ILCOR Consensus Statement

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 (American Heart Association, European Resuscitation Council, Australian and New Zealand Council on Resuscitation, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, Resuscitation Council of Asia); and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation

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We dedicate this publication to the late Dr. Ian Jacobs, who led ILCOR with passion and vision through to October 19, 2014.

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Abstract

Utstein-style guidelines contribute to improved public health internationally by providing a structured framework with which to compare emergency medical services systems. Advances in resuscitation science, new insights into important predictors of outcome from out-of-hospital cardiac arrest, and lessons learned from methodological research prompted this review and update of the 2004 Utstein guidelines. Representatives of the International Liaison Committee on Resuscitation developed an updated Utstein reporting framework iteratively by meeting face to face, by teleconference, and by Web survey during 2012 through 2014. Herein are recommendations for reporting out-of-hospital cardiac arrest. Data elements were grouped by system factors, dispatch/recognition, patient variables, resuscitation/postresuscitation processes, and outcomes. Elements were classified as core or supplemental using a modified Delphi process primarily based on respondents' assessment of the evidence-based importance of capturing those elements, tempered by the challenges to collect them. New or modified elements reflected consensus on the need to account for emergency medical services system factors, increasing availability of automated external defibrillators, data collection processes, epidemiology trends, increasing use of dispatcher-assisted cardiopulmonary resuscitation, emerging field treatments, postresuscitation care, prognostication tools, and trends in organ recovery. A standard reporting template is recommended to promote standardized reporting. This template facilitates reporting of the bystander-witnessed, shockable rhythm as a measure of emergency medical services system efficacy and all emergency medical services system–treated arrests as a measure of system effectiveness. Several additional important subgroups are identified that enable an estimate of the specific contribution of rhythm and bystander actions that are key determinants of outcome.

Introduction

The term "Utstein style" is synonymous with consensus reporting guidelines for resuscitation. It originated from an international multidisciplinary meeting held at the Utstein Abbey near Stavanger, Norway, in June 1990.[1] The purpose of this inaugural meeting was to develop, by consensus, uniform terms and definitions for out-of-hospital resuscitation. It was anticipated that this would lead to a better understanding of the epidemiology of cardiac arrest, facilitate inter- and intrasystem comparisons, enable comparison of the benefits of different system approaches, act as a driver to quality improvement, identify gaps in knowledge, and support clinical research.[2,3] The widespread implementation of these recommendations has encouraged the development of other Utstein-like consensus guidelines addressing pediatric advanced life support,[4] laboratory research,[5] in-hospital resuscitation,[6] education,[7] drowning,[8] postresuscitation care,[9] and emergency medical dispatch.[10]

The original Utstein definitions were revised in 2004 with the aim of reducing complexity and updating data elements based on advances in resuscitation science.[11] The original Utstein recommendations focused efforts to report on patients with a non–emergency medical services (EMS)-witnessed cardiac arrest of presumed cardiac cause, with ventricular fibrillation at the point of first rhythm analysis. The Utstein 2004 revision broadened this focus to include all EMS[12]-treated cardiac arrests irrespective of first monitored rhythm and whether or not the arrests were witnessed. Other major changes in 2004 related to the definition of cardiac arrest (transition from presence/absence of a carotid pulse to signs of circulation), inclusion of defibrillation attempts by bystanders, and extension of the template to include reporting of in-hospital cardiac arrest in both adults and children in the same template.

Since the 2004 update, there has been a substantial increase in the number and scope of resuscitation registries and clinical trial groups with major national and regional registries established in the United States,[13,14] Europe,[15] Asia,[16] Australia,[17] and Japan.[18] Data from such registries are being used increasingly to compare the epidemiology and outcome of cardiac

arrest,[19] explore the relation between key treatments and outcome,[20,21] identify and prioritize gaps in resuscitation science knowledge, and drive quality improvement.[22,23] With this background, in 2013, the International Liaison Committee on Resuscitation (ILCOR) proposed a group forum to review and, if necessary, update the Utstein templates for cardiac arrest. This article reports the results of that review with recommendations for further refinement of the Utstein reporting guidelines and reporting templates and a specific focus on out-of-hospital cardiac arrest (OHCA). Because of substantial differences between in-hospital and out-of-hospital epidemiology, process of care, and treatments, a decision was made once more to use separate reporting templates. Thus, this article focuses on OHCA, and a subsequent article will focus on recommendations for in-hospital cardiac arrest (IHCA) process of care and outcome reporting.

Current Uses and Applications

A review of articles citing the 2004 Utstein manuscript (Scopus, Elsevier, Amsterdam, The Netherlands: March 2014) identified 584 citations. These originated from 50 countries; most citations (493 [84%]) were classified as research articles. One third of the citations focused on epidemiology and outcome (OHCA, n=126 [22%]; IHCA, n=41 [7%]); and specialized populations (eg, drowning, children), n=43 (7%). Another third focused on links in the Chain of Survival (early access, including dispatcher, n=19 [3%]; cardiopulmonary resuscitation [CPR], n=43 [7%], and defibrillation, n=31 [5%]; advanced life support, including drugs, n=19 [3%]; airway, n=7 [1%]; and postresuscitation care, n=63 [11%]). The remaining articles examined elements related to outcome and prognostication (n=76 [13%]); described registries/registry methodology (n=14 [2%]), quality improvement (n=33 [6%]), or primary research (n=44 [8%]); were review articles (n=22 [4%]); or addressed other factors (n=3 [0.5%]).

Despite substantial application to a variety of clinical and research projects, a recent evaluation of 13 registries enrolling patients with OHCA in 13 countries noted variation in inclusion criteria, definition, coding, and process-of-care elements.[12] Overall, the registries

collected only two thirds of the recommended 2004 core elements. Recommended timed event elements were collected for 43% of events. Thus, the current proposed iteration of the revised Utstein templates attempts to balance (1) the desirability of uniform collection of evidence-based factors associated with outcome and (2) the practical challenges of real-life data collection and validation.

What Have We Learned About the Utstein Elements for Cardiac Arrest?

Several core elements have consistently been associated with survival to hospital discharge: witnessed arrest (by a bystander or EMS); bystander CPR; shorter EMS response interval; first shockable rhythm; and return of spontaneous circulation (ROSC) in the field.[24-27] However, it has become evident that the Utstein core elements incompletely explain the variability in OHCA survival across populations,[25-27] even allowing for the declining incidence of ventricular fibrillation in OHCA.[28,29] Since the last iteration of the Utstein style,[30] there has been increased recognition of the importance of additional factors associated with the likelihood of survival after OHCA, such as public access defibrillation,[24,31] dispatcher-assisted CPR,[32] the quality of CPR,[33,34] postresuscitation care,[35-37] variability in "not for resuscitation" order policies and procedures,[38] and accurate prognostication,[39] In addition there has been changing trends in organ recovery and transplantation.[40] Short-term outcomes such as ROSC and survival to hospital discharge (the latter being susceptible to local health system practices) do not take into account patients' health-related quality of life.[41,42] Given the advances in understanding of the prognostic determinants of survival in OHCA, the need to revisit and update the 2004 Utstein guidelines was evident.[30]

Methods

The Utstein collaborator group met face to face on 2 occasions to discuss the revisions to the Utstein reporting template. The first meeting was in Vienna in October 2012 and was linked to the European Resuscitation Council Scientific Congress. The second meeting followed the

ILCOR 2013 Task Force meeting in Melbourne in April 2013. During these meetings the strengths and weaknesses of the previous Utstein consensus articles for cardiac arrest[11,43,44] were reviewed, and opportunities to update and improve them were discussed.

Consensus was reached for several overarching principles. After repeated attempts to address key issues related to OHCA and IHCA in the same template, it became apparent that separate reporting templates would facilitate end-user acceptance and use of updated reporting templates. Consistency was sought in data elements and definitions between IHCA and OHCA unless there was a strong rationale for deviation. Core elements were defined as elements that *all* registries should aim to capture and report. The decision to assign an element as core was based on the evidence-based importance of capturing that element, tempered by the practical challenges of real-life data collection and validation. Collection and verification of core elements was considered the minimum recommended standard for quality assurance/improvement purposes. Supplemental elements were defined as elements that were desirable but not essential to capture and report, including elements more relevant to research than quality assurance.

