

# ILCOR Advisory Statement

## 2015 Revised Utstein-Style Recommended Guidelines for Uniform Reporting of Data From Drowning-Related Resuscitation

### An ILCOR Advisory Statement

Ahamed H. Idris, MD, FAHA\*; Joost J.L.M. Bierens, MD, PhD†; Gavin D. Perkins, MD‡; Volker Wenzel, MD, MSc§; Vinay Nadkarni, MD, FAHA||; Peter Morley, MD¶; David S. Warner, MD#; Alexis Topjian, MD, MSCE, FAHA\*\*; Allart M. Venema, MD; Christine M. Branche, PhD; David Szpilman, MD; Luiz Morizot-Leite, MS, EMT-P; Masahiko Nitta, MD, PhD; Bo Løfgren, MD, PhD; Jonathon Webber, RN, BHSc; Jan-Thorsten Gräsner, MD; Stephen B. Beerman, MD; Chun Song Youn, MD; Ulrich Jost, MD; Linda Quan, MD; Cameron DeZfulian, MD; Anthony J. Handley, MD, FRCP; Mary Fran Hazinski, RN, MSN, FAHA

**Background**—Utstein-style guidelines use an established consensus process, endorsed by the international resuscitation community, to facilitate and structure resuscitation research and publication. The first “Guidelines for Uniform Reporting of Data From Drowning” were published over a decade ago. During the intervening years, resuscitation science has advanced considerably, thus making revision of the guidelines timely. In particular, measurement of cardiopulmonary resuscitation elements and neurological outcomes reporting have advanced substantially. The purpose of this report is to provide updated guidelines for reporting data from studies of resuscitation from drowning.

**Methods**—An international group with scientific expertise in the fields of drowning research, resuscitation research, emergency medical services, public health, and development of guidelines met in Potsdam, Germany, to determine the data that should be reported in scientific articles on the subject of resuscitation from drowning. At the Utstein-style meeting, participants discussed data elements in detail, defined the data, determined data priority, and decided how data should be reported, including scoring methods and category details.

**Results**—The template for reporting data from drowning research was revised extensively, with new emphasis on measurement of quality of resuscitation, neurological outcomes, and deletion of data that have proved to be less relevant or difficult to capture.

**Conclusions**—The report describes the consensus process, rationale for selecting data elements to be reported, definitions and priority of data, and scoring methods. These guidelines are intended to improve the clarity of scientific communication and the comparability of scientific investigations. (*Circ Cardiovasc Qual Outcomes*. 2017;10:e000024. DOI: 10.1161/HCQ.0000000000000024.)

**Key Words:** AHA Scientific Statements ■ cardiac arrest ■ cardiopulmonary resuscitation  
■ drowning ■ guidelines ■ resuscitation

\*Conference and Writing Group Chair. †Conference and Writing Group Co-Chair. ‡Prehospital Data Section Chair. §Prehospital Data Section Co-Chair. ||Quality of Resuscitation Section Chair. ¶Quality of Resuscitation Section Co-Chair. #Hospital and Outcome Data Section Chair. \*\*Hospital and Outcome Data Section Co-Chair.

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

This statement was approved by the American Heart Association Science Advisory and Coordinating Committee on April 22, 2016, and the American Heart Association Executive Committee on June 11, 2016. A copy of the document is available at <http://professional.heart.org/statements> by using either “Search for Guidelines & Statements” or the “Browse by Topic” area. To purchase additional reprints, call 843-216-2533 or e-mail [kelle.ramsay@wolterskluwer.com](mailto:kelle.ramsay@wolterskluwer.com). The Data Supplement is available with this article at <http://circoutcomes.ahajournals.org/lookup/suppl/doi:10.1161/HCQ.0000000000000024/-/DC1>.

The American Heart Association requests that this document be cited as follows: Idris AH, Bierens JJLM, Perkins GD, Wenzel V, Nadkarni V, Morley P, Warner DS, Topjian A, Venema AM, Branche CM, Szpilman D, Morizot-Leite L, Nitta M, Løfgren B, Webber J, Gräsner J-T, Beerman SB, Youn CS, Jost U, Quan L, DeZfulian C, Handley AJ, Hazinski MF. 2015 Revised Utstein-style recommended guidelines for uniform reporting of data from drowning-related resuscitation: an ILCOR advisory statement. *Circ Cardiovasc Qual Outcomes*. 2017;10:e000024. doi: 10.1161/HCQ.0000000000000024.

This statement has been copublished in *Resuscitation*.

Expert peer review of AHA Scientific Statements is conducted by the AHA Office of Science Operations. For more on AHA statements and guidelines development, visit <http://professional.heart.org/statements>. Select the “Guidelines & Statements” drop-down menu, then click “Publication Development.”

Permissions: Multiple copies, modification, alteration, enhancement, and/or distribution of this document are not permitted without the express permission of the American Heart Association. Instructions for obtaining permission are located at [http://www.heart.org/HEARTORG/General/Copyright-Permission-Guidelines\\_UCM\\_300404\\_Article.jsp](http://www.heart.org/HEARTORG/General/Copyright-Permission-Guidelines_UCM_300404_Article.jsp). A link to the “Copyright Permissions Request Form” appears on the right side of the page.

© 2017 American Heart Association, Inc. and European Resuscitation Council.

*Circ Cardiovasc Qual Outcomes* is available at <http://circoutcomes.ahajournals.org>

DOI: 10.1161/HCQ.0000000000000024

The First International Utstein-style consensus conference on drowning convened in Amsterdam, the Netherlands, in June 2002 to develop guidelines for reporting outcome data related to drowning; these guidelines were published in 2003.<sup>1</sup> We describe in the present report the results of the Second International Utstein-Style Consensus Conference on Drowning that convened in Potsdam, Germany, in October 2013.

