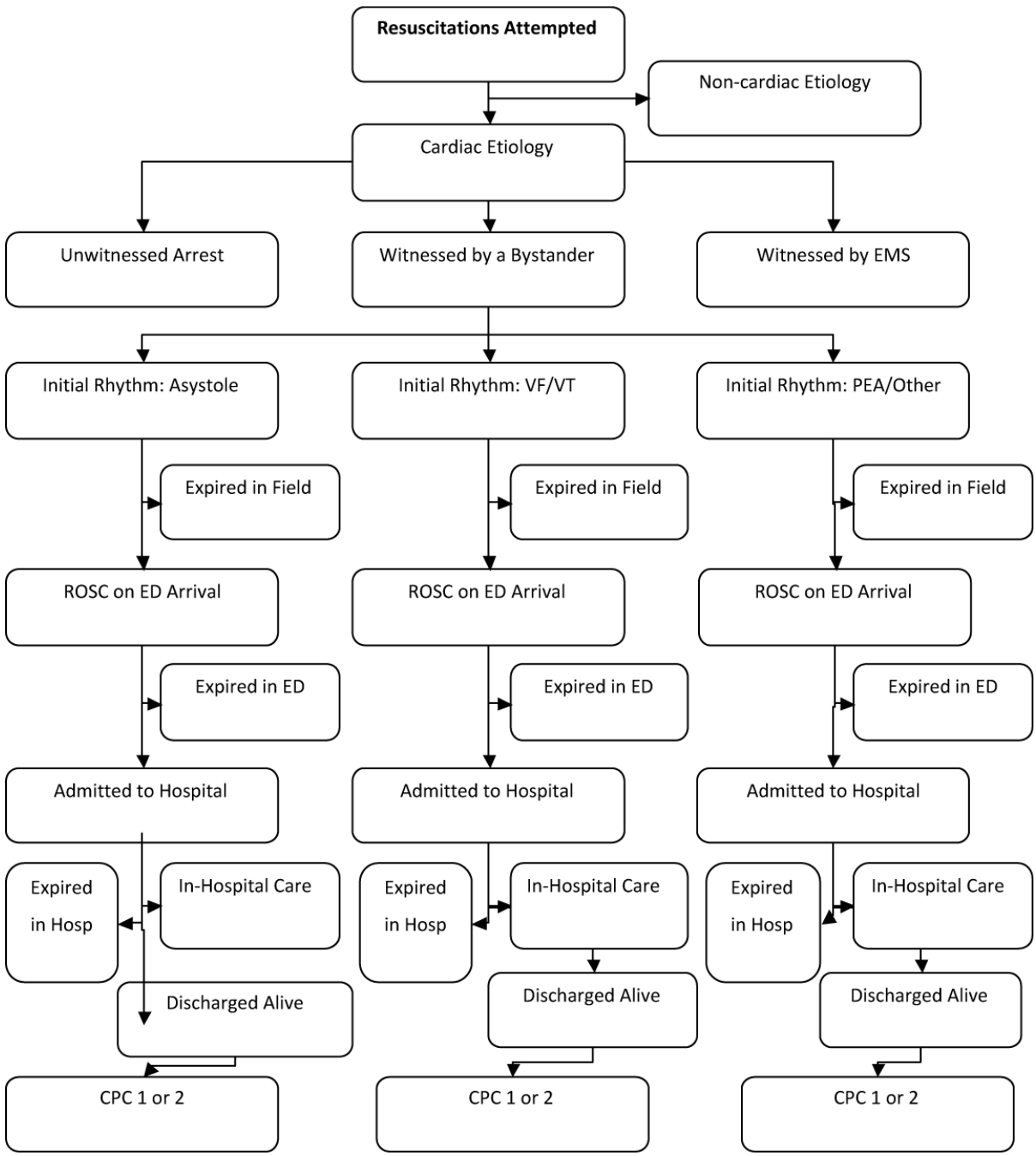
Report the number of cases included in the registry each month.

Month / Year	# Total Cases	# VF Cases	# Cases with Complete Data	# Cases reviewed by QI personnel
/				
/				
/				
/				
/				
/				
/				
/				
/				
/				
/				
/				

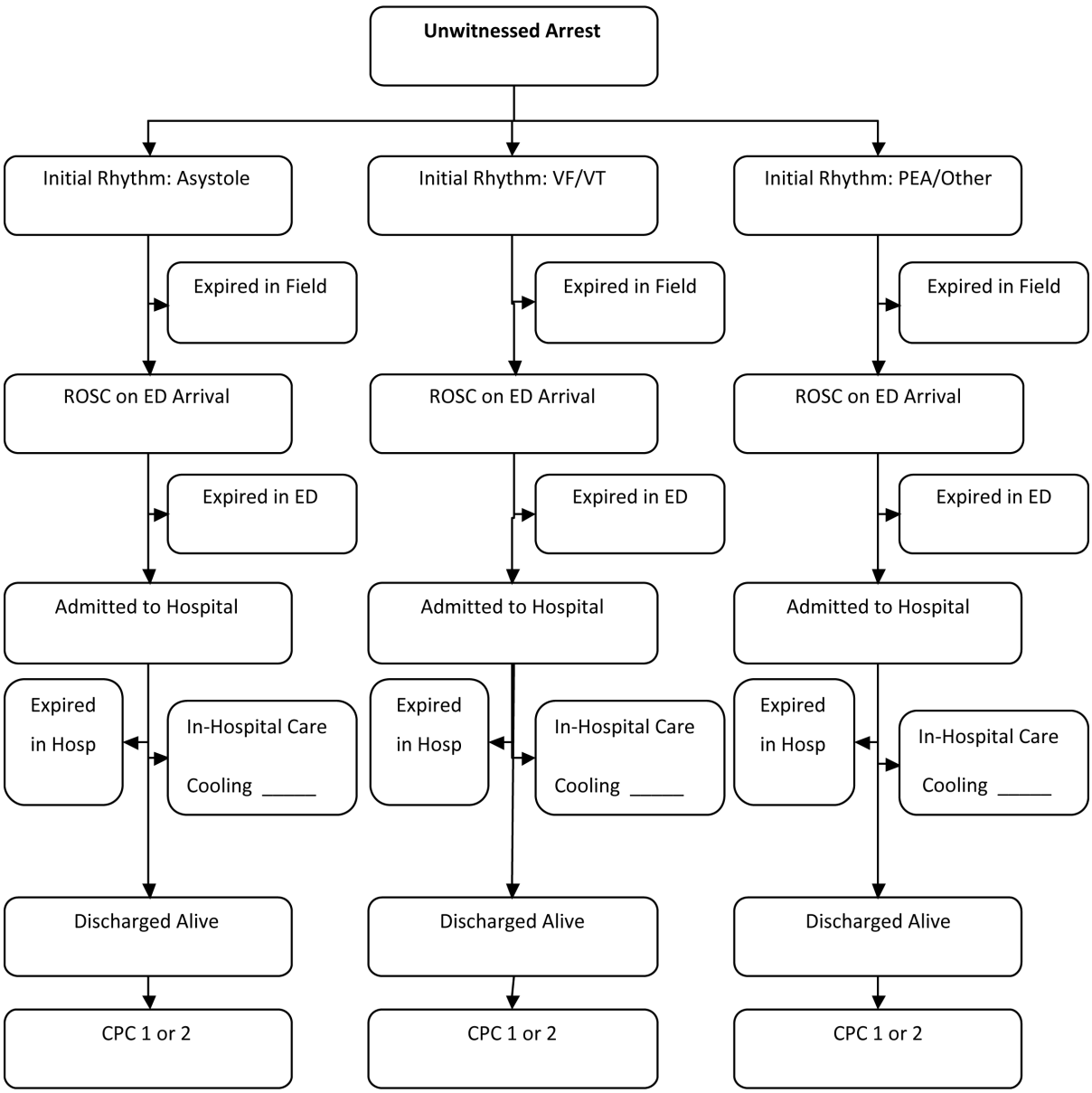
SCA Outcome Reports in the Utstein Style