Breakout groups considered core and supplemental data elements under the domains of system factors, dispatch/recognition, patient variables, resuscitation and postresuscitation processes, and outcomes. After the Melbourne meeting, a 2-stage Delphi process was conducted to refine the recommendations for core and supplemental elements. During stage 1, the output from the breakout groups was presented to the wider collaborator group. Agreement for core and supplemental element designations was sought using a 5-point Likert scale. Participants were also able to submit additional elements for consideration. New elements, or elements for which there was less than 85% agreement on designation as core or supplemental, were submitted to a second round of voting. There was greater than 85% agreement for designations for all elements by the end of the second round, so further rounds were not required.

Data definitions were based where possible on current 2004 Utstein definitions. New element definitions were proposed by the writing group and circulated to the collaborator group for vetting.

The writing group, on behalf of collaborators, summarized the output from this process in a draft of the manuscript that was circulated and discussed electronically with the Utstein collaborators. This led to further development of the Utstein reporting template and classification of etiology. The final manuscript was approved by the coauthors and ILCOR.

Results

OHCA Utstein Definitions

The Utstein elements were grouped into 5 domains (Figure 1). Each domain contained core and supplemental elements that are described in Table 1.

System Description

The system description defines the characteristics of the population served and the structure of the EMS response. It includes the number of cases of cardiac arrest attended by EMS (cardiac arrest is defined by the absence of signs of circulation irrespective of whether the assessment was made by EMS or bystander), the number of cases for which resuscitation was attempted by EMS, and the reasons why resuscitation was not attempted. A resuscitation attempt is defined as the act of trying to maintain or restore life by establishing and/or maintaining breathing and circulation through CPR, defibrillation, and other related emergency care). A structured system description has been added to improve consistency when describing the components of the healthcare system responsible for responding to OHCA.

Dispatch

Dispatcher-identified cardiac arrest and dispatcher-assisted CPR have been included as core elements to reflect the impact these processes can have on patient outcome.[45,46] The system description provides the opportunity to describe operation of the local EMS dispatch. Researchers and clinical service directors who wish to record additional information (eg, dispatcher diagnostic code, bystander response) are directed to a consensus paper on dispatcher assistance for OHCA.[47]

Patient Variables

Patient variables include patient demographics, comorbidities, etiology, initial presentation, and bystander response. The location of the arrest and whether it was witnessed should be recorded.

The designation of etiology was one of the most contentious areas discussed during this revision. The Utstein process has for decades tried to separate cardiac (or presumed cardiac) from noncardiac (or presumed noncardiac). The original intention was to create case equivalency; however, separation into cardiac and noncardiac has proved to be subjective,[48,49] with some communities reporting noncardiac percentages of all arrests as several percent and others up to 40%.[50,51]

Given this variation, we suggest that the primary reporting by systems should state the outcomes of all EMS-treated cardiac arrests (measuring system effectiveness) and those that are bystander witnessed and the first monitored rhythm is shockable (measuring system efficacy). Registries and researchers should continue to record the etiology of cardiac arrest and report it as part of the overall description of EMS-treated cardiac arrests. Etiology should be categorized under the following headings which also recognize the importance of backward compatibility with existing definitions: medical (presumed cardiac or unknown, other medical etiologies); traumatic cause; drug overdose; drowning; electrocution; asphyxial (external). Where more than one etiology is possible (eg, ventricular fibrillation arrest leading to a fall from a height), the most

likely primary cause should be cited (in this example, presumed cardiac). Table 1 provides further information about classification into different etiological categories.

The first monitored rhythm is the rhythm recorded at the time of first analysis of the monitor or defibrillator after a cardiac arrest. If the automated external defibrillator (AED) does not have a rhythm display, it may be possible to determine the first monitored rhythm from a data storage card, hard drive, or other device used by the AED to record data. If the AED has no data-recording device, the first monitored rhythm should be classified simply as shockable or nonshockable. This data point can be updated at a later time if the AED has data download capability. Bradycardia has been retained as an option to enable appropriate reporting when chest compressions are provided for severe bradycardia with pulses and poor perfusion (most commonly in children). When CPR is started because of the absence of signs of circulation despite electrocardiographic evidence of electrical activity (ie, pulseless electrical activity), it should be recorded as pulseless electrical activity even if the electrocardiographic rhythm is slow. Asystole is defined by a period of at least 6 seconds without any electrical activity of >0.2 mV (that could represent atrial complexes).

Bystander responses are critical to patient outcomes. All systems should capture the number of cases in which bystander resuscitation is started (chest compressions or standard CPR), whether or not an AED is deployed, and whether or not it delivered a shock.

Supplemental information includes whether a patient was living independently before the arrest, comorbidities, and new treatments (cardioverter-defibrillators, ventricular assist devices).

Process Elements

Core process elements include the EMS response time, time to first shock, whether targeted temperature management was used before or after ROSC, and whether coronary reperfusion was attempted. Twelve supplemental elements are included (6 elements related to treatments initiated out-of-hospital and 6 elements related to treatments initiated in-hospital).

Outcome

Recommendations on the documentation of survival outcomes remain largely unchanged from the 2004 Utstein style. The core reporting outcome for initial survival is "survived event" (which is defined ROSC sustained until arrival at the emergency department and transfer of care to medical staff at the receiving hospital). To ensure compatibility with historical datasets, any ROSC remains a core outcome. ROSC is defined following a clinical assessment showing signs of life comprising a palpable pulse or generating a blood pressure. Assisted circulation (eg, extracorporeal life support, ventricular assist devices, or mechanical CPR) should not be considered ROSC until patient-generated circulation is established. For nonsurvivors, a supplemental element may be recorded to show whether any solid organs were recovered for transplantation.

Long-term survival can be reported as either survival to 30 days or survival to hospital discharge according to the ease of collecting this information within each healthcare system. Survival at 12 months should be reported when possible, but is considered supplemental because of the challenge of such long-term follow-up. Neurologic outcome may be reported using the Cerebral Performance Category (CPC),[52] modified Rankin Scale (mRS),[53] or equivalent pediatric tools.[4] The CPC is a 5-point scale ranging from 1 (good cerebral performance) to 5 (dead). The mRS is a 7-point scale ranging from 0 (no symptoms) to 6 (dead). We define survival with favorable neurologic outcome as a CPC 1/2 or mRS 0-3 or no change in CPC or mRS from the patient's baseline status. Patient-reported outcomes and health-related quality of life are included to reflect the importance of the quality of recovery beyond simply survival.

Time Points and Intervals

Survival from cardiac arrest is related inversely to the interval from collapse to definitive care.[55,56] In this revised Utstein template, we have limited the core time point/interval elements to

response-time and time to first defibrillation (Table 1). The time of drug administration remains as a supplemental element. The previous Utstein documents recommended several additional core and supplemental time points/intervals. Certain time points are impossible to estimate (eg, time of collapse in an unwitnessed arrest), many are not routinely collected (eg, in OHCA, arrival at the patient's side), and others are unlikely to be recorded accurately (eg, time of first compression, time vascular access achieved, time of ROSC). It is recognized that additional time points/intervals may be collected routinely by some agencies: this revised template is not intended to suggest that such data points are redundant. Moreover, the collection of additional elements may be required for specific research studies.[57]

The problem of lack of synchronization of clocks and other time-recording devices persists[58-60] and can result in intervals being reported inaccurately. The recommendation remains that 1 clock (or synchronization to a single clock) be used to determine all times throughout the resuscitation attempt.