In the 1980s, an international group of investigators in the field of resuscitation research noted a lack of common nomenclature, definitions, and consistency in scientific reports of research regarding sudden cardiac arrest. In response to these problems, the first Utstein conference on resuscitation research took place at the Utstein Abbey in Stavanger, Norway, in June 1990. The conference sought to establish uniform definitions and guidelines for reporting data for research regarding out-of-hospital cardiac arrest.<sup>2</sup> Utstein-style conferences use an established consensus process, endorsed by the international resuscitation community, to create a uniform reporting structure to enable comparison of outcomes. Subsequently, several Utstein-style conferences on out-of-hospital cardiac arrest research have taken place to update and refine the original recommendations. Since the first Utstein conference, Utstein-style guidelines have been published for in-hospital resuscitation, trauma resuscitation, drowning resuscitation, disaster resuscitation, and laboratory research in resuscitation.<sup>3–8</sup>

The issues discussed at the first 1990 Utstein consensus conference are common to many specialties involved in resuscitation from causes other than primary cardiac arrest. Drowning is one important cause of death that shares many of the same definition and reporting problems as out-of-hospital cardiac arrest research. For example, a systematic review of drowning reports found 20 different definitions for drowning, 13 different definitions for near-drowning, and 13 related terms in the 43 articles reviewed.<sup>9</sup> In addition, 20 inconsistent outcome measures were identified.

In 2002, an international group of scientific investigators, including epidemiologists, and others concerned with resuscitation from drowning convened an Utstein-style consensus conference in Amsterdam at the World Congress on Drowning. The consensus conference developed guidelines for definitions and reporting of data related to drowning, published in 2003.<sup>1</sup> The report defined drowning as "... a process resulting in primary respiratory impairment from submersion/immersion in a liquid medium. Implicit in this definition is that a liquid/air interface is present at the entrance of the victim's airway, preventing the victim from breathing air. The victim may live or die after this process, but whatever the outcome, he or she has been involved in a drowning incident." The report also defined other terms including the drowning process.

More than 10 years have passed since the first drowning reporting guidelines were published. During that time, resuscitation science has advanced considerably, which makes revision and refining of the guidelines timely. A review of the drowning literature identified 11 studies that used the reporting template from the 2003 publication.<sup>10–20</sup> These reports recommended that additional data elements be added to the Utstein drowning reporting template, such as initial cardiac rhythm, duration of cardiopulmonary resuscitation (CPR),

serum potassium level, speed of rewarming, and more detailed neurological assessments.

The objective of the Second International Utstein-style consensus conference on drowning was to reassess and update data that should be reported in studies of drowning resuscitation. In addition, the participants reviewed all data elements in detail to determine priority for data reporting and to review and assess scoring methods and categories.

## Methods

A group of international scientists and experts in drowning resuscitation, including representatives of international organizations, were invited to participate in the Second International Utstein-style consensus conference on drowning.

The following organizations were represented at the conference:

- Maatschappij tot Redding van Drenkelingen
- American Heart Association
- European Resuscitation Council
- US Centers for Disease Control and Prevention
- Australia and New Zealand Resuscitation Council
- InterAmerican Heart Foundation
- Heart and Stroke Foundation of Canada

Members were selected on the basis of demonstrated interest and expertise in the area of resuscitation research by having participated in the previous drowning consensus conference or in other resuscitation consensus conferences, having authored Utstein-based reports on drowning, or having served in leadership roles in organizations devoted to the rescue and resuscitation of victims of drowning.

After the consensus group was identified and finalized, data evaluation was performed via a Delphi consensus process<sup>21,22</sup>; a spreadsheet with data elements taken from the first drowning consensus report was sent to participants. Participants were instructed to indicate whether each data element represented core (definitely necessary) or supplementary data and to give the data element a priority score of its importance for research, which could be impacted by the feasibility of collecting the data element.

For each of the original data elements, participants were asked to suggest descriptions, categories, or tests and to suggest alternatives or additions, as appropriate. They were also asked to select a primary review group in which to participate (Prehospital Data, Quality of Resuscitation, or In-Hospital and Outcome Data) and were provided with a list of the most recent literature on the issue. Finally, we asked participants to suggest a research question and to indicate whether the data in the spreadsheet were sufficient to answer the question or whether other data would be needed.

Results from the first round of review were then collected, tabulated, and sent to participants for a second round of review. The second review included priority scores from the first round and new data elements that had been suggested. Participants were instructed to score the data elements in a fashion similar to the first review.

Results from the second review were collected, tabulated, and sent to participants ≈2 weeks before the Second International Utstein-style Consensus Conference on Drowning in Potsdam ([Data Supplement Table](#)).

The Potsdam consensus conference participants were organized into the 3 main sections, which met separately. Except for the section chairs and co-chairs, conference participants rotated through each section, spending 1 hour in each section. Thus, all participants had an opportunity to engage in discussions in all 3 sections. Section chairs and co-chairs then summarized the results of the consensus and identified items that required further discussion.

All participants, including chairs and co-chairs, met in a plenary session to review the consensus results and to discuss further any remaining items that did not have consensus. Section chairs and co-chairs then summarized the final consensus results after the plenary session.

The results of the Potsdam conference were presented and discussed later that week at the 2013 World Congress on Drowning, Potsdam, Germany, and at the 2013 annual meeting of the European Resuscitation Council in Krakow, Poland. The consensus discussion continued through 2014 and 2015 by e-mail and teleconference. In addition, several members of the writing group of this report (A.H.I., J.B., G.D.P., V.W., V.N., P.M., A.T., A.J.H., M.F.H., B.L., L.Q., J.-T.G.) participated in the International Liaison Committee on Resuscitation (ILCOR) 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations (CoSTR) conference, which included sessions on drowning and basic life support, in Dallas, TX, January 31 to February 3, 2015. We have attempted to align recommendations in this report with CoSTR recommendations whenever possible.

## Results

### Recommended Data to Report

The Second International Utstein-style Consensus Conference on Drowning developed reporting tables to help investigators report methods and results for drowning research. A summary of data to be reported is shown in Tables 1 through 7. **Core** data (shown in **bold** typeface) should be reported in all studies; *supplementary* data (shown in *italic* typeface) are recommended but not essential. **Core** data were considered important and feasible to be reported in most systems worldwide. We expect that almost any investigator can reliably gather **core** data so that a minimum universal worldwide data set is feasible. *Supplementary* data were considered important but typically comprised information that is difficult to capture reliably (eg, time points and time intervals) or may be nonessential.