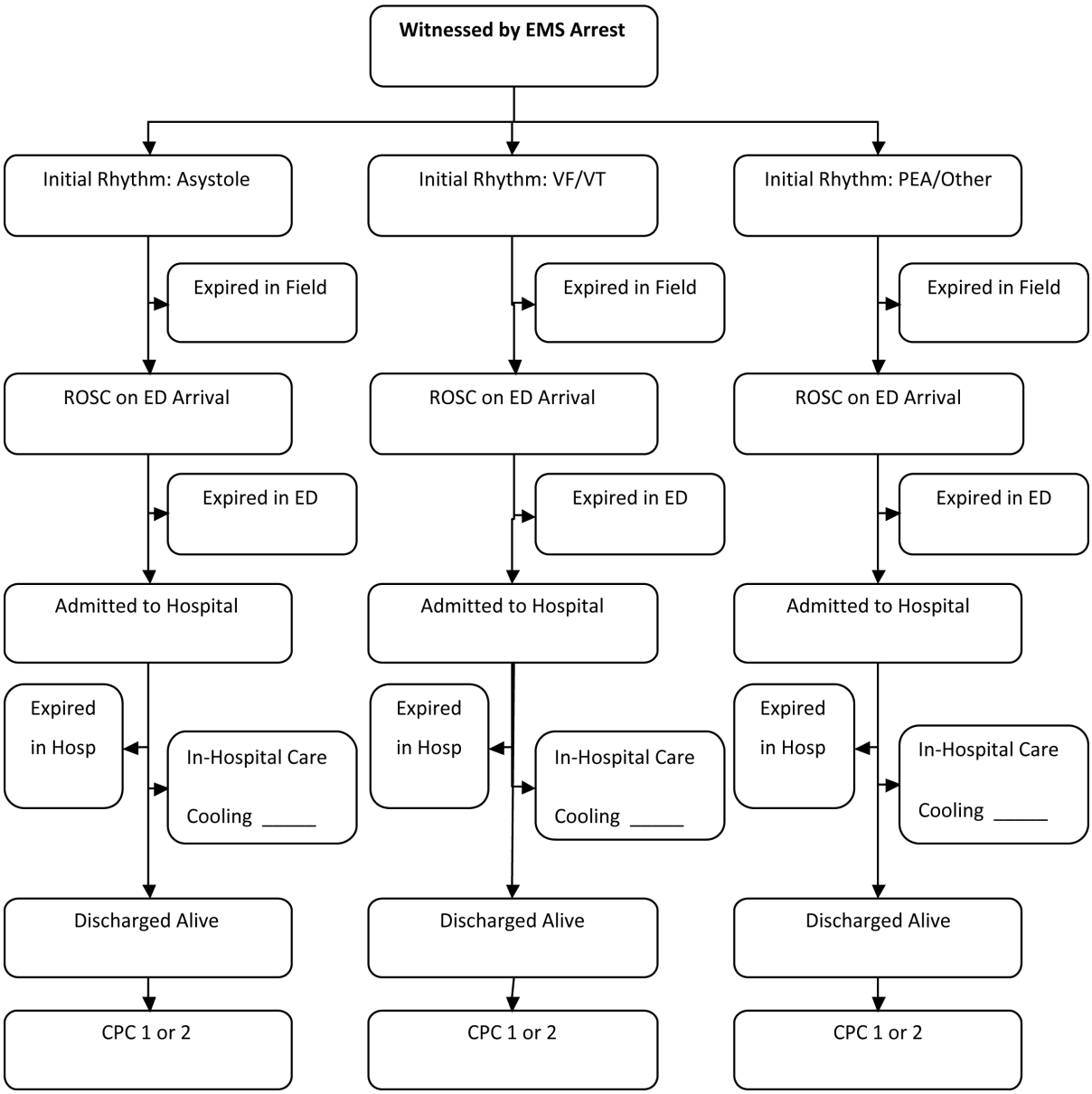
Data reported in the following forms should be limited to cases with a resuscitation attempt by 911 responder and/or a shock delivered by an AED before 911 responder arrival and include only cases with a cardiac etiology.

Report Start Date _____/_____/_____ Report End Date _____/_____/_____



Report Start Date _____/_____/_____ Report End Date _____/_____/_____




Witnessed by EMS Arrest
Initial Rhythm: Asystole
Initial Rhythm: VF/VT
Initial Rhythm: PEA/Other
Expired in Field
Expired in Field
Expired in Field
ROSC on ED Arrival
ROSC on ED Arrival
ROSC on ED Arrival
Expired in ED
Expired in ED
Expired in ED
Admitted to Hospital
Admitted to Hospital
Admitted to Hospital
Expired in Hosp
In-Hospital Care
Cooling _____
Expired in Hosp
In-Hospital Care
Cooling _____
Expired in Hosp
In-Hospital Care
Cooling _____
Discharged Alive
Discharged Alive
Discharged Alive
CPC 1 or 2
CPC 1 or 2
CPC 1 or 2

Prehospital Cardiac Arrest Quality Improvement Review

TO: EMS Crew Member (name) _____ Unit ____

FROM: _____

RE: EMS Run #_____
Date of Incident: _____ Incident Address: _____
Date of Review: _____ Reviewer: _____

Documented Initial Rhythm _____ Analyzed Initial Rhythm _____

Y	N			Monitor in PADDLES mode during CPR
Y	N	N/A	Unk	Turned on monitor immediately upon arrival at patient
Y	N	N/A	Unk	If in VF, initial 120 (90-150) seconds of CPR performed
Y	N	N/A	Unk	Compression pauses < 10 seconds prior to each defibrillation
Y	N	N/A	Unk	Documented presence or absence of bystander CPR
Y	N			Capnography was used and documented

Benchmark

PARAMETER	THIS EVENT		GOAL
% time chest compressions ongoing during arrest	%		80%
# pauses in chest compressions > 10 seconds	Pre Shock	Post Shock	0
Average ventilation rate (per minute)			6-8/min or titrated to PETCO2
Average chest compression rate (per minute)			100
Capnography reading during arrest	First	Last	30-45 mm Hg
Transported under CPR			No
Pulse present upon ED arrival?			Yes

Comments from Crew:

_____
_____
_____
_____

Comments from Reviewer:

_____
_____
_____
_____

This document is privileged, confidential, exempt from disclosure, and protected. Do not redisclose.

Example 1: Bystander CPR Pre-Arrival Instructions Call Review Sheet

(ALL TIMES IN MILITARY FORMAT using hh:mm:ss)

Date of call: _____ / _____ / _____ **Run number:** _____

Time of E911: ____:____:____

Time call received: ____:____:____

Time first responders dispatched: ____:____:____

Initial call type: _____

Did the call type change during the incident? ❑ Yes ❑ No

If yes, what was the final call type: _____

Patient's age: _____ Years

Patient's gender: ❑ Male ❑ Female

Patient location:

❑ Home/Residence	❑ Public Building	❑ Street/Hwy
❑ Nursing Home	❑ Residence/Institution	❑ Physician Office/Clinic
❑ Educational Institution	❑ Unknown	❑ Hospital
❑ Recreation/Sport	❑ Industrial Place	❑ Jail
❑ Airport	❑ Other _____	

Caller's gender: ❑ Male ❑ Female

Caller's relationship to patient:

❑ spouse/companion	❑ sibling	❑ son/daughter
❑ parent	❑ friend/acquaintance	❑ other family
❑ medical provider	❑ other non-family	❑ unknown

Did the caller state victim appeared dead? ❑ Yes ❑ No

Did the caller state victim appeared blue? ❑ Yes ❑ No

Did the caller state victim felt cold? ❑ Yes ❑ No

Did the caller state CPR was already initiated? ❑ Yes ❑ No

Did the dispatcher ask if the victim was responsive? ❑ Yes ❑ No ❑ N/A *(already stated by caller)*

Did the dispatcher ask if the victim was breathing? ❑ Yes ❑ No ❑ N/A *(already stated by caller)*

If the victim was breathing, did the dispatcher ask if the victim's breathing was normal?
❑ Yes ❑ No ❑ N/A *(victim not breathing)*

How did the caller describe the victim's breathing? _____

Did caller describe snoring (agonal) breathing? ❑ Yes ❑ No

Was the caller alone with the patient? ❑ Yes ❑ No ❑ N/A *(unknown)*

Caller states bystander has training in CPR (e.g. medical professional, EMT): ❑ Yes ❑ No

Was the patient determined to have obvious death? ❑ Yes ❑ No

If the patient was determined to be dead, did the dispatcher instruct the caller to stop all resuscitation procedures? ❑ Yes ❑ No ❑ N/A

Did the dispatcher state "I am going to help you do CPR until help arrives. Listen carefully. I'll tell you exactly what to do."?

