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Strategies to Improve Cardiac Arrest Survival

A Time to Act

Cardiac arrest can strike a seemingly healthy individual of any age at any time, often without warning. Each year, approximately 600,000 people in the United States experience a cardiac arrest. Using conservative estimates, it is the third leading cause of U.S. deaths, following cancer and heart disease. First and foremost, cardiac arrest treatment is a community issue—local resources and personnel must provide appropriate, high-quality care to save the life of a community member. Time between onset of arrest and provision of care is fundamental, and shortening this time is one of the best ways to reduce the risk of death and disability from cardiac arrest. Specific actions can be implemented now to decrease this time, and recent advances in science could lead to new discoveries in the causes of, and treatments for, cardiac arrest. However, specific barriers must first be addressed.

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With support from the American Heart Association; the American Red Cross; the American College of Cardiology; the Centers for Disease Control and Prevention; the National Institutes of Health; and the U.S. Department of Veterans Affairs, the Institute of Medicine (IOM) convened a committee of experts to study the current status of, and opportunities to improve, cardiac arrest outcomes in the United States. In *Strategies to Improve Cardiac Arrest Survival: A Time to Act*, the committee assesses the state of existing lifesaving therapies and strategies that could improve rates of survival without disability, and promising next steps to improve the quality of care for this prominent public health threat.

What Is Cardiac Arrest?

Cardiac arrest is a severe malfunction or cessation of the electrical and mechanical activity of the heart, resulting in almost instantaneous loss of consciousness and collapse.

The public and the media often incorrectly equate cardiac arrest with a heart attack. A heart attack can *cause* cardiac arrest, but the two are not synonymous. Unlike a heart attack, cardiac arrest frequently has no early warning signs and

requires intervention within seconds to minutes of collapse to avoid death and disability.

Overall survival rates are low: Less than 6 percent of people who experience a cardiac arrest outside the hospital, and 24 percent of patients who experience a cardiac arrest inside a hospital, live to leave the hospital.

Survival rates also vary widely across the country, depending on personal factors, such as age, race, gender, and health status, and on the characteristics of emergency medical services (EMS) and health care systems in the community, such as treatment availability, training, and care quality. Although some communities and hospitals have demonstrated the ability to improve cardiac arrest outcomes, pronounced variations and disparities persist, and individuals who are often already at greater risk for poor health status are disproportionately affected.

Opportunities for Improvement

Some high-performing communities in the United States have reported survival rates of more than 60 percent for specific types of cardiac arrest, which indicates that saving more lives is possible. These communities, as well as other international examples, offer insights about public health infrastructures and organized EMS and health system responses that can contribute to better cardiac arrest outcomes. Some EMS and health systems have adopted continuous quality improvement initiatives, which have led to more proactive and responsive care models, resulting in higher-quality care and better overall outcomes. These treatments, protocols, and strategies can be effectively implemented throughout the United States with appropriate leadership and mechanisms for accountability.

A national responsibility exists to improve the likelihood of survival and favorable neurologic outcomes following a cardiac arrest. This will require immediate changes in cardiac arrest reporting, research, training, and treatment. Also needed is collaboration among informed stakeholders and a new framework for cardiac arrest care that prioritizes and encourages real-time access to knowledge, multistakeholder partnerships, accountability and transparency, supportive system competencies, and leadership to promote a culture of action.

The IOM committee makes recommendations to improve the state of cardiac arrest treatment in the areas of educating and engaging the public, centralizing the collection and distribution of data, improving delivery of care, increasing the impact of research and therapies, and strengthening stakeholder collaboration.

Educating and Engaging the Public

Following a cardiac arrest, each minute without treatment decreases the likelihood of survival without disability. Without treatment within 10 minutes, the survival rate is almost zero. Because minutes count, the public plays a crucial role in saving a life by being prepared and willing to deliver basic life support before the arrival of professional emergency responders.

Basic life support includes first identifying an event, calling 911, administering early cardiopulmonary resuscitation (CPR), and using a publicly available automated external defibrillator (AED) device. Evidence indicates that bystander CPR and AED use can significantly improve survival and outcomes from cardiac arrest. Yet less than 3 percent of the U.S. public receives CPR training annually, rendering many bystanders unprepared to respond.

For this reason, the IOM committee recommends an informed, coordinated, and effective campaign to train the public to recognize cardiac arrest, initiate CPR, and apply AEDs. State and local education departments; employers, including federal agencies, private business owners, and schools; and local health departments all can play a role in the effort to promote and facilitate CPR and AED training.

Centralizing the Collection and Distribution of Data

It is difficult to adequately define a problem and develop solutions to that problem in the absence of complete data. Currently, there is no national database tracking the incidence, outcomes, and various factors associated with cardiac arrest. Databases that do exist are based on voluntary participation from select EMS

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agencies and hospitals in the country, thus limiting their ability to generalize information. The absence of standardized data collection across EMS agencies and hospitals makes it difficult to benchmark performance and hinders evidence-based decision making.