In this update, we deleted some items that were listed in the prior edition because the items were considered to be unreliable, difficult to capture, or had some other problem. Additionally, some data items were changed from **core** to *supplementary* or the other way around. There was some discussion regarding the meaning of the terms *immersion* and *submersion*, which were recommended in the 2003 guidelines. Some thought the term *immersion* was ambiguous because there are many situations that could be included under this term that are not associated with drowning. Immersion often signifies that the head is up and out of the water, whereas the rest of the body is immersed.<sup>23,24</sup> Drowning can occur with aspiration of even a small volume of water; even a wave splashing over the face could lead to

drowning but often does not. However, the term *submersion* indicates that the head and face are underwater, which leads to drowning if the airway is submerged long enough. The term *submersion* reflects the most important aspect of drowning, namely, that liquid covering the nose and mouth prevents air from entering the lungs. We decided to retain *submersion* because it is most applicable to studies of resuscitation from drowning.

There are 3 new tables in this edition, 1 related to rescue and treatment by lifeguards (Table 3), 1 specifically devoted to time points and time intervals (Table 4), and 1 focused on resuscitation quality (Table 8).

## Template

### Victim Information (Table 1)

#### Core Data

1. **Victim identifier:** A number, code, or other information for unique identification of each victim.
2. **Sex:** Male or female.
3. **Race and ethnic categories:** *Supplementary: Race/Ethnicity.* These characteristics have been important risk factors and issues for preventive interventions. Reported differences likely reflect differences in exposure rates, risk factors, and socioeconomic status, not differences in physiological responses. Racial or ethnic information may be difficult to ascertain clinically (eg, Hispanic versus white in the United States) or delineate (eg, mixed marriages and names).
4. **Age:** Record birthdate, if known. If the birthdate is unknown but the age is known, record age in years. Age may be estimated.
5. **Incident date and time of day.**
6. **Precipitating event:** Report if a precipitating event or factor is known that is causally related to the drowning. Although the cause of drowning is frequently unknown, the type of precipitating event can have a powerful influence on the patient's care and outcome.
7. **Was the face submerged (face underwater or covered in water) at any time before or at the time of rescue (new)?** We recommend using the objective phrase indicating that the face (nose and mouth) was underwater or covered in water in a manner that prevents air from entering the lungs.
8. **Preexisting illness:** List preexisting illness such as psychological, developmental, or medical disorders. It may be difficult to know whether the drowning was related to the illness, but the illness should be abstracted from hospital data, if it is known. (This was previously *supplementary* data in 2003.)

Although drowning has traditionally been an injury involving healthy people, changing demographics and recreational interests may contribute to drowning in nonhealthy people. With the increasing prevalence of chronic diseases and aging populations, cardiac, metabolic, and psychiatric conditions may predispose to drowning.<sup>25,26</sup>

Note: "Resident of city, county, state, and country" was in the 2003 guidelines and is no longer included even as *supplementary* data in the present guidelines because the relationship with resuscitation outcomes is unclear.

Table 1. Victim Information

Data Element	Priority	Description	Categories
<b>Victim identifier</b>	<b>Core</b>	A number, code, or other information for unique identification of each victim	For data collection, not reporting
<b>Sex</b>	<b>Core</b>	Sex	Male/female
<b>Age</b>	<b>Core</b>	Record birthdate if known. If the birthdate is unknown but the age is known or can be estimated, record age in years.	Birthdate; age in years
<i>Race/ethnicity</i>	<i>Supplementary</i>	Race, ethnicity	Race: White, African, African American, Asian Ethnicity: Hispanic, non-Hispanic
<b>Incident date and time of day</b>	<b>Core</b>	Date/time	Use 24-h clock time
<b>Precipitating event</b>	<b>Core</b>	Is there evidence to suggest a precipitating event or factor is causally related to the drowning? Evidence may be obtained at the scene or from hospital or postmortem history/toxicology tests.	One or more: Alcohol; drug intoxication; traumatic injury; seizures or syncope; suspected cardiac cause; suicide; drowning related to boating accident, submerged vehicle, or flood; hyperventilation/ breath holding; primary circulatory arrest; other (specify); unknown
<b>Was the face submerged (underwater) at any time before or during rescue?</b>	<b>Core</b>	A drowning occurs when a liquid covered the mouth and nose and prevented air from entering the lungs.	Y/N/U
<b>Preexisting illness</b>	<b>Core</b>	Preexisting illness causing impairment	Seizure disorders, chronic heart disease, chronic lung disease, chronic neurological disease, none, unknown

"Resident of city, county, state, and country" was in the 2003 guidelines and is no longer included even as supplementary data in the present guidelines. Y/N/U indicates yes/no/unknown.

### Scene Information (Table 2)

#### Core Data

- Water temperature:** Was the water icy or non-icy? The only water temperatures associated with possible improved outcomes have been icy waters.<sup>27–29</sup> Report the water temperature, if known or estimated.
- Was the drowning witnessed?** Did someone see the drowning victim enter the water or struggling before disappearing underwater? If not, the event should be labeled "unwitnessed." In drowning, it is not possible to witness the moment of cardiac arrest, which can happen before, during, or after drowning.<sup>30</sup>
- Was bystander CPR performed?** Did a bystander (non-emergency medical services [EMS] person) perform initial CPR? Yes/No. If yes, did the bystander perform CPR with ventilation? Yes/No. *Supplementary: CPR Method.*
- Trained first responder:** Did a trained first responder perform CPR? Did a lifeguard or other trained responder with a duty to treat perform CPR (Yes/No) or provide ventilation only (Yes/No)?
- Vital status at first trained responder/EMS assessment:** The consensus group recommended a focus on vital indicators of outcome: **Was the drowning victim responsive** (ABC [alert, blunted, comatose], AVPU [alert, responds to verbal stimuli, responds to painful stimuli, unresponsive<sup>31</sup>], or GCS [Glasgow Coma Scale<sup>32</sup>] scores) and **breathing normally**, and was a **pulse palpable**? The importance of actual respiratory and heart rates and their impact on resuscitation outcome is unknown; therefore, we recommend that both be collected as *supplementary* data.