❑ Yes ❑ No **If no, what did dispatcher say:** _____

_____

_____

Did the dispatcher ask if there was an AED at the location? ❑ Yes ❑ No

If yes, did the dispatcher instruct the caller to apply the AED? ❑ Yes ❑ No ❑ N/A

Did the caller state that an AED was already in use? ❑ Yes ❑ No

Assign emotional content of caller:	**Beginning of call**	**End of call**
Uncontrollable, hysterical	_____	_____
Yelling, not listening, uncooperative	_____	_____
Moderately upset, but cooperative	_____	_____
Anxious, but cooperative	_____	_____
Normal conversational speech	_____	_____

What was the presumed cause of the cardiac arrest? *(pick one)*

❑ Cardiac ❑ Trauma ❑ Respiratory ❑ Drowning ❑ Electrocution ❑ Other _____

Record the time for each task, as directed by the dispatcher

Task	**Time** *(minutes into the call)*
___ 1 Check for breathing	_____:_____
___ 2 Move patient to hard surface	_____:_____
___ 3 CPR landmarks	_____:_____
___ 4 Perform compressions	_____:_____
___ 5 Arrival of first responder	_____:_____

Were there any delays in following the pre-arrival instructions? ❑ Yes ❑ No

If yes, describe: _____ Caller refused to perform actions

_____ Chronic physical limitations of caller (e.g., cannot walk)

_____ Acute physical limitation of the caller (e.g., vomiting)

_____ Emotional state of caller

_____ Disagreeable patient characteristics (e.g., vomit or odor)

_____ Presence of agonal breathing

_____ Medical legal concern

_____ Other: _____

Did the rescuer perform chest compressions (complete direction 10)? ❑ Yes ❑ No

If yes, time chest compressions began _____:_____

Did rescuer continue to follow the instructions until EMS arrived in the house (e.g., did they continue compressions even when they heard the siren)?

❑ Yes ❑ No ❑ N/A ❑ Unknown

Time call ended _____:_____

Survival Data can be abstracted from EMS records, if available.

Example 2 : Dispatcher Assisted CPR Tape Review & Evaluation

This document is for Quality Review purposes only. Not for general distribution. Exempt from discovery.
(RCW 43.70.510)

Dispatch Center _____

Dispatcher _____

Instructions Offered _____

Instructions Accepted _____

Basic Information

Pt. ID# _____

Incident Date _____

Time of Call _____

Incident Number _____

Chief Complaint _____

LEP indicated on CAD _____

If no, should it have been? _____

If yes, was language line used? _____

Need for CPR

Was the need for CPR determined early?	YES ____	NO ____	UNKNOWN ____
CR proceeded with instructions without delay?	YES ____	NO ____	UNKNOWN ____
Were DACPR instructions given appropriately?	YES ____	NO ____	UNKNOWN ____
Was the pace of CPR adequate? If no, was it corrected? _____			
Were agonals present?	YES ____	NO ____	UNKNOWN ____
Described by RP	YES ____	NO ____	UNKNOWN ____
Recognized by dispatcher	YES ____	NO ____	UNKNOWN ____
Heard on tape	YES ____	NO ____	UNKNOWN ____

Comments:

_____

_____

_____

_____

Back to the Basics of CPR

Chest Compressions

- Start chest compressions immediately.
  - Continuous, good quality compressions improve survival. Keep pauses to an absolute minimum and < 10 seconds.
- Give compressions at a rate of 100/min.
  - Often compressions are too fast
  - Keep between 80-100 per minute
- Switch rescuers every two minutes.
  - No exceptions; everyone's compressions deteriorate.
- Do not stop compressions
  - Start IV, intubate, during compressions
  - Use PETC02 to evaluate quality of CPR and to watch for ROSC

Defibrillation

- Both pre and post defibrillation pauses are be detrimental.
  - Charge the defibrillator while providing chest compressions.
  - Do not shock during chest compressions, despite what you've heard about gloves, it is dangerous.
- Resume chest compressions immediately following defibrillation. Do not check for pulse. Check for rhythm change after at least two minutes have passed.
  - Successful defibrillation will reset the heart to Asystole before resuming a perfusing rhythm. Continued chest compressions may increase chance of developing a rhythm and won't hurt the patient.

Ventilation

- Agonal breaths are a sign that the brainstem is still reflexive; patients may have the best chance of survival.
- Each breath given by positive pressure decreases blood flow to the brain.
  - Air pushed into the chest temporarily prevents refilling of the heart
- Goal is to maximize 02 delivery.
  - More ventilation/02 is NOT better.
- Give no more than two breaths after 30 compressions while the patient is in arrest or if patient has a SBP <70 mm Hg.
  - Keep ventilations at 6-8 per min unless using ETCO2 to titrate breaths. Use the waveform on the monitor: keep ETC02 35-45 mm Hg.
  - Spikes in ETC02 may indicate ROSC
  - Hyperventilation decreases ETC02
  - Sodium Bicarb increases ETC02

Monitor/Defibrillator

- Consider whether or not to use the defibrillator in the AED mode, this may increase pause time around shocks.
- To allow CPR analytics with LP 12 or 15, put monitor in PADDLES lead.
- If using a LP 15, or other monitor with this function, use the metronome.
- Display the ETC02 Waveform on the monitor.

High-Impact Conditions for Which EMS has the Capacity to Profoundly Impact Outcomes

EMS services provide high-impact acute care for illness and injury throughout the United States. According to the AAA, there were 840,699 EMS personnel in the US in 2007. The patients these providers care for can present with high-impact conditions, such as cardiac arrest and trauma; conditions for which the EMS system was originally developed. In recent years, much new evidence has accumulated to inform and guide the care and treatment for SCA victims. Some notable examples are below.

Resuscitation From Sudden Cardiac Arrest

Sudden cardiac arrest is one of the two conditions for which EMS systems were originally designed. Successful resuscitation for patients in cardiac arrest requires a systems approach. Because of its extreme emergent onset and limited window for intervention, successful systems must develop an integrated, community-wide system of care, beginning with bystander care and continuing through coordinated care in the hospital.

Bystander CPR and AED Use

Bystander CPR can triple a victim's chance of survival, and is crucial to the patient's viability while EMS is en route.

Dispatcher Assisted CPR Instructions

Dispatch systems should provide effective just-in-time compression only CPR instruction over the phone to bystanders who access the 911 system.

High-Quality CPR

EMS system personnel must work together using the most evidence-based approach to provide circulation and perfusion during the EMS encounter. Current literature supports the strict limitation of pauses in chest compressions and the use of a system to ensure that rescuers provide high-quality CPR (Pit Crew Resuscitation strategies).

Resuscitation Medications

Currently, there is no evidence to support the use of drugs for resuscitation, but some medications may be necessary to stabilize patients following return of spontaneous circulation and in the light of the current emphasis on circulation and perfusion, use of the standard resuscitation drugs should be re-evaluated.

Use of the Cardiac Monitor/Defibrillator

The cardiac monitor/defibrillator is essential to monitor cardiac rhythm, and to provide defibrillation therapy which can be successful for up to 52% of patients with an initial rhythm of VF. Following ROSC patients may be continuously monitored to watch for rearrest, and also to detect any myocardial infarction that may develop.

Feedback Devices

To date, real-time feedback devices have not been demonstrated to improve survival and may distract crews from attending to the patient.

Endotracheal Intubation

Endotracheal intubation has taken a secondary role to compressions, what was previously termed the ABCs (Airway, Breathing, Circulation) has been re-emphasized as CAB (Circulation, Airway, Breathing). Intubation is a difficult clinical skill, one for which EMS personnel do not generally receive enough practice, and so, it must be performed carefully.

Capnography

Use of end-tidal CO2 waveform technology, provided by current monitor/defibrillators must be used to ensure that intubation is successful and that the airway remains intact. End tidal CO2 is also useful for gauging the need for ventilation, and in some cases, when chest compression has optimal and the ET tube placement is confirmed, the lack of end tidal CO2 may confirm that the patient is metabolically beyond resuscitation efforts.

Therapeutic Hypothermia or Targeted Temperature Management

There is no current evidence to suggest that initiating therapeutic hypothermia in the field, or intra-arrest, affects survival or neurological outcome. However, once ROSC is established, therapeutic hypothermia care provided well in the hospital setting has been shown to significantly affect positive neurologic outcome for patients.

Cardiac Arrest Center of Excellence

Patients should be taken to a hospital that is either a Cardiac Care Center of Excellence or a hospital that offers the range of services required by these patients. This likely includes a high volume of cardiac arrest patients, 24/7 access to a cath lab, electrophysiology services, critical care professionals with experience in providing therapeutic hypothermia and neuro critical care. Often genetic counseling may be necessary for these patients and their families, and support of survivors and their families in the form of access to psychological services and survivor groups is indicated.