Utstein Reporting Template

The purpose of the revised Utstein template is to provide a framework combining the core elements of resuscitation performance for OHCA, including the community response, EMS treatments, and hospital systems of care. In previous iterations of the Utstein template, the target user was primarily a resuscitation research scientist. In the 2014 Utstein template (Figure 2), the authors recognized the need to widen the scope of the reporting template to encompass the needs of those involved in research, program evaluation, and/or continuous quality improvement. The goal in 2014 is to make the template intuitive to complete, effective in mapping the patient's journey through the local resuscitation system, and to enable knowledge sharing between resuscitation networks. To this end, the template has been reengineered in the following ways: First, the template follows the natural flow of the patient through community, out-of-hospital, and in-hospital systems of care. It is expected that this format will facilitate data collection. Second,

the template encompasses the core system structure, process, and outcome of care as well as performance measures similar to those used in other systems of models of care (eg, ST-segment elevation myocardial infarction, stroke, trauma).[61] Third, the various data dictionary and data formats are embedded within the template, enabling easier data entry by the user. Outcomes are defined at 4 levels: any ROSC, survived event, survived to discharge, and favorable neurologic outcome at discharge if known. Registries may report survival to 30 days as an alternative to survival to discharge. The 2014 template allows reporting of the witnessed cardiac arrest, who received bystander CPR and had a first recorded rhythm that was shockable (which is recommended as a comparator of system efficacy), and all EMS-treated cardiac arrests (which is recommended for system effectiveness comparisons). Outcomes of several important subgroups are identified that allow an estimate of the specific contribution of rhythm and bystander actions that are key determinants of outcome. This is particularly important for improving bystander CPR and outcome of the increasingly prevalent nonshockable rhythms. Only with knowledge of these specific outcomes can differences between systems and improvement over time be understood. The template includes the capability to add other user-defined outcomes for specific purposes.

Scope for Improving Utstein-Style Reporting

Previous Utstein templates do not characterize the nature of the organized EMS response. EMS systems are commonly grouped as either 1- or 2-tier systems, depending on the number and skill of providers who respond. In some settings, multiple EMS agencies cover a region in a patchwork fashion, with variable geographic and administrative overlap. Some municipal EMS systems use a private EMS agency for nonurgent transportation. Other agencies occasionally dispatch a paramedic supervisor to the scene. Most experts would not classify either of these as 3-tier services. Additional details about how services are provided may yield additional insight into regional differences in process and outcome.

Some, but not all, cardiac arrest registries monitor routinely for completeness of case capture. A comparison of patients not enrolled versus those enrolled in a registry designed to capture consecutive patients with acute coronary syndrome found that 30% of eligible patients were missing.[62] The missing patients were at higher risk, received poorer quality of care, and had a higher mortality rate than those who were included.[62] A similar analysis of the Swedish cardiac arrest registry reported that 25% of eligible cases were missing.[63] These missing cases tended to be older and less likely to receive bystander CPR but had significantly higher survival rates. Such selection bias limits the ability of registries to reliably assess epidemiology and the effectiveness of quality improvement initiatives or other interventions.[64] Each EMS agency participating in the Resuscitation Outcomes Consortium (ROC) Epistry[65] uses routine monitoring and necessary corrections for completeness of case capture. By consistently applying such monitoring, the estimated incidence of EMS-treated OHCA in participating North American ROC sites has increased by more than 20% since the inception of the ROC Epistry.[66,67] Organizers of cardiac arrest registries should implement monitoring and remediation for completeness of case capture.

There is variation in the magnitude and coding of missing data between registries. Missing data arise in most clinical studies and can bias inferences if data are not missing completely at random.[68] In addition, some registries combine “not done” and “unknown” into a single response. Organizers of registries should work to reduce unknown and missing data.

Implementation

Since 1990, implementation, update, and simplification of ILCOR Utstein templates for cardiac arrest resuscitation audit, registry, and research have improved transparency and comparability of reports. Challenges lie ahead for future implementation, particularly in the balance of feasibility versus desirability of data elements. Challenges with adherence to “not-for-resuscitation” rules, capture of actual measured quality of CPR parameters (eg, depth, rate, chest compression fraction, ventilation rate, perishock pause intervals), and linkage of out-of-hospital

interventions and outcomes persist. We have continued to identify a few core elements that we think every system of care should collect and report, as well as many supplemental elements that we think may be applicable to research-oriented systems, special resuscitation circumstances or processes, or EMS systems with advanced capability to routinely capture information on CPR quality. Recognition and focus on a core outcome comparator (ie, bystander-witnessed, shockable cardiac arrest) may offer a universal comparator for all systems, as a tracer methodology for efficacy in all systems. Increased implementation of these updated consensus definitions and reporting templates will inform and improve future formulas for survival[69] and enable meta-analysis and inclusion of larger numbers of patients in studies of cardiac arrest where appropriate.

Just as the Consolidated Standards of Reporting Trials (CONSORT) Statement[70] is designed to assist reporting research by using a checklist and flow diagram (http://www.consort-statement.org/consort-2010), the application of the Utstein template is intended to improve transparency and consistency of reports of cardiac arrest process of care and outcomes (Table 2). In addition to reporting Utstein elements, researchers should ensure that appropriate reporting guidelines relevant to the specific study design are followed (eg, CONSORT Statement for clinical trials; Strengthening the Reporting of Observational Studies in Epidemiology [STROBE] statement for observational studies [http://www.equator-network.org]).

Conclusion

Utstein-style guidelines standardize reporting of the process of care and outcomes for patients with cardiac arrest. By using the ILCOR infrastructure, face-to-face meetings, and an Internet-based modified Delphi approach, the 2004 OHCA Utstein reporting definitions and templates were updated for the 5 domains: system factors, dispatch/recognition, patient variables, process variables, and outcomes. New or modified elements reflect consensus on the need to account for EMS system factors, increasing availability of AEDs, variability in the data collection process, trends in epidemiology, increasing use of dispatcher-assisted CPR, emerging field treatments,

postresuscitation care, prognostication tools, and trends in organ recovery and transplantation.[40] The consensus reporting template, which resembles a CONSORT diagram, facilitates reporting of bystander-witnessed, shockable rhythm as a measure of EMS system efficacy and all EMS-treated arrests as a measure of system effectiveness. Several important subgroups are identified that allow an estimate of the specific contribution of rhythm and bystander actions that are key determinants of outcome.

Contributions

The detailed contributions are summarized in the electronic supplemental material. In brief, GDP ran the Delphi surveys and prepared the first draft of the manuscript under the oversight of IGJ and VN. AHT and RWK developed and refined the reporting template. The draft manuscript and templates were revised after input from a core writing group initially (VMN, AHT, J-TG, JCF, GN, RAB, PTM, AHT, JPN). These outputs were then circulated and discussed in detail with coauthors and collaborators who added important intellectual content to the manuscript's refinement. The final manuscript was approved by all authors and collaborators.

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Figure 1. Data element domains. Core and supplemental elements are shown for each of the 5 domains.

AED indicates automated external defibrillator; BP, blood pressure; CPR, cardiopulmonary resuscitation; DNAR, do not attempt resuscitation; ECG, electrocardiogram; ECMO, extracorporeal membrane oxygenation; IABP, intra-aortic balloon pump; ROSC, return of spontaneous circulation; and STEMI, ST-segment elevation myocardial infarction.

	System	Dispatch	Patient	Process	Outcome
CORE	**Population served** **Cardiac arrests attended** **Resuscitation attempted** **Resuscitation not attempted** **System description**	**Dispatcher identified cardiac arrest** **Dispatcher CPR instructions**	**Age** **Gender** **Witnessed arrest** **Arrest location** **Bystander CPR/AED** **First monitored rhythm** **Etiology**	**Response times** **Defibrillation time** **Target temp control** **Drugs** **Reperfusion attempted**	**Survived event** **Any ROSC** **30-day survival / survival to discharge** **Neurological outcome**
SUPPLEMENTAL	DNAR legislation Termination of resuscitation rules Dispatch software used Resuscitation algorithms followed Data quality activities Prehospital ECG capability		Independent living Comorbidities Presence of STEMI Ventricular assist devices Cardioverter-defibrillator	Airway control type Number of shocks Drug timings CPR quality Vascular access type Mechanical CPR Targeted oxygenation / ventilation / BP ECMO IABP pH, lactate, glucose 12-lead ECG Neuroprognostication Hospital type / volume	Transport to hospital Treatment withdrawal Cause of death Organ donation Patient reported outcomes measures Quality of life measures 12-month survival

Figure 2. Utstein standardized template for reporting outcomes from out-of-hospital cardiac arrest.

