AHA Scientific Statement

Essential Features of Designating Out-of-Hospital Cardiac Arrest as a Reportable Event

A Scientific Statement From the American Heart Association Emergency Cardiovascular Care Committee; Council on Cardiopulmonary, Perioperative, and Critical Care; Council on Cardiovascular Nursing; Council on Clinical Cardiology; and Quality of Care and Outcomes Research Interdisciplinary Working Group

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***Abstract*—**The 2010 impact goal of the American Heart Association is to reduce death rates from heart disease and stroke by 25% and to lower the prevalence of the leading risk factors by the same proportion. Much of the burden of acute heart disease is initially experienced out of hospital and can be reduced by timely delivery of effective prehospital emergency care. Many patients with an acute myocardial infarction die from cardiac arrest before they reach the hospital. A small proportion of those with cardiac arrest who reach the hospital survive to discharge. Current health surveillance systems cannot determine the burden of acute cardiovascular illness in the prehospital setting nor make progress toward reducing that burden without improved surveillance mechanisms. Accordingly, the goals of this article provide a brief overview of strategies for managing out-of-hospital cardiac arrest. We review existing surveillance systems for monitoring progress in reducing the burden of out-of-hospital cardiac arrest in the United States and make recommendations for filling significant gaps in these systems, including the following: 1. Out-of-hospital cardiac arrests and their outcomes through hospital discharge should be classified as reportable events as part of a heart disease and stroke surveillance system. 2. Data collected on patients' encounters with emergency medical services systems should include descriptions of the performance of cardiopulmonary resuscitation by bystanders and defibrillation by lay responders. 3. National annual reports on key indicators of progress in managing acute cardiovascular events in the out-of-hospital setting should be developed and made publicly available. Potential barriers to action on cardiac arrest include concerns about privacy, methodological challenges, and costs associated with designating cardiac arrest as a reportable event. **(*Circulation*. 2008;117:2299-2308.)**

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The 2010 impact goal of the American Heart Association (AHA) is to reduce death rates from coronary heart disease and stroke by 25% and risk factors for these diseases by the same amount.[1] *Healthy People 2010*, a set of health priorities promulgated by the US Department of Health and Human Services, established national goals for prevention and management of heart disease and stroke in the United States, as shown in Table 1.[2] Much of the burden of acute heart disease and stroke is initially experienced out of hospital and can be reduced by timely delivery of effective prehospital emergency care. The Institute of Medicine has noted, however, that across the United States, the delivery of such care is fragmented.[3] Many patients with an acute myocardial infarction die from cardiac arrest before reaching the hospital. Although there have been tremendous advances in the treatment of acute myocardial infarction once the patient arrives at the hospital, by comparison, out-of-hospital cardiac arrest continues to be an important public health problem. In selected cities where cardiac arrest has been treated as a public health problem, gains have been made. But in most of the United States, little progress has been achieved.

Unfortunately, contemporary health surveillance systems cannot accurately determine the burden of acute cardiovascular illness in the prehospital setting or progress toward reducing it.[4] The AHA recently described the essential features of a surveillance system designed to support the prevention and management of heart disease and stroke, as shown in Table 2.[5] The present statement describes the burden of cardiac arrest and expands the focus on surveillance to address unique aspects of designating out-of-hospital cardiac arrest as a reportable event. Strategies for managing acute cardiovascular events are summarized, and the role of surveillance in monitoring the impact of efforts to treat these events is examined. We review existing surveillance systems for monitoring progress in reducing the burden of out-of-hospital cardiac arrest in the United States and make recommendations for filling significant gaps in the systems. Potential barriers to action on out-of-hospital cardiac arrest are also addressed. In the present statement, out-of-hospital cardiac arrest is the primary event of interest, but similar approaches are applicable to acute myocardial infarction, acute coronary syndromes, and acute stroke in the out-of-hospital setting.

Implementation of the recommendations made in the present statement would require the commitment of resources beyond those already devoted to surveillance. The return on such an investment, however, could be substantial in terms of improving emergency medical service (EMS) systems nationwide to prevent acute cardiovascular disease (CVD) and other major disorders that are treated by EMS systems, which would result in better population health as well as fewer inflation-adjusted healthcare dollars being spent on acute in-hospital care. Better data would also be useful for targeting research, prevention, and treatment of acute CVD to reduce the burden of illness.