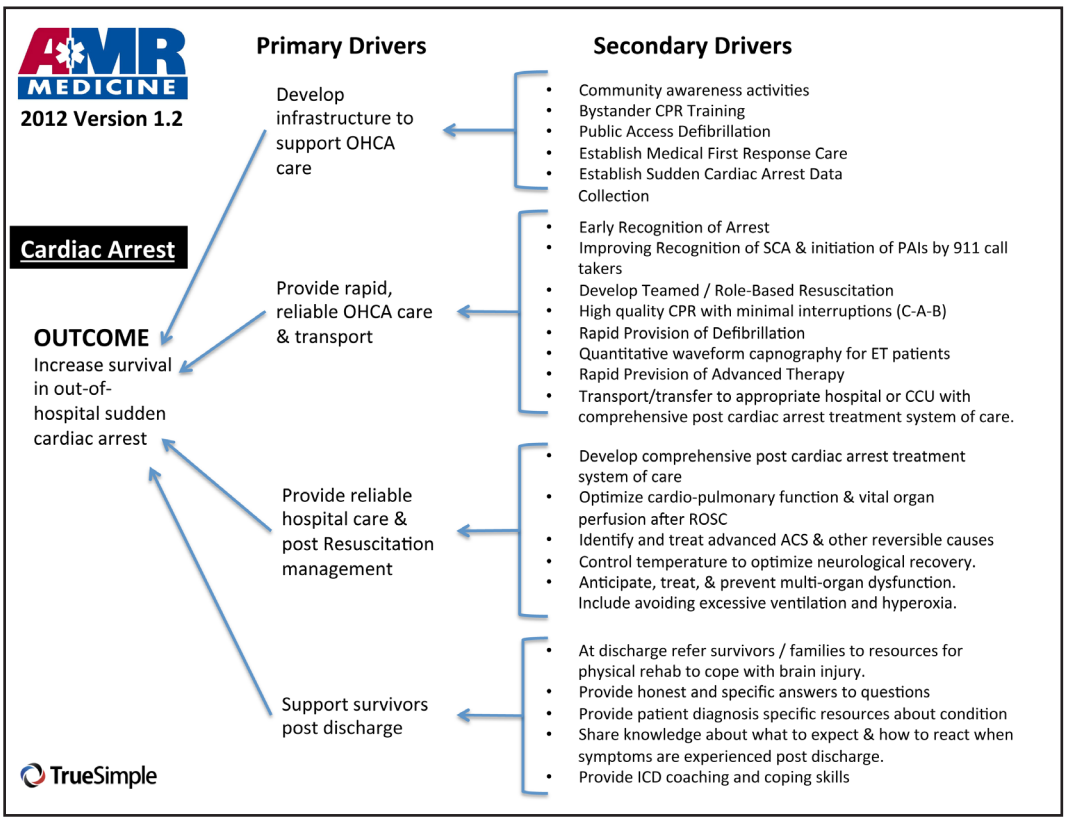
Quality Improvement

Hospitals and EMS agencies must work together to share outcome data which will inform best practices and provide powerful quality improvement initiatives for both hospital and EMS providers. Use of CPR analytic software to evaluate cases is encouraged.

Using a Driver Diagram to Guide Improvement

Driver diagrams are a type of structured logic chart with three or more levels. They are useful to provide a visual theory of change, and offer a logical way to present ideas that can then be tested to see if they produce or improve the desired outcome. The levels of the driver diagram logic chart include:

- A goal
- Factors that need to be influenced in order to achieve this goal, or "Primary Drivers"
- Specific actions and activities that would act upon these factors



Where possible, the drivers in a driver diagram should be measurable. That allows a driver diagram to provide a measurement framework for tracking progress towards a goal.

Driver diagrams can fulfill several functions, including:

- Assist a team to explore factors they believe must be addressed to achieve a specific goal
- Demonstrate how factors are connected
- Serve as a communication tool to explain a change strategy
- Offer the basis for a measurement framework

How to use a driver diagram

It is also important to remember that no driver diagram is objectively 'correct. Diagrams always represent a model of a situation which might not be shared by others. It can serve as a good tool for communicating this mental model.

Driver diagrams can have multiple primary and secondary drivers. Specific ideas, projects and activities for change can be connected to these drivers. The SCA driver diagram above shows strategies from multiple systems that are believed to contribute to an increase in survival from sudden cardiac arrest in a community. At a glance you can see what its creator decided were important factors and the actions that are planned.

Driver diagrams fit into an improvement process. Before starting a driver diagram it is important to be clear about your goal or "aim" statement. Once a driver diagram is complete project implementation can begin. Driver diagrams will lead the group into activities such as developing project plans and change concepts for undertaking Plan Do Study Act (PDSA) cycles.

More information on how to use Driver Diagrams and the Improvement Process can be found at http://www.ihi.org/knowledge/Pages/default.aspx

Secondary Drivers	Change Concepts & Change Ideas for PDSA Testing
• Community awareness activities	
• Early Recognition of Arrest	
• Bystander CPR Training	
• Public Access Defibrillation	
• 911 Dispatcher Pre-Arrival Instructions	
• Establish Sudden Cardiac Arrest Data Collection	
• Improving Recognition of SCA & initiation of PAIs by 911 call takers	
• High quality CPR with minimal interruptions (C-A-B)	
• Establish OHCA System of Care?	
• Implement quantitative waveform capnography for ET patients	
• Develop Teamed / Role-Based Resuscitation	
• Optimize cardio-pulmonary function & vital organ perfusion after ROSC	
• Transport/transfer to appropriate hospital or CCU with comprehensive post cardiac arrest treatment system of care.	
• Identify and treat advanced ACS & other reversible causes	
• Control temperature to optimize neurological recovery.	
• Anticipate, treat, & prevent multi-organ dysfunction. Include avoiding excessive ventilation and hyperoxia.	
• At discharge refer survivors / families to resources for physical rehab to cope with brain injury.	
• Provide honest and specific answers to questions	
• Provide patient diagnosis specific resources about condition	
• Share knowledge about what to expect & how to react when systems are experienced post discharge.	
• Provide ICD coaching and coping skills	

Evolving Technology

Sudden cardiac arrest is a condition for which there will likely be development of new technology in the near future. New technologies should be well studied in appropriate clinical settings before being adopted by EMS.

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Notes

Notes

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Tab 3 - titled - Hospital Response

Post-Cardiac Arrest Care

Background

In the past few years, new evidence has highlighted the important contribution of the medical care provided during the immediate post-cardiac arrest period.[1-10] While optimal prehospital care is critical to restore a heartbeat and preserve brain function, the best chance of a favorable outcome is significantly enhanced by systematic delivery of advanced post-cardiac arrest care in the hospital setting.[11]

The Contribution of Hospital Care

Due to its importance, post-cardiac arrest care has been elevated to the status of the fifth link in the metaphor used by the American Heart Association (AHA) to describe the interconnectedness of processes involved in the care of the sudden cardiac arrest (SCA) Victim. The AHA's 2010 Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) now includes a chapter dedicated to the post-cardiac arrest period.[12]

Steps for Survival

Recognition of cardiac arrest and call for help

Early CPR emphasizing chest compressions

Rapid defibrillation

Advanced life support

Advanced post-cardiac arrest hospital care

Post-Cardiac Arrest Syndrome

Many patients who achieve restoration of spontaneous circulation (ROSC) following out-of-hospital SCA experience *post-cardiac arrest syndrome*. This combination of complex pathophysiologic processes develops during the human body's recovery from prolonged whole body ischemia.[13] This severe injury progresses because of interactions between an injured brain, heart, and other organs which can ultimately result in multisystem organ failure and death. Post-cardiac arrest syndrome may be worsened by the precipitating cause of the cardiac arrest.

Objectives of Post–Cardiac Arrest Care

1. Optimize cardiopulmonary function and vital organ perfusion after ROSC
2. Transport/transfer to an appropriate hospital or critical care unit with a comprehensive post-cardiac arrest treatment system of care
3. Identify and treat ACS and other reversible causes
4. Control temperature to optimize neurologic recovery
5. Anticipate, treat, and prevent multiple organ dysfunction. This includes avoiding excessive ventilation and hyperoxia

(*Highlights of the 2010 American Heart Association Guidelines for CPR and ECC*. static.heart.org/eccguidelines/guidelines-highlights.html)

Many of the components of post-cardiac arrest syndrome can be successfully treated. All SCA patients who survive to hospital admission should have the opportunity to benefit from state of the art care to treat possible post-cardiac arrest syndrome. If necessary, patients should be transferred to a critical care unit in an institution that is committed to providing the best possible care which will address all aspects of post-cardiac arrest syndrome.