- Initial cardiac rhythm (new):** Report the initial cardiac rhythm from a cardiac monitor or an ECG.

#### Supplementary Data

- Vital signs at first EMS assessment:** Report heart rate, blood pressure, temperature, peripheral capillary oxygen hemoglobin saturation (SpO<sub>2</sub>, usually calculated with a pulse oximeter), and pupillary reaction to light.
- Pulmonary status at first EMS assessment (new):** When the patient is breathing, assess severity of lung injury. Such assessment could provide an approach to the stratification of the severity of drowning.<sup>33,34</sup> The severity of injury should be categorized; for example, report whether results of the lung examination are normal and whether the patient is coughing, and report the presence of unilateral rales or bilateral rales.
- Type of water/liquid:** Drowning in heavily contaminated water or water that contains chemicals may result in additional complications such as infection and pneumonitis.<sup>35</sup>
- Body of water.**

#### Pre-EMS Scene Information (Table 3)

Lifeguards and other trained first responders with a duty to treat are often among the first people to attempt rescue and resuscitation of the drowning victim. In view of the great importance of these rescuers, we have added Table 3 to provide the opportunity for researchers to add additional detail, if applicable, to reports on drowning.

The following data elements that were present in the 2003 guidelines have been revised or deleted from the present guidelines: Loss of consciousness; pre-EMS resuscitation; unconscious when removed from the water; was resuscitation

Table 2. Scene Information

Data Element	Priority	Description	Categories
<b>Water temperature</b>	<b>Core</b>	Was the water icy or non-icy? Report the water temperature if known.	Icy or non-icy
<b>Who witnessed the drowning</b>	<b>Core</b>	Did someone see the person going underwater? If not, the event should be labeled "unwitnessed."	Unwitnessed Witnessed by a bystander Witnessed by a lifeguard Witnessed by EMS
<b>Bystander CPR</b>	<b>Core</b>	Did a bystander (non-EMS person) perform CPR?	Y/N/U
	<i>Supplementary</i>	CPR method	Chest compressions and ventilation Chest compressions only Ventilation only Number of initial breaths
<b>Bystander ventilation</b>	<b>Core</b>	Was ventilation given?	Y/N/U
<b>Did a trained first responder perform CPR or provide ventilation only?</b>	<b>Core</b>	Did a lifeguard or other trained first responder with a duty to treat perform CPR or provide ventilation only?	CPR: Y/N/U Ventilation only: Y/N/U
<b>Vital status at first trained responder/EMS assessment</b>	<b>Core</b>	AVPU, ABC, GCS	Response (AVPU, ABC, or GCS) Normal breathing (Y/N/U) Pulse (Y/N/U)
<b>Initial cardiac rhythm</b>	<b>Core</b>	Cardiac rhythm from monitor or ECG	Ventricular fibrillation Ventricular tachycardia Pulseless electrical activity Asystole Other
<i>Vital signs</i>	<i>Supplementary</i>	Devices are necessary to measure vital signs	Heart rate Blood pressure Temperature SpO <sub>2</sub>
<i>Pulmonary status</i>	<i>Supplementary</i>	Assess severity of lung injury	Normal lung examination; patient is coughing; unilateral rales; bilateral rales
<i>Type of water/liquid (eg, salt/fresh/chemical/other)</i>	<i>Supplementary</i>	In what type of liquid did the drowning occur?	Fresh water, salt water, water containing chemicals
<i>Body of water (eg, river/ocean/swimming pool)</i>	<i>Supplementary</i>	Where did the drowning occur?	Bathtub, swimming pool, ocean, lake, river, creek, bayou, pond, bucket, hot tub, or other body or container of liquid? This list should be modified as needed to include local hazards.

The following data elements that were present in the 2003 guidelines have been deleted from the present guidelines: Loss of consciousness, pre-EMS resuscitation, unconscious when removed from the water, was resuscitation attempted before arrival of EMS? was EMS called? was an EMS vehicle dispatched? was cyanosis present? These elements have either been replaced with updated elements or are considered unreliable (eg, cyanosis could be a result of hypoxia or submersion in cold water).

ABC indicates alert, blunted, coma; AVPU, alert, responds to verbal stimuli, responds to painful stimuli, unresponsive; CPR, cardiopulmonary resuscitation; EMS, emergency medical services; GCS, Glasgow Coma Scale; and Y/N/U, yes/no/unknown.

attempted before arrival of EMS? was EMS called? was an EMS vehicle dispatched? was cyanosis present? These elements have either been replaced with updated elements or are considered unreliable (eg, cyanosis could be a result of hypoxia or submersion in cold water). Water temperature was previously supplementary and is now core data.

#### **Time Points and Intervals From EMS Data (Table 4)**

A general discussion took place during the meeting regarding the use of time points and time intervals. When available with sufficient accuracy, time points enable accurate calculation of

time intervals. Often, data on the exact time points of interest are unavailable. Time intervals can be estimated but are less reliable. In the end, conferees recommended that if time points are unavailable, then estimated time intervals should be reported and the manner of estimation noted.