Public Health Burden

CVD is a leading cause of disability, death, and income-related differences in premature mortality.[6–8] Much of this burden is attributable to sudden cardiac death and acute myocardial infarction. Although cardiovascular mortality has declined over the past 30 years,[9–11] the case-fatality rate of sudden cardiac arrest has not decreased.[10,12] The present AHA statement refers to sudden cardiac death as *out-of-hospital cardiac arrest* when it occurs in the prehospital setting, regardless of outcome, and as *out-of-hospital cardiac death* when a resuscitation attempt outside the hospital is unsuccessful.

The true incidence of out-of-hospital cardiac arrest is an elusive number. Data from the Framingham Heart Study cohort suggest that the age-adjusted annual incidence of sudden cardiac death has a much wider range, from 0.5 to 4.5 per 1000 individuals within the population.[13] Other published estimates of deaths attributable to out-of-hospital cardiac arrest range from 184 400 to 450 000 (0.6 to 1.5 per 1000) Americans annually.[14–17] Recent data suggest that there are 273 000 EMS-treated out-of-hospital cardiac arrests in the United States annually (ie, 89.9 per 100 000 people) (unpublished data, Resuscitation Outcomes Consortium Investigators, January 28, 2008), which has a population of approximately 303 295 561 individuals (www.census.gov, accessed on January 24, 2008). The incidence of out-of-hospital cardiac arrest appears to be increasing in some populations,[16,18] particularly in certain geographic areas.[19] Further-

Table 1. *Healthy People 2010* Goals for Preventing and Managing Heart Disease and Stroke

Prevention of cardiovascular risk factors
Detection and treatment of risk factors
Early identification and treatment of heart attacks and strokes
Prevention of recurrent cardiovascular events

Table 2. Recommendations for Comprehensive Cardiovascular Disease Surveillance System

Establish National Heart Disease and Stroke Surveillance Unit to monitor progress in preventing and managing heart disease and stroke
Classify cardiovascular disease as a reportable condition
Modify patient-encounter data to include lipoprotein cholesterol, blood sugar, and glycohemoglobin concentrations
Standardize data elements
Implement oversampling in existing surveillance programs to provide better estimates for ethnic subgroups
Enable linkage between healthcare data systems, national surveillance programs, and electronic health records
Validate the multiple measures collected by self-reports and the reports from providers that are used in national databases
Expand national surveys to include information on awareness of physical inactivity, unhealthy diet, cigarette smoking, and obesity and on detecting, treating, and controlling these problems
Develop, test, and implement indicators and systems for surveillance related to physical inactivity and unhealthy diet
Develop, test, and implement indicators and systems for surveillance related to knowing about and recognizing symptoms
Develop, test, and implement indicators and systems related to patients with newly diagnosed heart disease, stroke, congestive heart failure, and peripheral arterial disease in the outpatient setting

more, the incidence is likely to continue to increase because the prevalence of congestive heart failure is increasing.[20,21]

There is extensive variation in reported outcome after the onset of cardiac arrest[12,22]; understandably, this variation has drawn media attention.[23,24] The median reported survival-to-discharge rate after any first recorded rhythm is 6.4%.[12] This disparity in survival rates reemphasizes that an effective EMS system can decrease disability and death from acute cardiovascular events in the out-of-hospital setting.

Impact of Emergency Cardiovascular Care on Outcomes

The existing variation in survival rates can be partly attributed to regional differences throughout the United States in the availability of out-of-hospital and hospital-based emergency cardiovascular care.[22] Interventions for cardiac arrest include bystander cardiopulmonary resuscitation (CPR), defibrillation programs for lay responders,[25] CPR performed by experienced EMS providers,[26] and specific interventions performed by EMS providers[27,28] or receiving hospitals.[29,30] Bystander CPR is simple, inexpensive, and known to save lives. But only defibrillation by lay responders[25] and therapeutic hypothermia[30,31] have been shown in randomized trials to significantly improve outcome to hospital discharge after cardiac arrest.