AED indicates automated external defibrillator; ASYS, asystole; bCPR, bystander cardiopulmonary resuscitation; Brady, bradycardia; CA, cardiac arrest; CC, chest compressions; CPC, Cerebral Performance Category; CPR, cardiopulmonary resuscitation; DC; discharge; DNAR; do not attempt resuscitation; Educ, educational institution; EMS; emergency medical services; ID, identified; mRS, modified Rankin Scale; PEA, pulseless electrical activity; Rec, sports/recreation event; ROSC, return of spontaneous circulation; SD, standard deviation; Temp, temperature; Vent, ventilations; VF, ventricular fibrillation; and VT, ventricular tachycardia.

Population Served

Total Population Served by EMS

n=

Cardiac Arrests Attended

Total; Number of Cases

n=

Resuscitation Attempted

n=

EMS Description	Text	

Dispatcher ID Cardiac arrest			Dispatcher CPR		
Yes	No	Unknown	Yes	No	Unknown
n=	n=	n=	n=	n=	n=

Response Times	MM:SS, 90% Fractile	

Resuscitation Not Attempted	All Cases	DNAR	Obviously dead	Signs of Life
	n=	n=	n=	n=

VF n=

VT n=

PEA n=

ASYS n=

Brady n=

AED Non-shockable n=

AED Shockable n=

Not Recorded n=

Unknown n=

Location	Home	Work	Rec	Public	Educ	Nursing	Other	Unknown
	n =	n =	n =	n =	n =	n =	n =	n =

Patient	Age		Sex		
	n; mean±SD	Unknown	Male	Female	Unknown
		n =	n =	n =	n =

Witnessed	Bystander	EMS	Unwitnessed	Unknown
	n =	n =	n =	n =

Bystander Response	Bystander CPR					Bystander AED		
	No bCPR	bCPR	CC Only	CC/Vent	Unknown	Analyze	Shock	Unknown
	n =	n =	n =	n =	n =	n =	n =	n =

Etiology	Medical	Trauma	Overdose	Drowning	Electrocution	Asphyxial	Not recorded
	n =	n =	n =	n =	n =	n =	n =

EMS Process	First Defib Time	Targeted Temp Control				Drugs Given
	mm:ss	Indicated - Done	Indicated - Not Done	Not Indicated	Unknown	
		n =	n =	n =	n =	n =

Hospital Process	Reperfusion	Targeted Temp Control				Organ Donation
	Attempted	Indicated/Done	Indicated/Not Done	Not Indicated	Unknown	
	n =	n =	n =	n =	n =	n =

Patient Outcomes Reporting Population		Any ROSC		Survived Event		Survival^{DC} or Survival^{30d}		Fav neurological^{DC} CPC ≤2 or MRS ≤3	
		Yes	Unknown	Yes	Unknown	Yes	Unknown	Yes	Unknown
EMS witnessed Included	All EMS Treated Arrests	n=	n=	n=	n=	n=	n=	n=	n=
EMS witnessed excluded	Shockable bystander witnessed	n=	n=	n=	n=	n=	n=	n=	n=
	Shockable bystander CPR	n=	n=	n=	n=	n=	n=	n=	n=
	Non-shockable witnessed	n=	n=	n=	n=	n=	n=	n=	n=
	User Defined Subgroup	n=	n=	n=	n=	n=	n=	n=	n=

Table 1. Utstein Data Definitions.

Utstein OHCA Elements	Consensus Definition 2014	Data Options
Population served*	Total population of service area of EMS system	Number of cases
Number of cardiac arrests attended*	Number of cardiac arrests attended (arrests defined by absence of signs of circulation)	Number of cases
Resuscitation attempted	When EMS personnel perform chest compressions or attempt defibrillation, it is recorded as a resuscitation attempt by EMS personnel	Number of cases
Resuscitation not attempted	Total number of cardiac arrests in which resuscitation was not attempted and the number of those arrests not attempted because a written DNACPR order was present **or** victim was obviously dead **or** signs of circulation were present	Total number of cases, number with DNAR, number considered futile, number with signs of circulation, number unknown
System description*	A description of the organizational structure of the EMS service being provided. This should encompass the levels of service delivery, annual case numbers, and size of geographic region covered.	Number and type of EMS tier; providers' skill set; number of EMS calls, excluding interfacility transfers; population served based on census data; footprint served in square kilometers or square miles
System description (supplemental)*	System information: Free text description defining (A) the presence or existence of legislation that mandates no resuscitation should be started by EMS or health services in specific circumstances or clinical cohorts of patients; (B) systems for limiting/terminating prehospital resuscitation; (C) termination of resuscitation rules; (D) whether dispatch software is used (and type, version); (E) resuscitation algorithms followed (eg, AHA, ERC, any local variations, CPR or shock first, compression-only CPR initially/compressions and ventilations). (F) Describe any formalized data quality activities in place. (G) Describe prehospital ECG capability: if EMS system has ability to perform and interpret (or have interpreted via telemetry) 12-lead ECGs in the field.	Free text
Dispatcher identified presence of cardiac arrest*	Did the dispatcher identify the presence of cardiac arrest before arrival of EMS?	Yes/No/Unknown/Not recorded
Dispatcher provided CPR instructions*	Did the dispatcher provide telephone CPR instructions to the caller?	Yes/No/Unknown/Not recorded

Utstein OHCA Elements	Consensus Definition 2014	Data Options
Age	If the victim's date of birth is known, it should be recorded in an acceptable format. If the date of birth is not known but the victim's age is known, age should be recorded. If the victim's age is not known, age should be estimated and recorded.	3 Digits (state units - years, months, or days) Indicate if Estimated/Unknown/Not recorded. Specify if reported average ages include or exclude estimated ages.
Gender	Sex	Male/Female/Unknown/Not recorded
Witnessed arrest	A cardiac arrest that is seen or heard by another person or is monitored. EMS personnel respond to a medical emergency in an official capacity as part of an organized medical response team. Bystanders are all other groups. By this definition, physicians, nurses, or paramedics who witness a cardiac arrest and initiate CPR but are not part of the organized rescue team are characterized as bystanders, and the arrest is not described as EMS witnessed.	Bystander witnessed/EMS witnessed/Unwitnessed/Unknown
Arrest location	The specific location where the event occurred or the patient was found. Knowledge of where cardiac arrests occur may help a community to determine how it can optimize its resources to reduce response intervals. A basic list of predefined locations will facilitate comparisons. Local factors may make creation of subcategories useful.	Home/residence; Industrial/workplace; Sports/recreation event; Street/highway; Public building; Assisted living/nursing home; Educational institution; Other; Unspecified/Unknown/Not recorded
Bystander response	Bystander CPR is cardiopulmonary resuscitation performed by a person who is not responding as part of an organized emergency response system to a cardiac arrest. Physicians, nurses, and paramedics may be described as performing bystander CPR if they are not part of the emergency response system involved in the victim's resuscitation. Bystander CPR may be compression only or compression with ventilations (the act of inflating the patient's lungs by rescue breathing with or without a bag-mask device or any other mechanical device).	Bystander CPR (subset: compression only, compression and ventilations)/No bystander CPR/Unknown/ Not recorded
	Bystander AED use	AED used, shock delivered/ AED used, no shock delivered/ AED not used/Unknown/Not recorded
First monitored rhythm	The first cardiac rhythm present when the monitor or defibrillator is attached to the patient after a cardiac arrest.	VF/Pulseless VT/PEA/Asystole/ Bradycardia/Unknown/Not recorded