#### *Core Data*

- 1. Time face was first seen to be underwater.**
- 2. Time victim was removed from water.**
- 3. Duration underwater (see submersion duration):**  
The time interval or duration that the victim was un-

**Table 3. Pre-EMS Scene Information (Lifeguards and First Responders With a Duty to Treat)**

Data Element	Priority	Description	Categories
<b>Level of medical knowledge of the lifeguard delivering the patient care</b>	<b>Core</b>	Level of training and certification	Paramedic Emergency Medical Technician First Responder certified Other (specify)
<b>Interventions used by lifeguard or first responder during resuscitation</b>	<b>Core</b>	Type of equipment used	Bag-mask device Supraglottic airway device Endotracheal intubation Other (specify)
<i>Was the lifeguard or first responder performing CPR/patient care the same person who performed the water extrication (rescue)?</i>	<i>Supplementary</i>	Describe rescuer(s)	Y/N/U
<i>Number of lifeguards or first responders attending the patient</i>	<i>Supplementary</i>	Number	Number of lifeguards/first responders attending the patient
<i>If drowning was in the ocean or river, what were the water conditions?</i>	<i>Supplementary</i>	Water conditions	Waves and currents vs flat water Moving water on a river with strong currents vs nonmoving water
<i>How was the person removed from the water (if known)?</i>	<i>Supplementary</i>	Specify method of removal	Who removed the victim? Lifeguard, first responder, citizen responder (bystander) How was the victim removed? Swimming, boat, personal watercraft, jet ski, rescue board, helicopter/air rescue

CPR indicates cardiopulmonary resuscitation; EMS, emergency medical services; and Y/N/U, yes/no/unknown.

derwater is the most important predictor of outcome in drowning, because it represents the amount of anoxia; it should be recorded, if possible.<sup>36–38</sup> Although the submersion interval is seldom documented with a timepiece such as a stopwatch, the estimate of time intervals (eg, less than or greater than 5 to 6 minutes; less than or greater than 10 to 11 minutes; less than or greater than 15 to 20 minutes; and >25 minutes) has proven to be the most important predictor of outcome.<sup>30,35,39–41</sup> Duration underwater is derived from the time the face was first seen to be underwater to the time of removal from the water. Obtain the estimated

time in minutes from those closest to the scene or who talked with those at the scene. Cross-referencing with emergency call and ambulance arrival times (usually recorded centrally) can be helpful to determine time estimates.

- Time of first trained responder/EMS treatment:** The first EMS treatment may or may not be CPR and represents a point when “high-quality” medical intervention could be assured to have begun.
- Time trained responder/EMS started CPR (resuscitation) in the field:** Resuscitation is defined as the act of trying to maintain or restore life by establishing and/

**Table 4. Time Points and Time Intervals From First Responder or EMS Data**

Data Element	Priority	Description	Categories
<b>Time face/airway seen underwater</b>	<b>Core</b>	hh:mm:ss or unknown	Hours:minutes:seconds
<b>Time victim was removed from water</b>	<b>Core</b>	hh:mm:ss or unknown	Hours:minutes:seconds
<b>Time of first trained responder/EMS treatment</b>	<b>Core</b>	hh:mm:ss or unknown	Hours:minutes:seconds
<b>Time CPR first begun</b>	<b>Core</b>	hh:mm:ss or unknown	Hours:minutes:seconds
<b>Time ROSC was achieved</b>	<b>Core</b>	hh:mm:ss or unknown	Hours:minutes:seconds
<b>Time first conscious/awake</b>	<b>Core</b>	hh:mm:ss or unknown	Hours:minutes:seconds
<b>Time intervals derived from time points</b>			
<b>Submersion duration (face underwater)</b>	<b>Core</b>	Derived from time underwater to time of removal/commencing resuscitation	Minutes
<b>Underwater to first treatment or CPR interval</b>	<b>Core</b>	Derived from time underwater to time of first EMS treatment or CPR	Minutes

Times should be calculated by reference to fixed/measured time points (eg, EMS call time, EMS arrival time, EMS departure time). Duration underwater, time taken for removal from water, and time to CPR or first treatment is the interval: [←Duration Underwater→][←Removal→][←Initial EMS treatment or CPR→]

CPR indicates cardiopulmonary resuscitation; EMS, emergency medical services; hh, hours; mm, minutes; ROSC, return of spontaneous circulation; and ss, seconds.

Table 5. Hospital Course, Core Data

Data Element	Priority	Description	Categories
<b>Date and time of hospital arrival</b>	<b>Core</b>	Date and time	DD:MM:YY:hh:mm:ss or unknown
<b>CPR ongoing at hospital arrival</b>	<b>Core</b>	Was CPR ongoing when patient entered the hospital?	Y/N/U
<b>Duration of CPR</b>	<b>Core</b>	Record the total number of minutes that CPR was performed regardless of where it was stopped (scene, emergency department, hospital)	Minutes or unknown
<b>First documented vital signs after hospital arrival</b>	<b>Core</b>	Vital sign measurements	Temperature (centigrade) Heart rate Blood pressure (mm Hg) Respiratory rate (if spontaneous) Oxyhemoglobin saturation (%)
<b>First cardiac rhythm after hospital arrival</b>	<b>Core</b>	Cardiac electrical rhythm on cardiac monitor or ECG	Ventricular fibrillation Ventricular tachycardia Pulseless electrical activity Asystole Other
<b>Initial hospital neurological examination</b>	<b>Core</b>	GCS score or AVPU	GCS: Eyes, verbal, motor (total 3–15) or AVPU
<b>Arterial blood gas analysis</b>	<b>Core</b>	Arterial blood gas results	pH, Pao <sub>2</sub> , Paco <sub>2</sub> , base deficit
<b>Pulmonary edema/ARDS</b>	<b>Core</b>	Were bilateral lung opacities present on admission radiograph or within 1 wk of drowning?	Y/N/U
<b>Airway and ventilation requirements</b>	<b>Core</b>	What was the highest level of respiratory support the patient required during hospitalization?	(1) Nothing; (2) supplementary O <sub>2</sub> ; (3) noninvasive ventilation support; (4) conventional invasive ventilation support; (5) nonconventional invasive ventilation support
<b>ICU admission</b>	<b>Core</b>	Was the patient admitted to the ICU?	Y/N/U
<b>Induced hypothermia</b>	<b>Core</b>	Was the patient treated with induced hypothermia?	Y/N/U
<b>Temperature management</b>	<b>Core</b>	Was the patient treated with targeted temperature management?	Y/N/U
<b>Temperature peak/trough (new)</b>	<b>Core</b>	Highest and lowest temperatures in first 96 h after ROSC	Initial temperature Highest temperature Lowest temperature Unknown
<b>Serum glucose levels</b>	<b>Core</b>	Serum glucose levels in first 24 h after ROSC Was normoglycemia maintained?	Initial Highest Lowest Unknown Y/N/U
<b>Hypotension</b>	<b>Core</b>	Did the patient have 2 documented episodes of hypotension (defined as systolic blood pressure <90 mm Hg for adults and age adjusted for children)?	Y/N/U
<b>Circulatory support</b>	<b>Core</b>	Was continuous vasopressor/inotropic support initiated?	Y/N/U
<b>ECMO/CPB</b>	<b>Core</b>	Was the patient treated with ECMO or CPB?	Y/N/U
<b>Neurological function</b>	<b>Core</b>	Best GCS during hospitalization	Number (range, 3–15)
<b>In-hospital resuscitation</b>	<b>Core</b>	Did the patient have a cardiac arrest requiring chest compressions after hospital admission?	Y/N/U