There is substantial regional variation in EMS structures and processes, for example, service level provided, number of EMS providers typically responding to a call, time from receipt of a call to arrival at the patient's side, use of procedures or drugs in the field, level and type of training, and quality assurance and feedback. Some of these factors have been associated with differences in survival rates or quality-of-life indicators after out-of-hospital resuscitation,[32–35] although no analysis has been adequately powered to detect the independent effects of each of these factors.

Some recent studies have been interpreted as suggesting that prehospital emergency cardiovascular care interventions do not improve outcomes for cardiac arrest,[36–38] but these studies did not account for the EMS providers' previous experience, which is an important outcome predictor.[26] Broad implementation and ongoing maintenance of adequately funded EMS systems staffed by highly trained and experienced providers may be necessary to achieve a meaningful impact on death attributable to out-of-hospital cardiac arrest. Illuminating the national burden of out-of-hospital cardiac arrest is an important step toward improving prehospital care in the United States.

In the absence of high-quality evidence to describe the incidence of out-of-hospital cardiac arrest and its outcome, it is impossible to develop a fundamental understanding of acute CVD or to outline a scientifically based approach to reducing its burden.

Methodological Challenges to Designating Cardiac Arrest as a Reportable Event

There are several methodological challenges associated with designating out-of-hospital cardiac arrest as a reportable event. First, no practical, uniformly applied definition of cardiac arrest exists. As a consequence, incomplete identification of cases and the decisions to exclude or include particular cases in a surveillance system can affect estimated survival rates.[39] An international consensus workshop classified cardiac arrest as the "cessation of cardiac mechanical activity, as confirmed by the absence of signs of circulation."[40] This definition emphasizes that cardiac arrest is a clinical syndrome that involves the sudden (usually <1 hour from onset of first symptoms until death) loss of detectable pulse or the cessation of spontaneous breathing. If an EMS provider or physician does not witness the event, uncertainty may exist as to whether a cardiac arrest occurred. An alternative definition acknowledges that many cardiac arrests are not witnessed: for patients with no identifiable noncardiac etiology, sudden cardiac death includes death within 1 hour of the onset of symptoms for witnessed events or within 24 hours of being observed alive for unwitnessed events.[41]

Such definitions have several limitations. First, because the likelihood of underlying disease is uncertain, many studies presume that an arrest is of cardiac origin unless there is another obvious cause, specifically, unless the episode is known or likely to have been caused by trauma, submersion, drug overdose, asphyxia, exsanguination, or any other noncardiac cause as determined by the rescuers.[40] Such classifications are important, especially for studies of out-of-hospital cardiac arrest, but they remain inexact because they are subject to ascertainment bias due to incomplete assessment based on information at the scene or on toxicology tests ordered selectively on patients successfully transferred to the hospital. The frequent lack of autopsy data compounds the problem.

For inclusion in a surveillance system, a pragmatic definition of out-of-hospital cardiac arrest would be an event in which a person is evaluated by organized EMS personnel and (1) receives external defibrillation attempts (by lay responders or emergency personnel) or receives chest compressions by organized EMS personnel, or (2) is pulseless but does not receive defibrillation attempts or CPR from EMS personnel.

A second methodological challenge is presented by the lack of accurate data to describe the structure, process, and outcome of care related to out-of-hospital cardiac arrest because of the lack of uniformity in reporting results. Fortunately, there is now international consensus on how to uniformly report such results.[40] To date, however, these uniform standards have been used infrequently to report data from different geographic regions.[42]

A third methodological challenge is posed by the wide variety of EMS organizational structures, which range from tightly integrated groups of dispatch centers and responders that operate under a single military-like structure to loose networks of public, professional, and entrepreneurial components, each of which has its own oversight and funding sources. Record-handling systems also vary, from hard copy records stored in minimally organized filing systems to computer-based systems that track events from dispatch through hospital admission and outcome. The wide range of data-management methods presents challenges to the efficient conduct of public health surveillance. To avoid over-

whelming the resources of EMS agencies, any effort to require reporting of out-of-hospital cardiac arrest episodes must be simple, secure, and user friendly.

A separate but related issue is that EMS agencies provide patient care for many disorders, of which cardiac arrest represents only a small proportion. On the other hand, the standards of practice for other disorders are heterogeneous, whereas for cardiac arrest they are well defined. Thus, the monitoring of treatment of out-of-hospital cardiac arrest by EMS agencies could be the sentinel measure of the quality of EMS care in the community.