Utstein OHCA Elements	Consensus Definition 2014	Data Options
Etiology	Etiology is reported as Medical (Presumed cardiac or unknown, other medical etiologies); Traumatic cause; Drug overdose; Drowning; Electrocution; Asphyxial (external cause).	Medical (Presumed cardiac or unknown, other medical etiologies)/Traumatic cause/Drug overdose/Drowning/ Electrocution/Asphyxial (external cause)/Not recorded
	Medical (presumed cardiac or unknown, other medical etiologies): Includes cases where the cause of the cardiac arrest is presumed to be cardiac, other medical (eg, anaphylaxis, asthma, GI bleed), and where there is no obvious cause of the cardiac arrest	
	Traumatic: Cardiac arrest directly caused by blunt, penetrating, or burn injury	
	Drug overdose: Evidence that the cardiac arrest was caused by deliberate or accidental overdose of prescribed medications, recreational drugs, or ethanol	
	Drowning: Victim is found submersed in water without an alternative causation	
	Electrocution	
	Asphyxial: External causes of asphyxia, such as foreign-body airway obstruction, hanging, or strangulation	
Independent living*	Before the cardiac arrest, the patient was able to perform all activities of daily living without the assistance of caregivers.	Yes/No/Unknown/Not recorded
Comorbidities*	The patient has a documented history of other disease conditions that existed before the cardiac arrest.	Yes/No/Unknown/Not recorded
VAD	The patient is supported by any form of VAD to augment cardiac output and coronary perfusion.	Yes/No/Unknown/Not recorded
Cardioverter-defibrillator*	The patient has an internal or external cardioverter-defibrillator.	Internal/External/No/Unknown/Not recorded
Presence of STEMI*	At the time of the first 12-lead ECG performed after ROSC, the presence of STEMI is observed.	Yes/No/Unknown/Not recorded
Response times	The time interval from incoming call to the time the first emergency response vehicle stops at a point closest to the patient's location. The time of the incoming call is when it is first registered at the center answering emergency calls, regardless of when the call is answered.	mm:ss/Unknown/Not recorded
Defibrillation time	The time interval from incoming call to the time the first shock is delivered	mm:ss/Unknown/Not recorded

Utstein OHCA Elements	Consensus Definition 2014	Data Options
TTC*	The time and setting where TTC was initiated	Intra-arrest/Post-ROSC prehospital/Post-ROSC in-hospital,/TTC indicated but not done/TTC not indicated/Unknown/Not recorded Supplemental: If TTC used, what was target temperature (data options: Temperature C/Unknown/Not recorded)?
Drugs given	The term *drugs* refers to delivery of any medication (by IV cannula, IO needle, or tracheal tube) during the resuscitation event.	Adrenaline/Amiodarone/ Vasopressin/None given/ Unknown/Not recorded
Airway control (type)	Prehospital airway control: During the resuscitation, what was the main airway device used?	None used/Oropharyngeal airway/Supraglottic airway/ Endotracheal tube/Surgical airway/Multiple/Unknown/ Not recorded
CPR quality*	During the resuscitation, were there mechanisms or processes in place to measure the quality of CPR being delivered?	Yes/No/Unknown/Not recorded
Number of shocks	The number of shocks delivered (including shocks delivered by public access defibrillators)	Number/Unknown/Not recorded
Drug timings	The time interval from incoming call to the time vascular access is obtained and the first drug is given	mm:ss/Unknown/Not recorded
Vascular access (type)*	The main route through which drugs were administered during the arrest	Central line/Peripheral IV/IO/Endotracheal/Unknown/Not recorded
Mechanical CPR*	At any time during the resuscitation was a mechanical CPR device deployed?	Mechanical compression-decompression device/Load distributing band/Other mechanical device/Unknown/ Not recorded
Targeted oxygenation/ventilation*	After ROSC, was targeted ventilation applied?	O_2 and CO_2/O_2 only/CO_2 only/Not used/Unknown/Not recorded. If this variable is reported, include details of specific targets in system description.

Utstein OHCA Elements	Consensus Definition 2014	Data Options
Reperfusion attempted*	Was coronary reperfusion attempted?	Type: Angiography only/ PCI/Thrombolysis/None/ Unknown/Not recorded Timing: Intra-arrest/Within 24 h of ROSC/>24 h but before discharge/Unknown/Not recorded
ECLS*	When was ECLS used?	Before ROSC/After ROSC/ Not used/Unknown/Not recorded
IABP*	Was an IABP used?	Yes/No/Unknown/Not recorded
pH*	What was the first pH recorded after ROSC?	pH value/Unknown/Not recorded
Lactate*	What was the first lactate recorded after ROSC?	Lactate value mmol L-1/ Unknown/Not recorded
Glucose*	After ROSC, was glucose titrated to a specific target?	Yes/No/Unknown/Not recorded
Number and type of neuroprognostic tests*	Number and type of neuroprognostic tests used	SSEP—Yes/No/Unknown/Not recorded NSE—Yes/No/Unknown/Not recorded EEG—Yes/No/Unknown/Not recorded CT of brain—Yes/No/Unknown/Not recorded MRI of brain—Yes/No/Unknown/Not recorded Clinical examination—Yes/No/Unknown/ Not recorded Other (define)—Yes/No/Unknown/Not recorded Indicate timing of test and whether test led to discontinuation of treatment.
Hospital type*	Was the patient's primary transfer to a healthcare facility able to perform all forms of peri- and postarrest care and allocated this role by the area of administration?	Specialist center/Nonspecialist center/ Unknown/Not recorded
Hospital volume*	How many cases of OHCA does the hospital treat each year?	Number of cases per year
12-Lead ECG*	Was a 12-lead ECG performed after ROSC?	Yes/No/Unknown/Not recorded
Targeted blood pressure management*	What target blood pressure was used?	mm Hg/No target set/Unknown/Not recorded
Survived event	ROSC sustained until arrival at the emergency department and transfer of care to medical staff at the receiving hospital	Yes/No/Unknown/Not recorded
Any ROSC	Did the patient achieve a ROSC at any point during the resuscitation attempt?	Yes/No/Unknown/Not recorded

Utstein OHCA Elements	Consensus Definition 2014	Data Options
30-d survival or survival to discharge	Was the patient alive at the point of hospital discharge/30 d?	Yes/No/Unknown/Not recorded
Neurologic outcome at hospital discharge	Record CPC and/or mRS or pediatric equivalent at hospital discharge. Include a definition of how it was measured (face to face, extracted from notes, combination).	CPC score (1-5)/Unknown/ Not recorded mRS (0-6)/Unknown/Not recorded
Survival status	The patient is alive at 12 mo after cardiac arrest.	Yes/No/Unknown/Not recorded
Transported to hospital*	Was the patient transported to the hospital?	Yes/No/Unknown/Not recorded
Treatment withdrawn (including timing)*	A decision to withdraw active treatment was made. Record the time that this occurred after ROSC.	Yes/No/Unknown/Not recorded Days/hours
Cause of death*	Cause of death as officially recorded in the patient's medical records or death certificate	
Organ donation*	The number of patients who had 1 or more solid organs donated for transplantation	Number of cases/Unknown/ Not recorded
Patient-reported outcome measures (outcomes selected by patients as being important)*	Patient-focused health outcomes were assessed.	Free text
Quality-of-life measurements (standardized questionnaires, eg, EQ-5D, SF-12)*	A validated quality-of-life measure was used to assess health quality of life.	Yes/No/Unknown List quality-of-life instrument(s) used and outcomes/scores.

*New variables.

Data definitions have been categorized as core and supplemental. Data definitions have mostly been updated. Registries and researchers may wish to check against their current definitions.

AED indicates automated external defibrillator; AHA, American Heart Association; CPC, Cerebral Performance Category; CPR, cardiopulmonary resuscitation; CT, computed tomography; DNACPR, do not attempt cardiopulmonary resuscitation; DNAR, do not attempt resuscitation; ECG, electrocardiogram; ECLS, extracorporeal life support; EEG, electroencephalogram; EMS, emergency medical services; ERC, European Resuscitation Council; GI, gastrointestinal; IABP, intra-aortic balloon pump; IO, intraosseous; IV, intravenous; MRI, magnetic resonance imaging; mRS, modified Rankin Scale; NSE, neuron-specific enolase; OHCA, out-of-hospital cardiac arrest; PCI, percutaneous coronary intervention; PEA, pulseless electrical activity; ROSC, return of spontaneous circulation; SSEP, somatosensory evoked potentials; STEMI, ST-segment elevation myocardial infarction; TTC, targeted temperature control; VAD, ventricular assist device; VF, ventricular fibrillation; and VT, ventricular tachycardia.

Table 2. Utstein Checklist for Standardized Reporting.