(Continued)

Table 5. Continued

Data Element	Priority	Description	Categories
<b>Complicating illness of drowning</b>	<b>Core</b>	Report if the victim developed complications/illnesses	Check all that apply: <input type="checkbox"/> Acute respiratory distress syndrome <input type="checkbox"/> Disseminated intravascular coagulation <input type="checkbox"/> Pneumonia <input type="checkbox"/> Pancreatitis <input type="checkbox"/> Acute kidney injury <input type="checkbox"/> Shock <input type="checkbox"/> Multiple system organ failure <input type="checkbox"/> Sepsis <input type="checkbox"/> Electrolyte disturbance <input type="checkbox"/> Glucose disturbance <input type="checkbox"/> Other <input type="checkbox"/> Unknown

ARDS indicates acute respiratory distress syndrome; AVPU, alert, responds to verbal stimuli, responds to painful stimuli, unresponsive; CPB, cardiopulmonary bypass; CPR, cardiopulmonary resuscitation; DD:MM:YY:hh:mm:ss, day, month, year, hours, minutes, seconds; ECMO, extracorporeal membrane oxygenation; EMS, emergency medical services; GCS, Glasgow Coma Scale; ICU, intensive care unit; ROSC, return of spontaneous circulation; and Y/N/U, yes/no/unknown.

or maintaining breathing and circulation through CPR, defibrillation, and other related emergency care.

6. **Time ROSC achieved.**

7. **Time first conscious/awake.**

8. **Face submerged (underwater) to first treatment/ CPR interval:** The time of the first resuscitation attempt is important because it is another indicator of the duration of anoxia. Furthermore, in both cardiac arrest and drowning studies, intervals from drowning or cardiac arrest to CPR are known to affect outcome.<sup>36–38,42–44</sup>

### Hospital Course, Core Data (Table 5)

The core data included here have been expanded from the list included in 2003.

#### Core Data

1. **Date and time of hospital arrival:** This may include time of arrival in an emergency department or, if directly admitted from the scene, to another type of inpatient care area.
2. **CPR ongoing at hospital arrival (new)?** Was CPR being administered when the patient arrived at the hospital door?
3. **Duration of CPR:** The total number of minutes CPR was provided during the initial cardiac arrest, regardless of where it was stopped (scene, emergency department, or hospital). Duration of CPR has predicted outcome.<sup>16,36</sup>
4. **First documented vital signs after hospital arrival:** Report temperature, heart and respiratory rate, blood pressure (systolic and diastolic), oxygen hemoglobin saturation, and pupillary light reaction. If blood pressure is too low to measure, report whether the pulse is palpable. If blood pressure is sufficient to produce peripheral pulses, the oxyhemoglobin saturation (SpO<sub>2</sub>) may be measured with a pulse oximeter.
5. **First cardiac rhythm after arrival at hospital:** Cardiac electrical rhythm noted on a cardiac monitor or ECG.

6. **Initial hospital neurological examination:** Report results of the neurological examination when the victim first arrived in the emergency department using a validated, age-appropriate system (eg, ABC, AVPU, or GCS scoring systems). Specify the scale used.

7. **Arterial blood gas analysis:** Report arterial blood gas tensions and pH, especially in victims who are unconscious or who have oxyhemoglobin saturations <95% when breathing room air.

8. **Pulmonary edema or acute respiratory distress syndrome (new):** Did the patient have signs of radiographic bilateral opacities not fully explained by effusions, lobar/lung collapse, nodules within 1 week of the drowning, or other signs of acute respiratory distress syndrome? The Berlin definition of acute respiratory distress syndrome has additional detail.<sup>45</sup>

9. **Airway and ventilation requirements:** What was the highest level of respiratory support the patient required during the hospitalization? Choices include nothing, supplementary O<sub>2</sub>, noninvasive ventilation support, conventional invasive ventilation support, nonconventional invasive ventilation support, extracorporeal membrane oxygenation, and cardiopulmonary bypass.

10. **Intensive care unit admission (new).**

11. **Induced hypothermia (new).**

12. **Temperature management (new):** Was the patient treated with a protocol aimed at targeted temperature management<sup>46</sup> (defined as an active therapy to achieve and maintain a specific target temperature for a defined duration)? Yes, No, or Unknown. If yes, what was the target temperature range (degrees centigrade)?

13. **Temperature peak and trough (new):** What were the initial, highest, and lowest temperatures in the first 96 hours after return of spontaneous circulation (ROSC)?

14. **Serum glucose levels:** What were the initial, highest, and lowest serum glucose levels in the first 24 hours after ROSC? Was normoglycemia maintained? Yes, No, or Unknown.