AHA and *Healthy People 2010* Goals for Preventing and Managing Heart Disease and Stroke

Healthy People 2010 is a comprehensive set of objectives in disease prevention and health promotion for the United States to achieve during the first decade of the 21st century.[2] The overall goals of *Healthy People 2010* are to increase the quality and years of healthy life and to eliminate health disparities. The goal of *Healthy People 2010* that is pertinent to emergency cardiovascular care is early identification and treatment of out-of-hospital cardiac arrest, heart attack, and stroke.

The 10-year impact goal of the AHA to reduce death rates from coronary heart disease and stroke and risk factors for these diseases by 25% by 2010 is aligned with these national health objectives. The specific indicator for emergency cardiovascular care is a 25% reduction in the rate of death from coronary heart disease and stroke. Efforts are ongoing to develop goals for 2020 and beyond; hence, the recommendations provided in the present statement are intended to be flexible.

Surveillance of out-of-hospital cardiac arrest should be integrated into a comprehensive system that supports the prevention of risk factors (*Healthy People 2010* Goal 1); detection, treatment, and control of cardiovascular disease (*Healthy People 2010* Goal 2); and prevention of recurrent events (*Healthy People 2010* Goal 4) as recommended previously.

Opportunities and Approaches to Prevention and Management

Despite considerable study, the real causes of out-of-hospital cardiac death remain obscure. Atherosclerosis is likely a factor in the majority of cases in middle- or high-income countries; structural and congenital cardiac abnormalities, fibrosis, and conditions such as myocarditis contribute to most of the remaining cases.[43] Many risk factors for cardiac arrest, such as hypertension and hypercholesterolemia, are present for long periods of time and are likely to be identified whenever an individual is evaluated. Others can be evanescent (eg, hypokalemia). Risk factors may be cellular, phenotypic, environmental, social, educational, behavioral, clinical, or related to health systems; a combination of these factors is usually present. The interplay of these factors is complex; for example, socioeconomic gradients exist in some circulating factors that are not fully explained by health-related behaviors or risk factors for coronary heart disease.[44] Comprehensive monitoring of the incidence and outcome of out-of-hospital cardiac arrest could identify high-incidence areas in which the interplay of these factors could be studied in greater detail to identify interventions to prevent or successfully manage out-of-hospital cardiac arrest.

Role of Surveillance in Management Efforts

Public health surveillance is defined by the Centers for Disease Control and Prevention (CDC) as "the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health-related events for use in public health action to reduce morbidity and mortality and to improve health."[45] Comprehensive and accurate disease surveillance systems are critical to the success of efforts to reduce the burden of CVD. Approximately two thirds of cardiac arrests occur in individuals who had no earlier clinical recognition of cardiac disease,[46] and in one third of cardiac arrests, the symptoms began in the hour before the onset of arrest.[47] Approximately 60% of out-of-hospital cardiac arrests are treated by EMS personnel.[43] Regardless, surveillance systems that do not include episodes that occur in the out-of-hospital setting are likely to substantially underestimate the burden of illness due to CVD as well as the impact of prehospital emergency care on reducing it.

Available Data

At the National Level

Existing cardiac arrest registries do not contain the necessary information to determine which interventions are effective in the out-of-hospital setting. For example, the National Registry for Cardiopulmonary Resuscitation was developed by the AHA to collate data describing in-hospital cardiac arrest events.[48] As of January 1, 2007, this registry included more than 100 000 in-hospital events that required some form of resuscitation. More than 5000 adult and 200 pediatric events are added to the registry quarterly by more than 440 participating hospitals. Participation in this registry is voluntary, however, and events that occur outside of the hospital are excluded from the database (and most US hospitals do not participate). In addition, the etiology and epidemiology of out-of-hospital and in-hospital cardiac arrest differ.

The AHA has provided supplementary funding to the Resuscitation Outcomes Consortium to develop an out-of-hospital cardiac arrest registry. The Resuscitation Outcomes Consortium was established in 2004 by the National Heart, Lung, and Blood Institute in partnership with other governmental and nongovernmental funding partners to conduct a series of large, simple randomized trials to evaluate resuscitation interventions in the out-of-hospital setting. The Resuscitation Outcomes Consortium protocols involve 268 EMS and fire-protection agencies that cover 35 000 square miles and serve nearly 24 million people. But these sites consist largely of well-functioning urban and suburban EMS agencies, and thus, their data are likely not representative of the national experience.