Section	Checklist Item	Yes/No Page Reported
Abstract	Abstract includes the term "Utstein"	
Methods	System description	
	Setting and location where data were collected	
	Methods used to identify cases, including any quality assurance processes for completeness of measuring case ascertainment	
	Population of patients being reported (eg, Utstein comparator, EMS-treated arrests, or other population)	
	Systems used to obtain timed data, including any synchronization between clocks	
	Definitions used for core and supplemental elements are in concordance with Utstein 2014 style (or alternative definitions are identified)	
	Data source (eg, registry) and whether complete or partial data used	
	Appropriate EQUATOR tool used to support study reporting (http://www.equator-network.org/reporting-guidelines/)	
Statistical analysis	Analytical methods used to handle missing data (eg, complete case analysis, multiple imputation)	
Results	Time period from which data were collected	
	Utstein comparator population results	
	EMS-treated population results	
	Proportion of missing data	
Discussion	Limitations, addresses sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	
	External validity of findings	
	Interpretation consistent with results, balancing benefits and harms and considering other relevant evidence	

EMS indicates emergency medical services; and EQUATOR, Enhancing the Quality and Transparency of Health Research.

References

1. Nolan J, Soar J. Images in resuscitation: Utstein Abbey. *Resuscitation*. 2005;64:5-6.
2. Cummins RO, Chamberlain DA, Abramson NS, Allen M, Baskett PJ, Becker L, Bossaert L, Delooz HH, Dick WF, Eisenberg MS, Evans, TR, Holmberg S, Kerber R, Mullie A, Ornato JP, Sandoe E, Skulberg A, Tunstall-Pedoe H, Swanson R, Thies WH. 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*. 1991;84:960-975.
3. Cummins RO, Chamberlain DA. The Utstein Abbey and survival from cardiac arrest: what is the connection? *Ann Emerg Med*. 1991;20:918-919.
4. Zaritsky A, Nadkarni V, Hazinski MF, Foltin G, Quan L, Wright J, Fiser D, Zideman D, O'Malley P, Chameides L. Recommended guidelines for uniform reporting of pediatric advanced life support: the Pediatric Utstein Style: a statement for healthcare professionals from a task force of the American Academy of Pediatrics, the American Heart Association, and the European Resuscitation Council. *Resuscitation*. 1995;30:95-115.
5. Idris AH, Becker LB, Ornato JP, Hedges JR, Bircher NG, Chandra NC, Cummins RO, Dick W, Ebmeyer U, Halperin HR, Hazinski MF, Kerber RE, Kern KB, Safar P, Steen PA, Swindle MM, Tsitlik JE, von Planta I, von Planta M, Wears RL, Weil MH. Utstein-Style guidelines for uniform reporting of laboratory CPR research: a statement for healthcare professionals from a task force of the American Heart Association, the American College of Emergency Physicians, the American College of Cardiology, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, the Institute of Critical Care Medicine, the Safar Center for Resuscitation Research, and the Society for Academic Emergency Medicine. *Circulation*. 1996;94:2324-2336.
6. Cummins RO, Chamberlain D, Hazinski MF, Nadkarni V, Kloeck W, Kramer E, Becker L, Robertson C, Koster R, Zaritsky A, Bossaert L, Ornato JP, Callanan V, Allen M, Steen P, Connolly B, Sanders A, Idris A, Cobbe S. Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: the in-hospital 'Utstein style': a statement for healthcare professionals from the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, the Australian Resuscitation Council, and the Resuscitation Councils of Southern Africa. *Circulation*. 1997;95:2213-2239.
7. Chamberlain DA, Hazinski MF; on behalf of the European Resuscitation Council, the American Heart Association, the Heart and Stroke Foundation of Canada, the Resuscitation Council of Southern Africa, the Australia and New Zealand Resuscitation Council, and the Consejo Latino-Americano de Resususcitación. Education in resuscitation: an ILCOR symposium: Utstein Abbey, Stavanger, Norway, June 22-24, 2001. *Circulation*. 2003;108:2575-2594.
8. Idris AH, Berg RA, Bierens J, Bossaert L, Branche CM, Gabrielli A, Graves SA, Handley AJ, Hoelle R, Morley PT, Papa L, Pepe PE, Quan L, Szpilman D, Wigginton JG, Modell JH, Atkins D, Gay M, Kloeck W, Timerman S. Recommended guidelines for uniform reporting of data from drowning: the "Utstein style". *Circulation*. 2003;108:2565-2574.
9. Langhelle A, Nolan J, Herlitz J, Castren M, Wenzel V, Soreide E, Engdahl J, Steen PA; 2003 Utstein Consensus Symposium. Recommended guidelines for reviewing, reporting, and conducting research on post-resuscitation care: the Utstein style. *Resuscitation*. 2005;66:271-283.
10. Castrén M, Karlsten R, Lippert F, Christensen EF, Bovim E, Kvam AM, Robertson-Steel I, Overton J, Kraft T, Engerstrom L, Garcia-Castrill Riego L; Emergency Medical Dispatch Expert Group at the Utstein Consensus Symposium 2005. Recommended guidelines for reporting on emergency medical dispatch when conducting research in emergency medicine: the Utstein style. *Resuscitation*. 2008;79:193-197.

11. Jacobs I, Nadkarni V, Bahr J, Berg RA, Billi JE, Bossaert L, Cassan P, Coovadia A, D'Este K, Finn J, Halperin H, Handley A, Herlitz J, Hickey R, Idris A, Kloeck W, Larkin GL, Mancini ME, Mason P, Mears G, Monsieurs K, Montgomery W, Morley P, Nichol G, Nolan J, Okada K, Perlman J, Shuster M, Steen PA, Sterz F, Tibballs J, Timerman S, Truitt T, Zideman D; International Liaison Committee on Resuscitation. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update and simplification of the Utstein templates for resuscitation registries: a statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian Resuscitation Council, New Zealand Resuscitation Council, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa). *Resuscitation*. 2004;63:233-249.
12. Nishiyama C, Brown SP, May S, Iwami T, Koster RW, Beesems SG, Kuisma M, Salo A, Jacobs I, Finn J, Sterz F, Nürnberger A, Smith K, Morrison L, Olasveengen TM, Callaway CW, Shin SD, Grasner JT, Daya M, Ma MH, Herlitz J, Strömsöe A, Aufderheide TP, Masterson S, Wang H, Christenson J, Stiell I, Davis D, Huszti E, Nichol G. Apples to apples or apples to oranges? International variation in reporting of process and outcome of care for out-of-hospital cardiac arrest [Epub ahead of print July 8, 2014]. *Resuscitation*. 2014. doi: 10.1016/j.resuscitation.2014.06.031.
13. Morrison LJ, Nichol G, Rea TD, Christenson J, Callaway CW, Stephens S, Pirrallo RG, Atkins DL, Davis DP, Idris AH, Newgard C; ROC Investigators. Rationale, development and implementation of the Resuscitation Outcomes Consortium Epistry-Cardiac Arrest. *Resuscitation*. 2008;78:161-169.
14. McNally B, Stokes A, Crouch A, Kellermann AL; CARES Surveillance Group. CARES: Cardiac Arrest Registry to Enhance Survival. *Ann Emerg Med*. 2009;54:674-683.e2.
15. Grasner JT, Herlitz J, Koster RW, Rosell-Ortiz F, Stamatakis L, Bossaert L. Quality management in resuscitation--towards a European Cardiac Arrest Registry (EuReCa). *Resuscitation*. 2011;82:989-994.
16. Ong ME, Shin SD, Tanaka H, Ma MH, Khruekarnchana P, Hisamuddin N, Atilla R, Middleton P, Kajino K, Leong BS, Khan MN. Pan-Asian Resuscitation Outcomes Study (PAROS): rationale, methodology, and implementation. *Acad Emerg Med*. 2011;18:890-897.
17. Aus-ROC Epistry. 2014. https://www.ausroc.org.au/epistry/. Accessed March 23, 2014.
18. Kitamura T, Iwami T, Kawamura T, Nagao K, Tanaka H, Hiraide A. Nationwide public-access defibrillation in Japan. *N Engl J Med*. 2010;362:994-1004.
19. Berdowski J, Berg RA, Tijssen JG, Koster RW. Global incidences of out-of-hospital cardiac arrest and survival rates: systematic review of 67 prospective studies. *Resuscitation*. 2010;81:1479-1487.
20. Hasegawa K, Hiraide A, Chang Y, Brown DF. Association of prehospital advanced airway management with neurologic outcome and survival in patients with out-of-hospital cardiac arrest. *JAMA*. 2013;309:257-266.
21. Glover BM, Brown SP, Morrison L, Davis D, Kudenchuk PJ, Van Ottingham L, Vaillancourt C, Cheskes S, Atkins DL, Dorian P; Resuscitation Outcomes Consortium Investigators. Wide variability in drug use in out-of-hospital cardiac arrest: a report from the resuscitation outcomes consortium. *Resuscitation*. 2012;83:1324-1330.
22. Peberdy MA, Kaye W, Ornato JP, Larkin GL, Nadkarni V, Mancini ME, Berg RA, Nichol G, Lane-Trultt T. Cardiopulmonary resuscitation of adults in the hospital: a report of 14720 cardiac arrests from the National Registry of Cardiopulmonary Resuscitation. *Resuscitation*. 2003;58:297-308.
23. Nakamura F, Hayashino Y, Nishiuchi T, Kakudate N, Takegami M, Yamamoto Y, Yamazaki S, Fukuhara S. Contribution of out-of-hospital factors to a reduction in cardiac arrest mortality after witnessed ventricular fibrillation or tachycardia. *Resuscitation*. 2013;84:747-751.