There are many gaps in both the knowledge and delivery of post-cardiac arrest care. Optimal care for these patients has not been standardized. While regional systems of care have been proposed, they are not yet widely available. One example of a structure that is being explored as a model for a system of care for SCA patients is based on North Carolina's RACE program. However, regional care protocals for these patients do not yet commonly exist. Many physicians who currently care for SCA survivors may be unfamiliar with post-cardiac arrest syndrome and do not have access to evidence-based treatment protocols.[14]

Post-Cardiac Arrest Care Guidelines

While the best treatment for the constellation of abnormalities associated with the restoration of spontaneous circulation is still evolving, ongoing efforts have identified care strategies to improve outcomes. The 2010 American Heart Association (AHA) Guidelines for CPR and ECC contains a useful post-cardiac arrest care algorithm as well as a table documenting a multi-system approach to care, and clear explanations for current recommendations.[12] The guideline states: "A comprehensive, structured, multidisciplinary system of care should be implemented in a consistent manner for the treatment of post-cardiac arrest patients."[12]

Survivors of out-of-hospital sudden cardiac arrest should have access to a program that includes structured interventions which have been shown to improve survival, including:

- Therapeutic hypothermia or targeted temperature management
- Hemodynamic stabilization
- Immediate coronary reperfusion when indicated
- Glycemic control
- Neurologic diagnosis, management and prognostication

EMS systems should learn whether the facility to which they transport their patients has the capability to offer these therapies, and whether or not they are implemented when indicated. If a hospital does not, EMS must act in the patient's best interest to facilitate transport to a facility that does offer the patient the needed system of care. For example, if the post-cardiac arrest 12-lead ECG shows ST-segment elevation myocardial infarction (STEMI), EMS can request air transport to ensure rapid access to a cardiac catheterization facility.

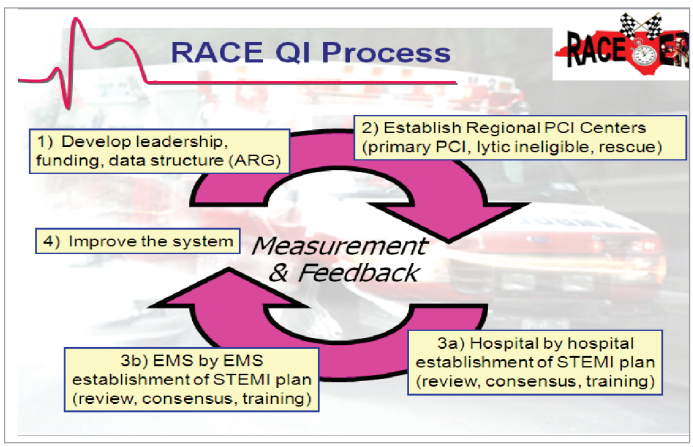
The North Carolina Experience

RACE: Reperfusion of Acute myocardial infarction in Carolina Emergency Departments

Since 2003, a dedicated group of medical experts in North Carolina have been collaborating on a project designed to improve rapid coronary artery reperfusion for patients with ST-elevation myocardial infarction (STEMI). The program is called RACE (Reperfusion of Acute myocardial Infarction in Carolina Emergency Departments). The goal of the project was to increase the rate and speed of reperfusion for STEMI patients.

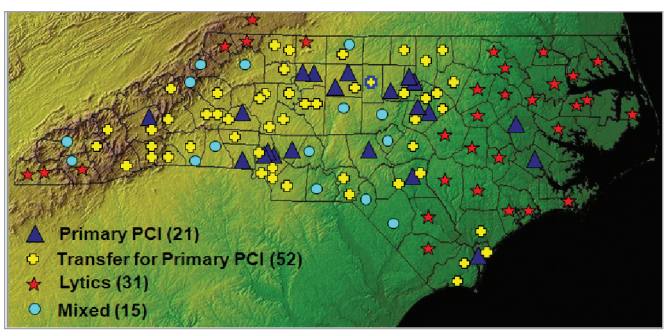
The recommendations of this project are based upon established guidelines, published data, and the knowledge and experience of numerous individuals specializing in acute myocardial infarction care.

The RACE statewide system incorporates the quality improvement efforts of 119 hospitals, 540 emergency medical systems, and thousands of healthcare professionals to direct coordinated efforts to provide timely reperfusion. The key elements of the system include regional organization and coordination, institution of the single best plan for treatment at every point of care, ongoing measurement, prompt feedback, and the establishment of teams of healthcare professionals that span all aspects of STEMI care. **RACE Website:** http://www.nccacc.org



The success of RACE has been based on the efforts and contributions of hundreds of healthcare professionals across the state of North Carolina. The partnership between the cardiology community and key emergency medicine physicians, nursing leadership through the RACE coordinators and emergency department nurse managers, quality assurance colleagues, and CV administration is critical to the project. The results of the initial RACE project were published in the Journal of the American Medical Association in November 2007, demonstrating substantial improvements in all treatment times across the state.[15] The RACE project was named one of the top 10 advances in heart disease by the American Heart Association and is being utilized as a national model for STEMI care.

The RACE Operations Manual was created to guide these systems in implementing the optimal specification by point of care. The manual contains both basic and advanced recommendations that represent features of systems of STEMI care likely to increase the rate and speed of coronary artery reperfusion.



Developing a regional approach to plan for cardiovascular emergencies, stroke, trauma, and pediatric events, begins by assembling experts from all disciplines who are involved in the care of these patients. These discussions should involve local EMS agencies, local hospitals and Emergency Department leadership as well as any state, local or regional representatives that are appropriate (health department leadership, political support–for example the city safety director). Bringing these stakeholders to the table allows dialogue about the importance of regionalized care and a common understanding of current practices.

This wide ranging leadership group can evaluate regional resources and begin to develop standards for the regional care of patients. Working together, a comprehensive plan can be developed to coordinate the delivery of care for victims from the scene of the event, EMS care, destination decisions, communication within the regional system, and feedback on performance of care for these patients. These coordinated efforts will save lives!

RACE CARS

Regional Approach to Cardiovascular Emergencies Cardiac Arrest Resuscitation System

Efforts to increase overall Sudden Cardiac Arrest (SCA) survival rates in the United States have been gaining momentum in the last decade, as the knowledge that improvements in survival are both necessary and attainable. Building on the RACE project, North Carolina is applying its expertise in developing and supporting community to statewide initiatives that focus on a "systems-based" approach to the improvement of SCA survival. The North Carolina HeartRescue partners will look to its statewide colleagues to coordinate training, community and system-wide response, and the application of "best practice" treatments among the general public, first responders (police/fire), emergency medical services (EMS) and hospitals.

Therapeutic Hypothermia

EMS can facilitate initiation of therapeutic hypothermia for eligible post-cardiac arrest patients. Studies have shown that brain injury due to cardiac arrest can be mitigated with therapeutic hypothermia.[1, 2, 9] While this is a relatively simple and inexpensive therapy to implement in the hospital setting, there is no scientific evidence that prehospital initiation of therapeutic hypothermia changes outcome. However, much like delivery of aspirin to patients with chest pain, prehospital initiation of therapeutic hypothermia offers a redundant system to help ensure that appropriate patients are treated.

Examples of hospital therapeutic hypothermia protocols are available from the University of Pennsylvania's Center for Resuscitation Science at **www.med.upenn.edu/resuscitation/hypothermia**.

If your system does provide therapeutic hypothermia therapy in the prehospital setting there are a few things to take into consideration.

1. Effective hypothermia (that which decreases metabolic rate) will result in lower end tidal CO2 levels on capnography readings.
2. Providing prehospital hypothermia must not interfere with excellent quality basic resuscitation skills.
3. Ensure a good continuity of cooling during handoff of the patient from EMS to the Emergency Department (ED), and from the ED to either the Catheterization Laboratory (Cath Lab) or Critical Care (CCU) unit. If body temperature is allowed to fluctuate during therapy, particularly if there are delays before cooling can be initiated/continued in the hospital, this may be detrimental to the patient's outcome.

Emergent Cardiac Catheterization

EMS must also learn if the institution to which they transport post-cardiac arrest patients will take those who have STEMI or a high suspicion of acute MI expediently to the cardiac catheterization lab.[16] Waiting for the patient to "wake up" before treating STEMI will increase loss of heart muscle.[5, 17] Patients can be cooled while on the way to and during heart catheterization.[18] Additionally, appropriate survivors should be evaluated for ICD placement prior to hospital discharge.[19]

Multidisciplinary Team Care

The comprehensive care required to manage the constellation of problems possible in the post-arrest period requires that the patient be cared for by a multidisciplinary team of critical care as well as cardiology and neurology specialists who have a plan of care available which will allow them to anticipate and treat problems as they arise.

