Introduction to CARES

(Cardiac Arrest Registry to Enhance Survival)

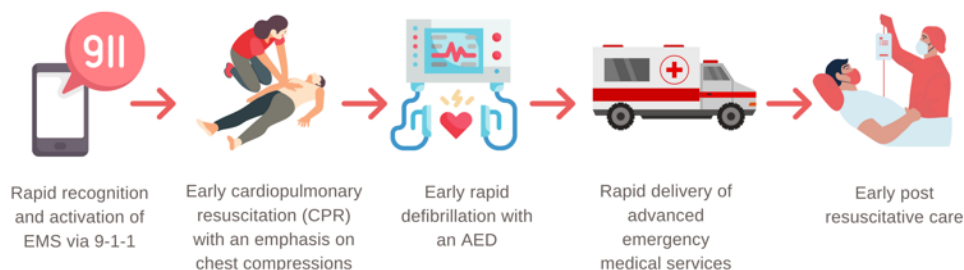# Contents

Importance of OHCA Data Collection

EMS treated out-of-hospital cardiac arrest (OHCA) affects more than 350,000 Americans each year and is the third leading cause of disability adjusted life years (DALY) in the United States, behind cardiovascular disease and back pain. About 90 percent of people who experience an out-of-hospital cardiac arrest die. However, community-specific survival rates vary markedly in the United States.

Cardiac arrest resuscitation is an important measure of a community's emergency response readiness. Successful resuscitation requires involvement by a range of individuals – including bystanders, emergency medical dispatchers, first responders, paramedics, and hospital providers – and depends on rapid performance of a series of critical actions intended to maximize the chances of survival following cardiac arrest, known as "the chain of survival". The links in this chain include activation of the emergency response system, rapid provision of CPR, early defibrillation, prompt delivery of EMS care, and early post-resuscitative care. It is the range in timeliness and quality of these links in the chain of survival that create the wide variation in survival rates. For every minute of cardiac arrest without CPR or defibrillation, a patient's chance of survival falls by 7-10%. Performing bystander CPR can nearly double survival and public access defibrillation results in an almost 50% survival rate for patients presenting in a shockable rhythm.

Critical actions needed to improve chances of survival of an out-of-hospital cardiac arrest

| Rapid recognition and activation of EMS via 9-1-1 | Early cardiopulmonary resuscitation (CPR) with an emphasis on chest compressions | Early rapid defibrillation with an AED | Rapid delivery of advanced emergency medical services | Early post resuscitative care |

Measurement is key to improving quality of care and patient outcomes. In 2015, the Institute of Medicine released "Strategies to Improve Cardiac Arrest Survival: A Time to Act," which recommended the establishment of a national cardiac arrest registry to monitor performance, identify problems, and track progress. Comprehensive surveillance and reporting are the foundations for improving patient outcomes. Reliable and accurate data are critical toward developing metrics, identifying benchmarks, revising education and training materials, and implementing best practices.

Brief History of CARES

In 2004, the Centers for Disease Control and Prevention (CDC) established CARES in collaboration with the Department of Emergency Medicine at the Emory University School of Medicine, with a mission to help communities determine standardized outcome measures for OHCA allowing for quality improvement efforts and benchmarking capability to improve care and increase survival. The program allows participating EMS systems to compare their performance to de-identified aggregate statistics, allowing for longitudinal benchmarking capability at the local, regional, and national level. By creating a user-friendly system to collect OHCA data and forming a network to share best practices, CARES has transformed the manner in which EMS agencies address OHCA.

CARES began in Atlanta, Georgia collecting nearly 1,500 OHCA events in 2006. As displayed on the CARES Participant Map, the program has since expanded to include 29 state-based registries and more than 50 individual community sites in 15 additional states. CARES represents a catchment area of more than 165 million people or approximately 51% of the US population. To date, the registry has captured over 700,000 records, with more than 2,000 EMS agencies and 2,300 hospitals participating nationwide.

CARES Case Definition

CARES captures data on all non-traumatic out-of-hospital cardiac arrests where resuscitation is attempted by a 911 Responder (CPR and/or defibrillation). This also includes patients that receive an AED shock by a bystander prior to the arrival of 911 Responders. Inclusion and exclusion criteria are described below in **Tables 1 and 2**:

Table 1. CARES inclusion criteria (all of the following must be met)
• Patients of all ages who experience a non-traumatic, out-of-hospital cardiac arrest.
• Patients who are pulseless on arrival of 911 Responder; OR • Patients who become pulseless in the presence of 911 Responder; OR • Patients who have a pulse on arrival of EMS, where a successful attempt at defibrillation was undertaken by a bystander prior to arrival of 911 Responder.