The IOM committee recommends that a national registry be established to track cardiac arrest events and make information about cardiac arrest incidence and outcomes publicly available. This would help increase public awareness related to cardiac arrest, improve accountability for EMS system and health care system performance, and pinpoint interventions that can best improve the public's health. Furthermore, a standard set of definitions and data elements across local, state, national, and international lines would help to reduce unnecessary confusion in an already complex field.

Improving Delivery of Care

Surviving cardiac arrest also depends on the provision of high-quality care by first responders, EMS personnel, and hospital providers. These individuals must be adequately educated and properly trained to deliver the best possible care in team environments. Although it is possible to assess the quality of care provided by EMS or hospital systems on a broad level, it can be more difficult to distinguish which specific aspects of care, or which combination of factors, directly improve the health of patients. Even so, promising strategies have emerged that could be more widely adopted to reduce the public health burden of cardiac arrest.

An effort to standardize training and performance-evaluation measures for cardiac arrest treatment would promote a more rapid and uniform adoption and assessment of high-quality care on a national scale. With respect to EMS systems, the IOM committee recommends establishing a standardized set of protocols and training curriculums to improve system capabilities and promote delivery of high-performance CPR. Training EMS dispatchers to provide CPR and AED instruction to 911 callers can provide additional support. Hospital accreditation can encourage outcome monitoring and reporting. Likewise, all EMS and health care systems, including individual hospitals, should adopt continuous quality improvement programs for cardiac arrest, tracking system performance, highlighting accountability, and ensuring that personnel are trained to respond competently to cardiac arrest.

Increasing the Impact of Research and Therapies

Despite the prevalence of cardiac arrest, federal support for resuscitation research is less than for other diseases and conditions that are just as common. Compelling new research holds promise for boosting survival without disability and for reshaping approaches to cardiac arrest treatments. Yet much is still unknown about some aspects of cardiac arrest, including the effectiveness of current treatments.

Future research must include a focus on science that leads to pioneering therapies. This requires clinical studies to develop new knowledge and evidence related to cardiac arrest causes and treatment, as well as studies to evaluate the effectiveness of existing therapies and protocols. Local translation of research and national guidelines into practice, coupled with continuous quality improvement programs, could generate new data streams that would help inform evidence-based practices.

The IOM committee recommends that federal agencies, private industry, and nonprofit organizations collaborate to build the nation's research infrastructure in an effort to support and accelerate innovative work on the causes, treatment, and outcomes of cardiac arrest. Research related to identifying, evaluating, and adopting best practices and new

implementation strategies for treatments also should be prioritized.

Strengthening Stakeholder Collaboration

Over time, numerous organizations and institutions have supported valuable activities to advance cardiac arrest treatment, leading to critical progress within the resuscitation field. Yet there remains no united advocacy presence to raise the visibility of cardiac arrest for policy makers and the public. To develop shared strategies, identify and support new leaders and advocates, and maximize the impact of limited resources within the resuscitation field, formal and sustained collaboration is essential. To this end, the IOM committee recommends the establishment of a national cardiac arrest collaborative that brings together federal agencies, EMS and health care systems, private industry, professional organizations, patient advocates, and members of the public to identify a shared strategy and build momentum that can ultimately lead to higher cardiac arrest survival rates across the United States.

Conclusion

The resuscitation field is well positioned to capitalize on a substantial knowledge base from which to improve health outcomes in the near future. The IOM committee's recommendations provide high-priority actions to advance the field as a whole. Leveraging existing and developing capabilities can strengthen the entire system of response to cardiac arrest throughout the United States. It is now up to the resuscitation field, individual communities, and society as a whole to act to preserve the length and quality of life for many individuals who experience a cardiac arrest.

Committee on the Treatment of Cardiac Arrest: Current Status and Future Directions

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Let's get pumped up about CPR in Michigan schools!

Teaching our students CPR before they graduate would put 100,000 more qualified lifesavers in our community every year.

Here's what you need to know:

- ✓ Each year, about **357,000 Americans** suffer sudden cardiac arrest outside of a hospital, and *only about **8 percent** of these victims survive.*
- ✓ CPR can nearly **triple** these victims' survival rates by providing assistance until the EMTs arrive.
- ✓ If all Michigan high school students learn basic CPR prior to graduation, Michigan will gain **100,000 more** CPR-trained lifesavers each year.
- ✓ **Four out of every five** cardiac arrests occur at home, so family members' lives are the ones students are most likely to save.
- ✓ Hands-Only CPR training can take **as little as 30 minutes** and can be easily incorporated into existing curriculum.
- ✓ Many school districts already teach CPR to students with the help of community members or local police, fire or ambulance agencies who offer CPR training.
- ✓ **31 states** across the country have passed laws to ensure that every high school student is CPR-trained before graduation, and it's saving lives.
- ✓ Communities that have high school CPR training have seen **dramatic increases in survival rates** for cardiac arrest victims.

Endorsed by:

- ✓ American Heart Association
- ✓ American College of Cardiology – Michigan Chapter
- ✓ C.S. Mott Children's Hospital, University of Michigan Congenital Heart Center
- ✓ Michigan Association of Ambulance Services
- ✓ Michigan College of Emergency Physicians
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