Avoidance of Early Termination

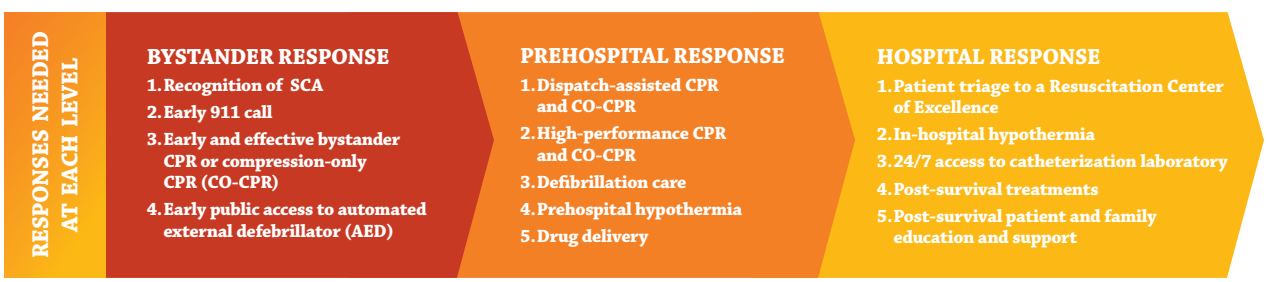
The goal of management is to return patients to their pre-arrest level of functioning. Currently there is no way to predict an individual patient's outcome based on pre-arrest or intra-arrest parameters. In the hospital setting, it is not possible to predict poor outcome during the first 24 hours, and possibly not until 72 hours after ROSC. It is recommended that patients who have received therapeutic hypothermia be observed for more than 72 hours after ROSC before predicting poor outcome.[12, 20]

Organ Donation

Victims of sudden cardiac arrest who progress to brain death from cardiac arrest should be considered for organ donation. These patients are an under-recognized source of organ donors whose cause of death does not prohibit them from consideration as a donor.[21]

Regional Systems of Care

Currently there is no national process in place to establish, categorize, verify, or designate regional cardiac arrest systems of care. However, in some areas of the country, EMS medical directors have been able to organize coordinated approaches to hospital care by ensuring that appropriate patients are transported to institutions that have the most coordinated approach to post-cardiac arrest care.[14]



Appendix

Emergency Department Post-Cardiac Arrest Checklist			
	Targeted Temperature Management Indicated?		
	GSC Motor score < 6 (i.e. not following commands)	Yes	No
	Cardiac arrest most likely cause of coma	Yes	No
	If both are "Yes", then follow your hypothermia therapy protocol.		
	Emergent Cardiac Intervention Indicated?		
	STEMI on 12-lead ECG	Yes	No
	High clinical suspicion for acute MI	Yes	No
	Hemodynamic instability	Yes	No
	If any "Yes", then begin your STEMI protocol.		
	Is oxygen saturation between 94 and 99%?[10]		
	Is mean arterial pressure at least 65 mm Hg (systolic BP > 90)?		
	Labs for lactate, troponin, potassium, glucose, and creatinine drawn?		
	Is bedside glucose measurement between 80 and 180?		
	Is chest x-ray taken?		
	If comatose, is core temperature monitored?		
	Is there an indication for a head CT scan?		
	Is there an indication for echocardiography (e.g., detect global stunning, wall-motion abnormalities, structural problems or cardiomyopathy)?		
	Is invasive monitoring indicated (e.g., low mean arterial pressure, hypothermia therapy, shock)?		

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Notes

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Patient and Family Support Following Sudden Cardiac Arrest

Patient Support and Reintegration

Impact of SCA

When a loved one experiences sudden cardiac arrest, family members are devastated and shocked by the swiftness and cruelty of the event, much the same as families of other victims of tragedies such as motor vehicle collisions. The ability to understand an SCA event is quite different from other tragedies, however, because few people understand what SCA is, or how their loved one came to be a victim. Whether or not their loved one has survived, all families need to leave the hospital with an informed understanding of sudden cardiac arrest and the ability to access resources they may need as they take back their lives.

For survivors and their families, leaving the hospital after experiencing a sudden cardiac arrest can be a terrifying experience. Many survivors have received an implantable cardioverter defibrillator (ICD) to prevent future fatal arrhythmias and may have multiple concerns related to the device.[1-5]

Up to 40% of survivors may experience mild to moderate cognitive impairments following arrest. The most common cognitive issue is thought to be memory loss or delayed recall.[6] The cause, prognosis, and methods for coping with these deficits must be addressed. If deficits such as forgetfulness, reduced attention to stimuli, comprehension, and problem-solving ability are not identified and managed, they can lead to high levels of depression, anxiety, anger, and stress as well as social isolation and behavior changes.[7] Survivors should have access to intervention programs to aid their adjustment, family coping, and reintegration into society.[8-9] As they prepare for hospital discharge, patients should have the opportunity to meet with their healthcare providers to ask questions relevant to managing their concerns. Ideally, every institution should have a discharge policy which includes this opportunity.

Basic Needs Upon Hospital Discharge

- At discharge, survivors and families should receive referrals to resources for any additional physical rehabilitation programs to help them cope with existing brain injury.
- Honest and specific answers to questions are highly appreciated by survivors and families.
- Survivors welcome resources they can access for accurate information about their condition. Resources given at hospital discharge are most helpful if they have been screened for accuracy and relevance to the patient's specific diagnosis. For example, information about SCA caused by an inherited disorder may not be relevant for someone who experienced arrest due to a myocardial infarction. (Sources of patient information are included in the Appendix.)
- Knowledge of what to expect and how to react when symptoms are experienced after hospital discharge can be very helpful to the patient. For example, what types of symptoms should prompt a call to 911; when is it appropriate to call my doctor?
- Although the implantation of an internal cardioverter defibrillator (ICD) can provide some reassurance that sudden death will not occur again, individuals cannot help but worry and wonder each time there is a twinge of pain or feeling of discomfort. Up to 35% of patients develop anxiety disorders following ICD placement[10] and need to learn coping skills as well as what to do if they receive a shock from a new ICD.

- Information should be available that both advocates the use of counseling and support groups, and gives appropriate referrals to individuals and groups experienced with survivor concerns. Often survivors have very real and potentially paralyzing concerns about how to resume their lives. Do I plan for the future or not? Referral to counselors who are experienced with these issues, specifically for this population, can help survivors begin to deal with and resolve their concerns.

An Understanding Boss

"At the office, my husband's boss and co-workers let him concentrate fully on me and my recovery. There was no one counting sick-time hours or danger of a reduced paycheck. He was told to take the time he needed. What's more, the boss even told him that he couldn't return full-time until the three of us had lunch together".

"He was true to his word and my husband was able to do what needed to be done at home for his wife and two young children without being concerned about the impact on his work life."

Support Groups

Within a support group, members provide each other with various types of help. Generally support groups provide peer-to-peer or patient-to-patient support for a particular shared, and generally burdensome, characteristic. Help may take the form of providing and evaluating relevant information, relating personal experiences, listening to and accepting others' experiences, providing sympathetic understanding, and establishing social networks. A support group may also work to inform the public or engage in advocacy.

What Makes a Good Support Group?

Although the needs and potential benefits may be different for each person, there are some basic components that make a particular support group effective for an individual. These include:

- Provision of current and reliable information
- The ability to respond in a timely manner to individuals and their questions
- Regularly scheduled meetings and or correspondence such as newsletters
- Access to appropriate professional support, if needed
- Strong leadership and a clear confidentiality policy
- Content relative to the members specific needs: common interests and experiences and other members that can relate to what is happening to you

Insights from a Survivor

"Planning for your own imminent death when you have just survived SCA may sound like a contradiction, but is very real."

"I was 33 years old when I experienced a sudden cardiac arrest. I had been saving for retirement, but had always wanted to travel more. Trying to balance the need to plan for a future with the likelihood of there not being one made it very difficult for me to continue to save money for things in the distant future."

"During my first post-arrest follow up appointment with my cardiologist, I asked if I should continue saving for retirement or if I should spend the money on a trip around the world. He told me to keep saving. This was very good advice. However, I really did want to know if I was going to die quickly so that I could do some very cool stuff with the money I wouldn't be using in retirement!"

Starting a Support Group

Establishing a new support group is time consuming and requires dedication. Often help can be enlisted from a local hospital or religious organization to get the group started. Studying existing support groups can be helpful as it may provide information about a group structure that works well, or can help identify educational materials that have already been developed. Once a group is started, it may be of benefit to make sure local organizations or hospitals are aware of its existence so that they can offer support and refer individuals to the group.

SCA Survivor Groups and Advocacy

Survivor groups can provide a focal point for members to inform the public about sudden cardiac arrest. There are a number of advocacy activities that can help to improve survival from SCA within a community.