Table 2. CARES exclusion criteria (any of the following)

• Unworked/untreated cardiac arrests, to include codes that are terminated immediately upon arrival of EMS because the patient is not a viable candidate for resuscitation due to:
    ○ Injuries incompatible with life.   ○ Signs of decomposition.
    ○ The presence of rigor mortis or lividity.   ○ Presence of a valid DNR.

• Private EMS transport that did not involve 911 dispatch.
• Cardiac arrest of clear and obvious traumatic etiology.
• Bystander suspected cardiac arrest, where ROSC was achieved without the need for defibrillation or 911 Responder CPR.

Data Collection & Elements

Data collection within CARES is based on the Utstein-style definitions – a standardized template of uniform reporting guidelines for clinical variables and patient outcomes that was developed by international resuscitation experts.[1,2] The Utstein template can be used within hospitals, EMS systems, or communities and enables identification of areas that need improvement and comparisons across systems.

The CARES web-based software (https://mycares.net/), links three sources to describe each OHCA event: 1) 911 call center data, 2) EMS data, and 3) hospital data. Data can be submitted in two ways:
1. Using a data-entry form on the CARES website for manual input.
2. Daily upload from an agency's electronic patient-care record (ePCR) system.
   ○ *Please note, only applicable if using a CARES-compliant ePCR vendor <u>and</u> the EMS agency meets the minimum requirement of at least 10 CARES-qualifying cases per month.*

Access to the CARES website is restricted to authorized users, who are prohibited from viewing data from another agency or hospital.

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[1] Cummins RO, Chamberlain DA, Abramson NS, et al. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: The Utstein style. A statement for health professionals from a Task Force of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, and the Australian Resuscitation Council. Circulation. 84:960-975.

[2] Perkins GD, Jacobs IG, Nadkarni VM, et al. Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Templates for Out-of-Hospital Cardiac Arrest: A Statement for Healthcare Professionals From a Task Force of the International Liaison Committee on Resuscitation and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. Resuscitation. 96:328-340.

The required and optional CARES elements collected from 911 call centers, EMS providers, and receiving hospitals are described below in **Table 3**.

Table 3. CARES data elements			
	Dispatch	**EMS**	**Hospital**
Required	None; supplemental data completion is encouraged	Patient demographics (i.e., name, age, date of birth, incident address, sex, and race/ethnicity) Arrest circumstances (i.e., location type, witness status, and etiology) Resuscitation-specific data (i.e., CPR initiation, AED application, defibrillation, initial arrest rhythm, return of spontaneous circulation [ROSC], field hypothermia, and pre-hospital survival status)	Emergency department outcome Provision of therapeutic hypothermia (TTM) Hospital outcome Discharge location Neurological outcome at discharge (using the Cerebral Performance Categories [CPC] Scale)
Supplemental	Time call received at dispatch center, time of dispatch, time en route, time of arrival at the scene, time of arrival at ED	Pre-hospital interventions (i.e., usage of mechanical CPR device, ITD, 12 Lead, automated CPR feedback device, and advanced airway; administration of drugs; and diagnosis of STEMI) Treatment times (i.e., time of arrest, CPR, defibrillation, sustained ROSC, and field termination)	Hospital procedures (i.e., coronary angiography, CABG, and stent or ICD placement), date/time of discharge/death, and Medical Record Number

The CARES dataset is geocoded on an annual basis and linked to a number of census-tract level variables: median household income, median age, race/ethnicity, unemployment rate, poverty status, urbanicity, and educational attainment.

Reporting Capability

The CARES software includes functionality to automate data analysis for participating EMS agencies. The reports include 911 response intervals, delivery rates of critical interventions (i.e., bystander CPR, dispatcher CPR, public access defibrillation [PAD]), and community rates of survival using the Utstein template. An EMS agency has continuous access to their data and can generate reports by date range at their convenience. The software is also capable of aggregate reporting such that CARES staff can generate custom reports for benchmarking and surveillance purposes. In addition, hospitals have access to facility-specific reports, allowing users to view pre-hospital and in-hospital characteristics of their patient population with benchmarking capability. A robust query feature also allows agencies and hospitals to create customized searches of their data. These search results can be easily exported to Microsoft Excel for further analysis.

Sample EMS Reports: Utstein Survival Report, CARES Survival Report, CARES Summary Report, EMS CAD Times Report, and Demographics Report

Sample Hospital Reports: Hospital Survival Report, Hospital Benchmarking Report

Sample Dispatcher Assisted-CPR Report

CARES in Action

CARES releases an Annual Report in the spring and uses this publication as an opportunity to highlight innovative and impactful work being done in CARES states and communities, in the "CARES in Action" section. These reports are hosted under the Data tab of our website.

Additional case studies, testimonials, and letters of support can be found in the CARES in Action document.

Additional Resources

Internal Resources
- CARES Fact Sheet
- MMWR Document

External Resources
- Resuscitation Academy
- HeartRescue
- Citizen CPR Foundation