24. Hallstrom AP, Ornato JP, Weisfeldt M, Travers A, Christenson J, McBurnie MA, Zalenski R, Becker LB, Schron EB, Proschan M. Public-access defibrillation and survival after out-of-hospital cardiac arrest. *N Engl J Med*. 2004;351:637-646.
25. Fredriksson M, Herlitz J, Nichol G. Variation in outcome in studies of out-of-hospital cardiac arrest: a review of studies conforming to the Utstein guidelines. *Am J Emerg Med*. 2003;21:276-281.
26. Rea TD, Cook AJ, Stiell IG, Powell J, Bigham B, Callaway CW, Chugh S, Aufderheide TP, Morrison L, Terndrup TE, Beaudoin T, Wittwer L, Davis D, Idris A, Nichol G. Predicting survival after out-of-hospital cardiac arrest: role of the Utstein data elements. *Ann Emerg Med*. 2010;55:249-257.
27. Sasson C, Rogers MAM, Dahl J, Kellermann AL. Predictors of survival from out-of-hospital cardiac arrest a systematic review and meta-analysis. *Circ Cardiovasc Qual Outcomes*. 2010;3:63-81.
28. Cobb LA, Fahrenbruch CE, Olsufka M, Copass MK. Changing incidence of out-of-hospital ventricular fibrillation, 1980-2000. *JAMA*. 2002;288:3008-3013.
29. Vayrynen T, Boyd J, Sorsa M, Maatta T, Kuisma M. Long-term changes in the incidence of out-of-hospital ventricular fibrillation. *Resuscitation*. 2011;82:825-829.
30. Jacobs I, Nadkarni V, Bahr J, Berg RA, Billi JE, Bossaert L, Cassan P, Coovadia A, D'Este K, Finn J, Halperin H, Handley A, Herlitz J, Hickey R, Idris A, Kloeck W, Larkin GL, Mancini ME, Mason P, Mears G, Monsieurs K, Montgomery W, Morley P, Nichol G, Nolan J, Okada K, Perlman J, Shuster M, Steen PA, Sterz F, Tibballs J, Timerman S, Truitt T, Zideman D; International Liaison Committee on Resuscitation. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update and simplification of the Utstein templates for resuscitation registries: a statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian Resuscitation Council, New Zealand Resuscitation Council, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa). *Resuscitation*. 2004;63:233-249.
31. Weisfeldt ML, Sitlani CM, Ornato JP, Rea T, Aufderheide TP, Davis D, Dreyer J, Hess EP, Jui J, Maloney J, Sopko G, Powell J, Nichol G, Morrison LJ; ROC Investigators. Survival after application of automatic external defibrillators before arrival of the emergency medical system: evaluation in the resuscitation outcomes consortium population of 21 million. *J Am Coll Cardiol*. 2010;55:1713-1720.
32. Lerner EB, Rea TD, Bobrow BJ, Acker JE 3rd, Berg RA, Brooks SC, Cone DC, Gay M, Gent LM, Mears G, Nadkarni VM, O'Connor RE, Potts J, Sayre MR, Swor RA, Travers AH; on behalf of the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, and Perioperative and Resuscitation. Emergency medical service dispatch cardiopulmonary resuscitation prearrival instructions to improve survival from out-of-hospital cardiac arrest: a scientific statement from the American Heart Association. *Circulation*. 2012;125:648-655.
33. Stiell IG, Brown SP, Christenson J, Cheskes S, Nichol G, Powell J, Bigham B, Morrison LJ, Larsen J, Hess E, Vaillancourt C, Davis DP, Callaway CW; Resuscitation Outcomes Consortium (ROC) Investigators. What is the role of chest compression depth during out-of-hospital cardiac arrest resuscitation? *Crit Care Med*. 2012;40:1192-1198.
34. Wallace SK, Abella BS, Becker LB. Quantifying the effect of cardiopulmonary resuscitation quality on cardiac arrest outcome: a systematic review and meta-analysis. *Circ Cardiovasc Qual Outcomes* 2013;6:148-156.
35. Nolan JP, Neumar RW, Adrie C, Aibiki M, Berg RA, Bottiger BW, Callaway C, Clark RS, Geocadin RG, Jauch EC, Kern KB, Laurent I, Longstreth WT, Merchant RM, Morley P, Morrison LJ, Nadkarni V, Peberdy MA, Rivers EP, Rodriguez-Nunez A, Sellke FW, Spaulding C, Sunde K, Vanden Hoek T. Post-cardiac arrest syndrome: epidemiology, pathophysiology,

treatment, and prognostication: a scientific statement from the International Liaison Committee on Resuscitation; the American Heart Association Emergency Cardiovascular Care Committee, the Council on Cardiovascular Surgery and Anesthesia, the Council on Cardiopulmonary, Perioperative, and Critical Care, the Council on Clinical Cardiology, the Council on Stroke. *Resuscitation*. 2008;79:350-379.
36. Dumas F, White L, Stubbs BA, Cariou A, Rea TD. Long-term prognosis following resuscitation from out of hospital cardiac arrest: role of percutaneous coronary intervention and therapeutic hypothermia. *J Am Coll Cardiol*. 2012;60:21-27.
37. Nolan JP, Lyon RM, Sasson C, Rossetti AO, Lansky AJ, Fox KA, Meier P. Advances in the hospital management of patients following an out of hospital cardiac arrest. *Heart*. 2012;98:1201-1206.
38. Goto Y, Maeda T, Nakatsu-Goto Y. Neurological outcomes in patients transported to hospital without a prehospital return of spontaneous circulation after cardiac arrest. *Crit Care*. 2013;17:R274.
39. Sandroni C, Cavallaro F, Callaway CW, D'Arrigo S, Sanna T, Kuiper MA, Biancone M, Della Marca G, Farcomeni A, Nolan JP. Predictors of poor neurological outcome in adult comatose survivors of cardiac arrest: a systematic review and meta-analysis. Part 2: patients treated with therapeutic hypothermia. *Resuscitation*. 2013;84:1324-1338.
40. Orioles A, Morrison WE, Rossano JW, Shore PM, Hasz RD, Martiner AC, Berg RA, Nadkarni VM. An under-recognized benefit of cardiopulmonary resuscitation: organ transplantation. *Crit Care Med*. 2013;41:2794-2799.
41. Mateen FJ, Josephs KA, Trenerry MR, Felmlee-Devine MD, Weaver AL, Carone M, White RD. Long-term cognitive outcomes following out-of-hospital cardiac arrest: a population-based study. *Neurology*. 2011;77:1438-1445.
42. Elliott VJ, Rodgers DL, Brett SJ. Systematic review of quality of life and other patient-centred outcomes after cardiac arrest survival. *Resuscitation*. 2011;82:247-256.
43. Cummins RO, Chamberlain D, Hazinski MF, Nadkarni V, Kloeck W, Kramer E, Becker L, Robertson C, Koster R, Zaritsky A. Recommended guidelines for reviewing, reporting, and conducting research on in hospital resuscitation: the in-hospital 'Utstein style': a statement for healthcare professionals from the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, the Australian Resuscitation Council, and the Resuscitation Councils of Southern Africa. *Resuscitation*. 1997;34:151-183.
44. Cummins RO, Chamberlain DA, Abramson NS, Allen M, Baskett PJ, Becker L, Bossaert L, Delooz HH, Dick WF, Eisenberg MS. Recommendation 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*. 1991;84:960-975.
45. Vaillancourt C, Charette ML, Bohm K, Dunford J, Castrén M. In out-of-hospital cardiac arrest patients, does the description of any specific symptoms to the emergency medical dispatcher improve the accuracy of the diagnosis of cardiac arrest: a systematic review of the literature. *Resuscitation*. 2011;82:1483-1489.
46. Bohm K, Vaillancourt C, Charette ML, Dunford J, Castrén M. In patients with out-of-hospital cardiac arrest, does the provision of dispatch cardiopulmonary resuscitation instructions as opposed to no instructions improve outcome: a systematic review of the literature. *Resuscitation*. 2011;82:1490-1495.
47. Castrén M, Bohm K, Kvam AM, Bovim E, Christensen EF, Steen-Hansen JE, Karlsten R. Reporting of data from out-of-hospital cardiac arrest has to involve emergency medical dispatching--taking the recommendations on reporting OHCA the Utstein style a step further. *Resuscitation*. 2011;82:1496-1500.