Some activities that survivor groups can support include:

- Sharing survivor stories. This can have powerful influence on the public and be leveraged to challenge the public to learn CPR and place AEDs in their neighborhoods.
- Increasing awareness of SCA using media campaigns and fund raisers such as sports competitions. Funds raised can be used to purchase AEDs for local businesses or churches.
- Taking an active role in providing CPR training and in encouraging citizens to provide bystander CPR.

Evolution of a Successful Survivor Support Program

As a part of the AMR HeartRescue Community Grant to the Spokane Washington Community, a survivor celebration was held to recognize the hard work of the EMS and hospital personnel in the community and to honor the survivors of Sudden Cardiac Arrest in Spokane, Washington.

During that very successful first celebration, it became obvious that SCA survivors were dealing with ongoing struggles. Watching the interaction between survivors at the celebration and listening to their concerns, Cathy St. Amand, Clinical Education Specialist at AMR Spokane, became convinced of the need for a survivors group to offer the survivors an outlet for their frustrations and an opportunity to support each other. Along with Ryan Schaefer from Providence Sacred Heart Hospital and Tammy Drapeau, also with AMR Spokane, they set out to develop a series of survivor support meetings. While each survival story is unique, many of their struggles are very similar and Cathy heard over and over again, "I wish someone would have told me (insert concern here) was normal", or "I know I should be thankful to be alive, but life has not returned to normal", or "I can't seem to get past this". It was heartbreaking to see the tears and to hear the survivors express their suffering.

So, with the plans for their second annual survivor celebration underway, they announced the availability of the survivor support group. Invitations sent for the survivor celebration included information on the first support group meeting, held in a local fire station's community room.

To plan for the support group, they discussed their goals, the mission, and their plan for implementation. "We scheduled a monthly meeting with survivors to help them connect; to provide education about their "new lives" and to empower them to work with their healthcare team." said Cathy St. Amand. Their stated mission was to "Connect survivors of sudden cardiac arrest to provide interaction and support". Their implementation plan was to schedule the first meeting, introduce everyone, give a short talk on "normal" feelings for cardiac arrest survivors, and then to see if there were any subjects the survivors wanted to know more about.

During the first meeting, there was enthusiastic participation among the group, who had copious questions about myriad issues. Some of the top concerns included: understanding their ICDs, medications, and limitations to their activities. As these questions were answered, many survivors stated they wished someone had given them this information before they were discharged. While it is fairly clear that survivors had been given this type of information around the time of their discharge from the hospital, it was obvious that they did not remember it. The one hour meeting progressed to two hours and would have gone longer, but the survivors were promised they could continue discussions during the next month.

Several survivors brought spouses to the next meeting, and new participants showed up as they had heard about the meeting in cardiac rehab, or by word of mouth. The week after the first meeting, the local Rehab Program requested information so they could make referrals.

The group is always given a chance to ask about anything on their minds, which includes concerns from the spouses. As the survivors become more comfortable within the group, they will ask of the group, "Has anyone ever experienced (insert concern)?" and they all compare notes. Cathy, Ryan and Tammy note that it is a very gratifying experience and obvious that they are meeting a deep need.

There is awareness that issues might come up that are beyond the scope this group's expertise. In preparation for that they compiled a list of counselors and psychologists who would be willing to work with the survivors and their families. They also have the cooperation of a "resource specialist" at one of the hospitals who can help match a person's insurance and geographical area with resources in their area.

Cathy, Ryan and Tammy expect that this will be a dynamic group and that both new and "old" survivors will come and go as their needs dictate. One of the challenges is trying to find a consistent way to notify new survivors of the meetings and also to know how long to continue to invite the "old" survivors. Another challenge is to find a space large enough to accommodate the enthusiastic group. Cathy and her partners have been humbled by the response they have received so far, and look forward to continuing to develop this support group.

Survivor Celebrations

A survivor celebration can be a wonderful event for your community. They serve myriad purposes: celebration of the second chance at life accorded the survivors, with an opportunity to thank their rescuers; promoting awareness of sudden cardiac arrest among members of the community; and bringing a community together at all levels to celebrate awe-inspiring accomplishments.

The best survivor celebrations focus on the survivors first and foremost, and the rescuers both professional and bystander, second. They are non-denominational, without agency identification or boundaries, and all inclusive. Families, hospital personnel, EMS personnel, 911 dispatchers, police, fire, and bystanders are among the most common attendees.

Planning a celebration

Like any gathering, it is about the people who attend–not the food, drink, door prizes or entertainment. While it is important to understand that some survivors may choose to decline, ensuring that all survivors have the opportunity to attend if they wish is critical.

Steps to Organizing a "Survivor Celebration" in your Community

As far in advance as possible

1. Make sure that your supervisors are on board with the idea.
2. GET HELP!! Don't take this on alone, the more partners in this venture the better the product, and the more fun it will be along the way.
    a. Form a Survivor Celebration Committee
        i. Invite stakeholders from your community, be inclusive and invite any interested survivors, their wives, friends, hospital folks, business owners etc to help you plan your event.
        ii. Make sure that you do not brand this as an AMR only event. Increasing survival is a community effort; activities should include other first responder agencies, police, fire, hospital personal, city government, local health departments. The more you involve, the more powerful your gathering.
        iii. Decide on date with your committee. Many survivor celebrations are held in February, heart month, around Valentine's Day. You aren't held to that date, October is Cardiac Arrest Awareness month, or EMS Week is in May; any date is good if it works in your community.
3. Inform and invite your destination hospitals to participate and enlist their support. Sometimes they may offer to organize media coverage and or take care of printing brochures–contact them early, often they require lots of lead time.
4. Identify survivors over the year
    a. Make sure you follow HIPAA guidelines to protect privacy
        i. Always keep in contact with survivors who contact you to thank you for their save or care.

ii. Consider putting an ad in the local paper

iii. Check with hospital follow up programs to see if they can send the patient information about the event during their follow up contacts and which will allow the patient to contact you if interested

1. Cath lab nursing staff can be a good source of information and patient contact.

iv. Snowball invites: Sometimes, survivors know other survivors. Let them know if they can invite them or if they should send them to you.

5. Determine your needs; consider your budget.

a. What type of celebration do you want to hold?

i. Formal ceremony with pomp and circumstance

ii. Wine and cheese party

iii. Sit down dinner with educational topics

iv. Cake and Ice Cream and a few words from the stakeholders

b. What time of day would you prefer?

i. 10 AM ceremony followed by buffet luncheon or cake and coffee?

ii. Evening dinner or cocktail hour?

c. Special local venue? (Sonoma holds a winery celebration!) What items do you need to acquire?

i. Food

ii. Transportation

iii. Give aways/Awards (we like the Survivor Coins described below), centerpieces, etc. Encourage hospitals and other agencies to include their trinkets, even if branded.

iv. Signs/Invitations/Banners?

v. Tableware/Decorations: balloons, flowers?

vi. Media coverage

vii. Enlist an amateur photographer for group and candid photos

viii. Transportation for survivors who can't drive?

d. Who can be approached to donate items or cash for items?

i. For food: local grocery stores, ice cream shops, wineries, etc.

ii. For cash donations: Other public safety agencies, fire, EMS police (make sure they are invited), area hospitals, area businesses.

e. Program printing

i. See if you can find a hospital or print company to do the printing for you as a donation and include their logo on the brochure.