**Table 6. Hospital Course, Supplementary Data**

Data Element	Priority	Description	Categories
<i>If CPR was not ongoing on arrival, why?</i>	<i>Supplementary</i>	Why was CPR not ongoing on arrival?	Pulse present Patient was considered deceased Unknown
<i>Time CPR stopped in emergency department</i>	<i>Supplementary</i>	Date and time	DD:MM:YY:hh:mm:ss or unknown
<i>Number of defibrillation attempts after hospital arrival</i>	<i>Supplementary</i>	Number of shocks	Number
<i>Initial neurological function: FOUR score</i>	<i>Supplementary</i>	Document the patient's admission FOUR score <sup>47,48</sup>	FOUR score or unknown
<i>Serum lactate</i>	<i>Supplementary</i>	Document the patient's serum lactate levels (mg/dL) (evidence of tissue hypoxia)	Initial Highest Lowest Unknown
<i>Potassium level</i>	<i>Supplementary</i>	Document the potassium levels (mEq/L); this can be obtained from either a blood gas or chemistry panel	Initial Highest Lowest Unknown
<i>Prior substance abuse</i>	<i>Supplementary</i>	Omit here if already documented under victim information	Y/N/U
<i>Blood alcohol level</i>	<i>Supplementary</i>	Document the initial blood alcohol level	mEq/L or unknown
<i>Oxygenation</i>	<i>Supplementary</i>	What was highest arterial oxygen tension (Pao <sub>2</sub> ) in the first 96 h after ROSC? What was lowest Pao <sub>2</sub> in the first 96 h after ROSC?	Initial Pao <sub>2</sub> Highest Pao <sub>2</sub> Lowest Pao <sub>2</sub> Unknown
<i>Temperature goal</i>	<i>Supplementary</i>	What was the target temperature and temperature range (degrees centigrade)?	Degrees centigrade or unknown
<i>Neurological function tests</i>	<i>Supplementary</i>	Did the patient have neuromonitoring/neuroimaging or biomarker measurement?	Yes: Computed tomography, magnetic resonance imaging, electroencephalography, evoked potentials, intracranial pressure, microdialysis, or tissue oxygen monitoring/serum biomarkers No Unknown

The following data elements that were present in the 2003 guidelines have been deleted from the present guidelines: pupillary reaction (because an abnormal reaction has many possible causes) and toxicology testing (because this is not universally available).

CPR indicates cardiopulmonary resuscitation; DD:MM:YY:hh:mm:ss, day, month, year, hours, minutes, seconds; FOUR, Full Outline of Unresponsiveness; and Y/N/U, yes/no/unknown.

15. **Was hypotension documented  $\geq 2$  times during hospitalization (new)?** Did the patient have  $\geq 2$  documented episodes of hypotension (defined as systolic blood pressure  $< 90$  mmHg for adults and age adjusted for children)? Yes, No, or Unknown.
16. **Circulatory support (new):** Was continuous vasopressor/inotropic support initiated? Yes, No, or Unknown.
17. **Cardiopulmonary bypass (new).**
18. **Neurological function:** What was the best GCS (or pediatric equivalent) during hospitalization (score range 3–15)?
19. **In-hospital resuscitation (new):** Did the patient have another cardiac arrest requiring attempted resuscitation after hospital admission? Yes, No, or Unknown.
20. **Complicating illness of drowning (new):** Check all that apply.

### **Hospital Course, Supplementary Data (Table 6)**

#### *Supplementary Data*

1. *If CPR was not ongoing on arrival at the hospital, what was the reason (new)?* Was CPR not indicated because the patient had a pulse, or was the patient deceased?
2. *Time CPR stopped in the emergency department (new).*
3. *Number of defibrillations administered (new):* If the patient was defibrillated after hospital arrival, document the number of shocks the patient received.
4. *Initial neurological function (new):* FOUR score (Full Outline of Unresponsiveness).<sup>47,48</sup>
5. *Serum lactate:* Document the patient's initial and highest serum lactate levels, because this can provide evidence of tissue hypoxia.
6. *Potassium level:* Document the initial, highest, and lowest serum or blood potassium levels on admission

Table 7. Disposition

Data Element	Priority	Description	Categories
<b>Date of hospital discharge</b>	<b>Core</b>	Document the date of discharge from the hospital	DD:MM:YY or unknown
<b>Vital status at discharge</b>	<b>Core</b>	Did the patient survive to hospital discharge?	Y/N
<b>Cause of death, if patient did not survive</b>	<b>Core</b>	What were the causes of death?	Fill in causes per clinician, such as respiratory distress syndrome, disseminated intravascular coagulation, intracranial hypertension, electrolyte disturbances, acute renal failure, seizures, sepsis, or myocardial failure
<b>Neurological outcome at hospital discharge, if patient survived</b>	<b>Core</b>	Use an age-appropriate validated scoring system	CPC scale, <sup>50</sup> OPC scale, <sup>50</sup> pediatric CPC scale, <sup>51</sup> or pediatric OPC scale <sup>51</sup> or modified Rankin score <sup>52,53</sup>
<i>A. If patient died in the hospital:</i>			
<i>How did patient die?</i>	<i>Supplementary</i>	How did the patient die?	Brain death with withdrawal of life support Cardiac arrest without ROSC
<i>Was an autopsy performed?</i>	<i>Supplementary</i>		Y/N
<i>Channelopathy evaluation?</i>	<i>Supplementary</i>	Did the patient have an evaluation for cardiac channelopathies?	Y/N/U
<i>B. If patient survived to hospital discharge:</i>			
<i>Neurological and quality-of-life outcomes 6 mo after hospital discharge</i>	<i>Supplementary</i>	Use an age-appropriate validated scoring system	CPC scale, OPC scale, pediatric CPC scale or pediatric OPC scale, or modified Rankin score Unknown

The following data elements that were present in the 2003 guidelines have been deleted from the present guidelines: How was the cause of death determined? Was a forensic investigation performed and was a forensic cause uncovered (suicide, murder)? Other injuries and morbidities.

CPC indicates Cerebral Performance Category; DD:MM:YY, day, month, year; OPC, Overall Performance Category; ROSC, return of spontaneous circulation; and Y/N/U, yes/no/unknown.

(in mEq/L). This can be an important predictor of outcome.<sup>49</sup>

7. *Toxicology screening or history of prior substance abuse.*
8. *Blood alcohol level:* What was the first documented blood alcohol level?
9. *Arterial oxygen tension (Pao<sub>2</sub>):* What was initial, lowest, and highest Pao<sub>2</sub> in the first 96 hours after ROSC?
10. *Temperature goal (new):* What was target temperature range and temperature range (degrees centigrade)?
11. *Neurological function tests (new):* Did the patient have neuromonitoring/neuroimaging or biomarker measurement (computerized tomography, magnetic resonance imaging, electroencephalography, evoked potentials, intracranial pressure, microdialysis, or tissue oxygen monitoring/serum biomarkers)?