Several federal agencies have supported work that could facilitate the development of an out-of-hospital cardiac arrest surveillance system. In 1993, the National Highway Traffic Safety Administration supported the development of the Uniform Prehospital Dataset.[49] Later, the Emergency Medical Services Agenda for the Future emphasized the need to develop a uniform set of data elements for emergency services as well as mechanisms with which to apply them.[50] In 2001, the US General Accounting Office stated that consistent EMS data would facilitate development of national healthcare policy, improve local performance, and improve the ability of clinicians and researchers to assess EMS outcomes.[51] Since 2001, the National Highway Traffic Safety Administration has supported the development and implementation of a National EMS Information System (NEMSIS) that is intended to capture the EMS episode from activation of the system through release of the patient from EMS care. In 2005, the National Highway Traffic Safety Administration and other agencies, including the CDC, funded a technical assistance center to support implementation of NEMSIS and to use it to populate a national EMS database. As of March 5, 2007, 49 states, the District of Columbia, and 3 territories had agreed to support full implementation of the NEMSIS dataset in their jurisdictions. Although the focus of NEMSIS is EMS as a whole rather than just cardiac arrest, the ongoing development of this database will greatly enhance the ability to monitor out-of-hospital cardiac arrest.

At the State Level

Several states have implemented or are in the process of implementing statewide registries that either describe all EMS care, and therefore could be adapted to surveillance of out-of-hospital cardiac arrest, or that focus specifically on cardiac arrest. For example, all EMS agencies in North Carolina are required to submit data to the state daily using the NEMSIS data definitions and extensible markup language–standard-based software. This software is available to interested EMS agencies (at http://www.emspic.org/ems_toolkits/index.htm) as a toolkit to help the agencies monitor and improve their outcomes. The state of Washington is in the process of implementing a statewide cardiac arrest registry.

At the Local Level

Few EMS agencies routinely assure the quality of care provided to patients being treated for out-of-hospital cardiac arrest, and fewer still report their results. And yet, the Seattle Fire Department Medic One program has monitored the incidence and outcome of out-of-hospital cardiac arrest in Seattle for more than 35 years.[52] The paramedic program in King County, Washington, has conducted public health surveillance over a similar period.[53] In Olmsted County, Minnesota, the incidence and outcome of out-of-hospital cardiac arrest has been monitored for more than 15 years.[54] Each of these agencies reports survival rates that are much greater than elsewhere, thereby reemphasizing the value of ongoing surveillance of cardiac arrest.

Recently, investigators at Emory University and the CDC developed the Cardiac Arrest Registry to Enhance Survival, which they implemented in 8 counties in the Atlanta area. This simple surveillance system links performance measures from 911, fire department first responders, and paramedics to patient survival status at hospital discharge. Participation in the Cardiac Arrest Registry to Enhance Survival has been extended to other geographic areas, but its catchment population to date is less than that of the Resuscitation Outcomes Consortium out-of-hospital cardiac arrest registry.

Gaps in Data Systems

At the National Level

There are no nationally representative data to describe the burden of out-of-hospital cardiac arrest. Available data on the quality of EMS care that is provided to these patients apply only to selected subgroups of patients (eg, those with witnessed ventricular fibrillation) or are reported on a voluntary basis. There are no widely applied performance measures, nor are data available on community indicators relevant to early identification and response to symptoms (eg, bystander CPR, defibrillation by lay responders) or access to high-quality care in the prehospital setting (which might be defined, for example, by an average time from the call to EMS to rhythm analysis of <8 minutes). Limited data are available pertaining to patient health status at discharge.

At State and Local Levels

Representative data are also lacking at state and local levels on the incidence of out-of-hospital cardiac arrest, process of care, and outcome at hospital discharge, as are community indicators of early identification and response to symptoms. Finally, representative data on patient health status at discharge are generally unavailable at the state or local levels.