6. Find a venue
    a. Your hospital or a large corporation in your community may be able to donate the use of an auditorium or banquet room.
    b. MAKE SURE THERE is PLENTY of Accessible Parking. Sometimes these folks are elderly or frail. Make it easy for them to find parking and to access your venue.
    c. Consider approaching a local banquet hall & ask for donation of the space for the event.
7. Determine a theme for the program
    a. Birthday, Reunion, Celebrations
    b. Common icons: balloons, hearts, red heart balloons
8. Identify possible speakers
    a. Keep speakers to a minimum, have one keynote and keep it short
    b. Consider previous survivor if articulate, community leader (Mayor) or well-loved physician.
9. Form a rough draft of the program
    a. Determine if you want to have an honor guard and or a benediction.
        i. If so, make arrangements for those individuals to be scheduled.
    b. Consider which survivors will want to tell their stories
        i. If you have a lot of survivors, select only a few of the survivor stories to share with the audience
        ii. Consider printing stories of others in inserts if survivors are in favor. Make sure the stories come from the survivors and do not contain protected information unless supplied by patient.
    c. End with a working brochure with times and slots for activities.
10. Consider & confirm menu, decorations, music, survivor gifts
    Spokane had a survivor coin made that was given to survivors and rescuers. Contact Cathy St. Amand, AMR Spokane for info on the survivor coin. **Eric Perez| Challenge Coins PLUS**
    5840 Red Bug Lake Road, Suite 35, Winter Springs, Florida 32708
    T: 1-800-252-0904 | F: 1-866-226-7303 | E: info@challengecoinsplus.com www.ChallengeCoinsPLUS.com

A Month Before the Celebration

11. Contact survivors to confirm addresses
12. If survivors will be asked to speak, give them advance notice.
13. Obtain any written stories from survivors for inclusion in the program (Insert pages are handy and can be easily updated.)
14. Send out invitations with RSVPs

15. Confirm speakers and firm up program
16. Print program
    a. Include all sponsor logos and thanks on the back of program

A Week Before the Celebration

17. Confirm RSVPs, call and remind (Make sure survivors that want to attend have transportation)

During the Celebration

18. Make sure to recognize all the attending survivors individually and by name, including, if possible their rescuers.
19. Schedule time for a photographer to take a group photo of survivors, survivors and rescuers and bystanders. Both formal and informal photos are great.
20. Allow time for survivors to mingle with rescuers. Try to have at least one rescuer attending(bystander or EMS/fire for each survivor so they have someone to thank)
21. Enlist new participants to work on next year's event
22. Make any information available on local survivor groups, activities and counseling.

A poignant story

While planning the first survivor celebration for Spokane Washington in 2012, Cathy St. Amand learned that one of the older survivors who lived 2 hours away could not attend. The man had experienced his SCA while visiting Spokane. The man's wife had written a lovely note to the EMS system, thanking them for all they had done for her husband, and expressing their regret at not being able to attend due to the long drive. The EMS agency ultimately sent a supervisor's car to their house the afternoon before the event, picked them up, took them to lunch, and delivered them to the celebration right on time. At the ceremony the couple read their note aloud to the EMS providers and sported the biggest smiles of all the attendees. The note read: "…How do you thank someone who gave you more time…the opportunity to live life to the fullest?"

Appendix

Resources for Survivors

There are many organizations that offer support and advocacy opportunities for survivors of SCA, for families who have lost loved ones, and for healthcare professionals. The list below includes patient organizations as well as physician and professional organizations that offer useful resources on a multitude of topics.

Patient-Oriented Organizations

Sudden Cardiac Arrest Association (SCAA) www.suddencardiacarrest.org

The Sudden Cardiac Arrest Association (SCAA) identifies and unites survivors and those at risk of sudden cardiac arrest, as well as others who are interested in being advocates on SCAA issues in their communities and beyond. SCAA promotes solutions to prevent sudden cardiac death including increased awareness, immediate bystander action, public access to defibrillation (PAD), cardiovascular disease prevention, and access to preventative therapies. The website contains multiple resources on the topics of understanding and surviving SCA, AED program implementation, and living with ICDs.

Sudden Cardiac Arrest Foundation (SCAF) www.sca-aware.org

The mission of the Sudden Cardiac Arrest Foundation is to raise awareness and support programs that give ordinary people the power to save a life. One of the Foundation's signature programs is the National Sudden Cardiac Arrest Network, which gives survivors and their families an opportunity to find others who have experienced this life-changing event, share experiences and help one another in the healing process, and participate in research and awareness activities. Survivors and their families are invited to share their stories, participate in discussion forums, write a blog or personal reflection, and help in the fight to raise awareness and save more lives.

The Mended Hearts, Inc. www.mendedhearts.org

Recognized for its role in facilitating a positive patient-care experience, Mended Hearts partners with 460 hospitals and rehabilitation clinics, and offers services to heart patients through visiting programs, support group meetings, and educational forums. The Mended Hearts mission is to inspire hope in heart disease patients and their families.

Because Mended Hearts is made up of the very kinds of people it serves—heart patients, their families, and others impacted by heart disease, its members draw on personal experience as they help others. Mended Hearts support groups help people understand that there can be a rich, rewarding life after heart disease. Members listen, share their experiences, learn from healthcare professionals, and volunteer to talk to other heart patients about what they may face, including lifestyle changes, depression, recovery, and treatment. Annually, Mended Hearts volunteers make visits to patients, family members and caregivers in hospitals, online, and by phone.

Mended Little Hearts provides hope and support to children, families, and caregivers impacted by congenital heart defects in order to extend and improve quality of life.

WomenHeart www.womenheart.org

The National Coalition for Women with Heart Disease is the nation's only patient-centered organization promoting women's heart health through advocacy, education, and support. WomenHeart advocates for equal access to quality care, provides in-person and online support to women living with heart disease, and provides information and resources to help women take charge of their health. Visit www.womenheart.org/kit to receive a free online heart health action kit.

Adult Congenital Heart Association (ACHA) www.achaheart.org

The Adult Congenital Heart Association provides information and resources for adults with congenital heart defects and their families as well as the medical community. The organization provides a resource center and is active in outreach as well as advocacy and the promotion of adult congenital heart defect research. The website offers information for patients and families along with services through health-professional members.

Parent Heart Watch (PHW) www.parentheartwatch.org

Parent Heart Watch is a state-by-state network of parents and partners solely dedicated to reducing the often disastrous effects of sudden cardiac arrest in youth. This national network serves to inform, educate, advocate, and implement nationwide programs that help achieve the mission and vision of the organization.

Sudden Arrhythmia Death Syndromes Foundation (SADS) www.StopSADS.org

The mission of the Sudden Arrhythmia Death Syndromes Foundation (SADS) is to save the lives and support the families of children and young people who are genetically predisposed to sudden death due to heart rhythm abnormalities. The SADS website contains extensive patient and family support materials, medical education information and numerous other resources.

Hypertrophic Cardiomyopathy Association (HCMA) www.4hcm.org

The HCMA Foundation's mission is to provide support, advocacy, and education to patients and their family members, the medical community, and the public about hypertrophic cardiomyopathy. Their vision is to serve as the major organization improving the lives of those with Hypertrophic Cardiomyopathy, preventing untimely deaths, and advancing global understanding. This organization provides multiple patient resources, including material on how to cope with loss, screening, and prevention of SCA in athletes along with information to assist in AED program development.

The Children's Cardiomyopathy Foundation (CCF) www.childrenscardiomyopathy.org

The Children's Cardiomyopathy Foundation (CCF) is a national nonprofit organization focused on pediatric cardiomyopathy, a chronic disease of the heart muscle. CCF's mission is to accelerate the search for a cure by supporting research on pediatric cardiomyopathy, by educating and assisting physicians and patients, and by increasing awareness and advocacy related to the needs of affected children and their families. The hope is that more lives will be saved, and every child with cardiomyopathy will have a chance to live a full and active life.

Healthcare-Patient-Professional Organizations:

American Heart Association (AHA) www.heart.org/HEARTORG

The American Heart Association website allows the identification of its local branches and provides information on local cardiovascular and stroke initiatives and programs. The mission of the AHA includes promoting healthier communities through advocacy, improving the quality of healthcare for heart and stroke patients, educating high-risk populations through multiple initiatives and online tools, and support of research into heart and stroke care.

Heart Rhythm Society (HRS) www.hrsonline.org

The Heart Rhythm Society provides education and advocacy for cardiac arrhythmia professionals and patients, and serves as a primary information resource on heart rhythm disorders. Its mission is to improve the care of patients by promoting research, education, and optimal healthcare policies and standards. The Heart Rhythm Society website offers patient information about common heart rhythm disorders.

The Pediatric and Congenital Electrophysiology Society (PACES) www.pediatricepsociety.org

This nonprofit organization is comprised of an international group of physicians and allied professionals dedicated to improving the care of children and young adults with cardiac rhythm disturbances. The group's primary mission is to foster high-quality collaborative research and exchange of ideas on arrhythmia topics that are relevant to infants and children or patients of any age with congenital heart disease. The website allows identification of pediatric electrophysiologists by city.

Recommended Reading

Sotile, W.M. and R. Cantor-Cooke, *Thriving with heart disease : a unique program for you and your family : live happier, healthier, longer.* 2003, New York: Free Press. xiv, 303 p.[11]

Kastan, Kathy, LCSW, MA. Ed, *From the Heart: A Woman's Guide to Living Well with Heart Disease,* 2007, Cambridge: Perseus Book Group.

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Notes

Medtronic FOUNDATION

About Medtronic and the Medtronic Foundation

Medtronic, Inc. is the global leader in medical technology – alleviating pain, restoring health and extending life for millions of people worldwide. The Medtronic Foundation is committed to improving the lives of people around the world living with chronic illness. Its grant making is focused in three areas: health, education and community.

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