48. Nashelsky MB, Lawrence CH. Accuracy of cause of death determination without forensic autopsy examination. *Am J Forensic Med Pathol*. 2003;24:313-319.
49. Kürkciyan I, Meron G, Behringer W, Sterz F, Berzlanovich A, Domanovits H, Müllner M, Bankl HC, Laggner AN. Accuracy and impact of presumed cause in patients with cardiac arrest. *Circulation*. 1998;98:766-771.
50. Drory Y, Turetz Y, Hiss Y, Lev B, Fisman EZ, Pines A, Kramer MR. Sudden unexpected death in persons less than 40 years of age. *Am J Cardiol*. 1991;68:1388-1392.
51. Kuisma M, Alaspaa A. Out-of-hospital cardiac arrests of non-cardiac origin: epidemiology and outcome. *Eur Heart J*. 1997;18:1122-1128.
52. Jennett B, Bond M. Assessment of outcome after severe brain damage. *Lancet*. 1975;1:480-484.
53. van Swieten JC, Koudstaal PJ, Visser MC, Schouten HJA, van Gijn J. Interobserver agreement for the assessment of handicap in stroke patients. *Stroke*. 1988;19:604-607.
54. Jennett B, Bond M. Assessment of outcome after severe brain damage. *Lancet*. 1975;1:480-484.
55. Yasunaga H, Miyata H, Horiguchi H, Tanabe S, Akahane M, Ogawa T, Koike S, Imamura T. Population density, call-response interval, and survival of out-of-hospital cardiac arrest. *Int J Health Geogr*. 2011;10:26.
56. Koike S, Ogawa T, Tanabe S, Matsumoto S, Akahane M, Yasunaga H, Horiguchi H, Imamura T. Collapse-to-emergency medical service cardiopulmonary resuscitation interval and outcomes of out-of-hospital cardiopulmonary arrest: a nationwide observational study. *Crit Care*. 2011;15:R120.
57. Hostler D, Everson-Stewart S, Rea TD, Stiell IG, Callaway CW, Kudenchuk PJ, Sears GK, Emerson SS, Nichol G; Resuscitation Outcomes Consortium Investigators. Effect of real-time feedback during cardiopulmonary resuscitation outside hospital: prospective, cluster-randomised trial. *BMJ*. 2011;342:d512.
58. Brabrand M, Hosbond S, Petersen DB, Skovhede A, Folkestad L. Time telling devices used in Danish health care are not synchronized. *Dan Med J*. 2012;59:A4512.
59. Frisch AN, Dailey MW, Heeren D, Stern M. Precision of time devices used by prehospital providers. *Prehosp Emerg Care*. 2009;13:247-250.
60. Kaye W, Mancini ME, Truitt TL. When minutes count--the fallacy of accurate time documentation during in-hospital resuscitation. *Resuscitation*. 2005;65:285-290.
61. Tu JV, Khalid L, Donovan LR, Ko DT; Canadian Cardiovascular Outcomes Research Team/Canadian Cardiovascular Society Acute Myocardial Infarction Quality Indicator Panel. Indicators of quality of care for patients with acute myocardial infarction. *CMAJ*. 2008;179:909-915.
62. Ferreira-González I, Marsal JR, Mitjavila F, Parada A, Ribera A, Cascant P, Soriano N, Sánchez PL, Arós F, Heras M, Bueno H, Marrugat J, Cuñat J, Civeira E, Permanyer-Miralda G. Patient registries of acute coronary syndrome: assessing or biasing the clinical real world data? *Circ Cardiovasc Qual Outcomes*. 2009;2:540-547.
63. Strömsoe A, Svensson L, Axelsson AB, Göransson K, Todorova L, Herlitz J. Validity of reported data in the Swedish Cardiac Arrest Register in selected parts in Sweden. *Resuscitation*. 2013;84:952-956.
64. Krumholz HM. Registries and selection bias: the need for accountability. *Circ Cardiovasc Qual Outcomes*. 2009;2:517-518.
65. Newgard CD, Sears GK, Rea TD, Davis DP, Pirrallo RG, Callaway CW, Atkins DL, Stiell IG, Christenson J, Minei JP, Williams CR, Morrison LJ; ROC Investigators. The Resuscitation Outcomes Consortium Epistry-Trauma: design, development, and implementation of a North American epidemiologic prehospital trauma registry. *Resuscitation*. 2008;78:170-178.
66. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Borden WB, Bravata DM, Dai S, Ford ES, Fox CS, Franco S, Fullerton HJ, Gillespie C, Hailpern SM, Heit JA, Howard VJ,

Huffman MD, Kissela BM, Kittner SJ, Lackland DT, Lichtman JH, Lisabeth LD, Magid D, Marcus GM, Marelli A, Matchar DB, McGuire DK, Mohler ER, Moy CS, Mussolino ME, Nichol G, Paynter NP, Schreiner PJ, Sorlie PD, Stein J, Turan TN, Virani SS, Wong ND, Woo D, Turner MB; on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcomittee. Heart disease and stroke statistics--2013 update: a report from the American Heart Association. *Circulation*. 2013;127:e6-e245.

67. Nichol G, Thomas E, Callaway CW, Hedges J, Powell JL, Aufderheide TP, Rea T, Lowe R, Brown T, Dreyer J, Davis D, Idris A, Stiell I; Resuscitation Outcomes Consortium Investigators. Regional variation in out-of-hospital cardiac arrest incidence and outcome. *JAMA*. 2008;300:1423-1431.

68. He Y. Missing data analysis using multiple imputation: getting to the heart of the matter. *Circ Cardiovasc Qual Outcomes*. 2010;3:98-105.

69. Soreide E, Morrison L, Hillman K, Monsieurs K, Sunde K, Zideman D, Eisenberg M, Sterz F, Nadkarni VM, Soar J, Nolan JP; Utstein Formula for Survival Collaborators. The formula for survival in resuscitation. *Resuscitation*. 2013;84:1487-1493.

70. Begg C, Cho M, Eastwood S, Horton R, Moher D, Olkin I, Pitkin R, Rennie D, Schulz KF, Simel D, Stroup DF. Improving the quality of reporting of randomized controlled trials. The CONSORT statement. *JAMA*. 1996;276:637-639.

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This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives $10,000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $10,000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

*Modest.
†Significant.

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