Barriers to Implementation

There are several barriers to effective implementation of a surveillance system for out-of-hospital cardiac arrest. One major obstacle in many areas has been the reluctance of EMS or hospital systems to share outcome data because of their concern about how the data will be used and the potential for violating regulations that protect personal health information. Even before the Health Insurance Portability and Accountability Act, EMS providers and researchers had difficulty ascertaining the vital status at discharge of patients treated and transported by EMS. Historically, hospitals have often been reluctant to share such information because of the burden of doing so as well as their concern about how such data will be used. But at least 1 city council has mandated that its municipal EMS agency report outcomes of area cardiac arrests annually (M. Sayre, MD, unpublished data, November 2006). As a general rule, illumination of results is likely to be a powerful method of motivating change. An alternative approach to encouraging EMS agencies to report the incidence of cardiac arrest and its outcomes would be to provide anonymous quality-assurance reports to participating EMS agencies and hospitals at least annually to allow them to compare their patient populations, interventions, and outcomes with others. Collectively, these strategies could enable

clinicians to identify opportunities to improve quality of care and thereby improve outcomes for cardiac arrest.

There is legitimate concern that EMS agencies and those hospitals that receive EMS-treated patients will be reluctant to provide data because they perceive the Health Insurance Portability and Accountability Act as a barrier to release of any patient data. But the act also states that without individual authorization, a covered entity may disclose protected health information to a public health authority (or to an entity working under a grant of authority from a public health authority) that is legally authorized to collect or receive the information for the purposes of preventing or controlling disease, injury, or disability including but not limited to reporting of disease, injury, and vital events (eg, birth or death) and conducting public health surveillance, investigations, and interventions.[55]

Thus, state or federal governments and entities working under their authorization for the purpose of public health surveillance should be able to convince care providers that reporting patient data for surveillance purposes does not, under the Health Insurance Portability and Accountability Act, require patient authorization. Adding the designation of out-of-hospital cardiac arrest as a reportable disease should stimulate the collection of such data. Furthermore, under the criteria of minimal risk, collection of de-identified data for these purposes qualifies for a waiver of documented written consent to review the clinical record. State health departments should request assistance from their state's legal services department to develop a written document that highlights interpretation of the Health Insurance Portability and Accountability Act as well as the separate but related issue of informed consent to share with potential sources of EMS and hospital data.

Potential Benefits of Surveillance

Our grand challenge[56] is to seek a fundamental understanding of CVD and develop scientific innovations that would remove barrier(s) to reducing its burden. Accurate identification of the incidence and distribution of out-of-hospital cardiac arrest throughout the United States would contribute to meeting this challenge by identifying (1) epidemiologic hot spots that may reflect emerging risk factors; (2) disparities in incidence and outcomes across socioeconomic, health, and geographic gradients; (3) opportunities to improve population health by community-based prevention efforts in high-risk areas; (4) more efficient distribution of emergency response resources**;** and (5) more efficient distribution of hospital resources. Effective EMS and hospital resource allocation would contribute to improvements in care for cardiac arrest as well as for acute coronary syndromes and acute myocardial infarction.[57,58] Dissemination of information about the incidence and outcome of out-of-hospital cardiac arrest would also foster recognition among the public, providers, and policy makers of the true burden of this event and thus provide motivation for allocating additional efforts to prevent and treat this problem.

Table 3. Recommendations for Designating Out-of-Hospital Cardiac Arrest a Reportable Event

	Priority*	Staging†	Estimated Cost per Year‡
Classify occurrence of out-of-hospital cardiac arrest and its outcome through hospital discharge status as reportable events	I	I	$
Collect data on performance of bystander CPR and defibrillation by lay responders at time of out-of-hospital cardiac arrest	II	II	$$
Report progress in management of acute cardiovascular events in out-of-hospital setting	I	I	$

*Categories are I for high and II for intermediate; no low-priority recommendations were made.

†Categories are I for early (1 to 2 years), II for intermediate (2 to 4 years), and III for later.

‡Categories are $ for <$10 million, $$ for $10 to $100 million, and $$$ for $100 million.

Recommendations

Prevention of cardiac arrest requires attention to all 4 of the goals in *Healthy People 2010* that are related to CVD.[5] and thus we strongly endorse all of the recommendations made in the previous AHA statement on surveillance of CVD. Additional recommendations (Table 3) are classified (see below) according to priority (P), staging (S), and cost (C) in accordance with the classification scheme adopted in the AHA statement on surveillance of CVD.[5] Priority was classified as high (I) or moderate (II); no low-priority recommendations were made. Staging was classified as early (I; 1 to 2 years), intermediate (II; 2 to 4 years), or later (III). Cost per year was classified as low (<$10 million), intermediate ($10 to $100 million), or high (>$100 million).

1. Occurrence of out-of-hospital cardiac arrest and outcome to hospital discharge should be classified as reportable events as part of a system for reporting heart disease and stroke events (P=I, S=I, C=$). Classification of the incidence and outcome of acute cardiovascular events as reportable conditions would remove many barriers to timely surveillance. Standard definitions exist for these events and for most of the relevant data elements related to quality of care and outcomes, but they have not been applied. Hence, an efficient surveillance system could be developed and implemented based on a reportable event model. This recommendation was judged to be high priority and inexpensive. Much of the necessary developmental work has been completed over the past few years. Consequently, this recommendation was considered for early staging.

2. The data collected on patients' encounters with EMS systems should be revised to include the performance of bystander CPR and defibrillation by lay responders at the time of out-of-hospital cardiac arrest (P=II, S=II, C=$$). Multiple examples of duplicate and fragmented data-collection activities were identified. Improved coordination of effort, with greater standardization and less redundancy, could result in cost savings and thereby free resources to support enhanced surveillance in critical areas. This recommendation was judged to be a high priority for early staging, although some cost would be incurred in the short term to implement collection of additional data and develop a coordination plan for existing surveillance programs.
3. A mechanism should be established to produce annual publically available reports on key indicators of national progress in managing acute cardiovascular events in the out-of-hospital setting (P=I, S=I, C=$). The proposed National Heart Disease and Stroke Surveillance Unit[5] should be charged and resourced to assemble the most currently available and relevant data on a continuing basis, identify critical gaps in knowledge and data systems related to acute cardiovascular events, and propose modifications to existing surveillance components or develop new ones to fill these gaps. This recommendation was judged to be a high priority for early staging and to have only a moderate cost as it would require a staff of 3 or 4 appropriately trained individuals. This need is being partially addressed by the efforts of AHA volunteers and staff, as well as by professional staff in the EMS Office of the National Highway Traffic Safety Administration and divisions of the Department of Health and Human Services (Agency for Healthcare Research and Quality, the CDC [including the National Center for Health Statistics and the Division for Heart Disease and Stroke Prevention], and the National Heart, Lung, and Blood Institute).

Conclusions

The success of efforts to prevent and manage out-of-hospital cardiac arrest depend on the availability of surveillance data at the national, state, and local levels to assist federal agencies, state and local health departments, and their partners in assessing priorities in prevention and treatment and in guiding program planning, implementation, and evaluation. The present statement summarizes the information needed at the national, state, and local levels to address the AHA and *Healthy People 2010* goals related to emergency cardiovascular care for cardiac arrest; when possible, existing efforts to collect data on cardiac arrest have been identified for addition of new items. Significant gaps have been identified and recommendations made for enhancing the surveillance of emergency cardiovascular care in the United States. Just as implementation of a national surveillance system for CVD would require substantial additional resources,[5] implementation of all recommendations in this report would require the commitment of resources beyond those already devoted to surveillance. Because surveillance of both acute and chronic CVD is likely necessary to reduce the overall burden of CVD, these efforts are complementary rather than competitive. A staged rollout of these recommendations, however, could mitigate their financial impact. Finally, to the extent that surveillance of cardiac arrest is used to track the impact of programs focused on the prevention and detection of risk factors and their treatment and control, the return on investment could extend far beyond improvements in care and outcomes for cardiac arrest to result in fewer inflation-adjusted healthcare dollars being devoted to acute in-hospital care and care for chronic illness. Consequently, the present statement should serve as a guide to policy makers as they work with public health agencies to develop and implement an emergency cardiovascular care surveillance system that can contribute importantly to efforts to prevent heart disease and stroke.

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Writing Group Disclosures

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Expert Witness	Ownership Interest	Consultant/ Advisory Board	Other
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Barbara "Bobbi" Leeper	Baylor University Medical Center	None	None	None	None	None	None	None
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*Modest.

†Significant.

Reviewer Disclosures

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