### Disposition (Table 7)

#### Core Data

1. **Date of hospital discharge.**
2. **Vital status at discharge:** Did patient survive to hospital discharge? Yes, No, or Unknown.
3. **Cause(s) of death (new):** Describe the factors contributing to death associated with drowning, such as alcohol or other drug intoxication, cardiac arrhythmia (prolonged QT), or myocardial infarction. Indicate clinical causes listed in the medical record, such as respiratory distress syndrome, dis-

seminated intravascular coagulation, intracranial hypertension, electrolyte disturbances, glucose disturbances, acute renal failure, seizures, sepsis, or myocardial failure.

4. **Neurological outcome at hospital discharge:** Use an age-appropriate validated scoring system such as the Cerebral Performance Category scale,<sup>50</sup> Overall Performance Category scale,<sup>50</sup> pediatric Cerebral Performance Category scale<sup>51</sup> or pediatric Overall Performance Category scale,<sup>51</sup> modified Rankin score,<sup>52,53</sup> or other.

#### Supplementary Data

##### A. If patient died in the hospital:

1. *How did the patient die (if applicable) (new):* Multiorgan failure, intractable shock, recurrent cardiac arrest without ROSC, brain death, withdrawal of life support.
2. *Was an autopsy performed?*
3. *Channelopathy evaluation (new):* Did the patient have an evaluation for cardiac channelopathies? Yes, No, or Unknown.

##### B. If patient survived to hospital discharge:

4. *Neurological and quality-of-life outcomes 6 months after discharge (new):* Report quality of life at the time of discharge from the hospital using an age-appropriate validated scoring system (eg, Cerebral Performance Category scale, Overall Performance Category scale, pediatric Cerebral Performance Category scale or pediatric Overall Performance Category scale, or modified Rankin score).

**Table 8. Quality of Resuscitation Factors**

Data Element	Priority	Description	Categories
<b>Method of administering ventilation</b>	<b>Core</b>	Type of equipment used	Mouth-to-mouth Bag mask Supraglottic airway device Endotracheal intubation Unknown
<i>Ventilation rate</i>	<i>Supplementary</i>	Breaths/min	Number or unknown
<i>Chest compression rate</i>	<i>Supplementary</i>	Chest compression rate measured during compressions, usually measured as average rate for each minute	Rate/min
<i>Chest compression fraction</i>	<i>Supplementary</i>	Proportion of time doing compressions for each minute	Percent or proportion or unknown
<i>Chest compression depth</i>	<i>Supplementary</i>	Depth of chest compressions, usually measured as average depth for each minute Other measurements: maximum depth	In mm or cm or unknown
<i>Preshock pause interval</i>	<i>Supplementary</i>	Interval between last chest compression and the shock	Seconds or unknown

Note: The following disposition data elements that were present in the 2003 guidelines have been deleted from the present guidelines: How was the cause of death determined? Was a forensic investigation performed and was a forensic cause uncovered (suicide, murder)? Other injuries and morbidities.

#### **Quality of Resuscitation Factors (Table 8)**

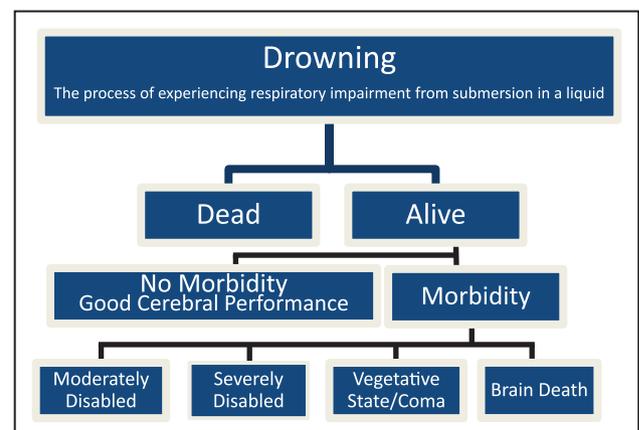
Over the past decade, a number of studies have demonstrated the importance of factors related to CPR quality (eg, rescuer compression rate, depth of chest compressions, compression fraction, and preshock pause interval [ie, time elapsed between last compression and shock delivery during attempted defibrillation]) and their effect on ROSC and neurologically intact survival to hospital discharge in patients with out-of-hospital cardiac arrest.<sup>54-58</sup> Because drowning is primarily a respiratory problem, information regarding the quality of ventilation is important. Data regarding CPR quality for each patient can be displayed in real time and recorded for later analysis by many commercially available automated external defibrillators and monitor-defibrillators used during resuscitation. These data are important for quality assurance and quality improvement programs that have been used to improve survival from sudden cardiac arrest in prehospital systems.<sup>59</sup>

The following factors are considered important indicators of resuscitation quality:

1. **Method of administering ventilation:** Mouth-to-mouth, bag-mask, supraglottic airway device, or endotracheal intubation.
2. **Ventilation rate:** Breaths per minute.
3. **Chest compression rate:** Chest compression rate measured during compressions.
4. **Chest compression fraction:** Proportion of time compression was performed for each minute of total resuscitation time (percent or fraction of resuscitation).
5. **Chest compression depth:** Usually measured as average depth for each minute.
6. **Preshock pause interval:** Interval (in seconds) between the last chest compression and shock delivery when defibrillation is attempted.

## **Discussion**

This report describes the results of the Second International Utstein-style Consensus Conference on Drowning that convened in Potsdam, Germany, in October 2013, as well as additional conferences and meetings through 2014 and 2015. This report is an update of the 2003 publication,<sup>1</sup> is based on a 3-stage Delphi consensus process that was used to arrive at consensus recommendations, and expands the number of reporting parameters from 47 to 68 on the basis of advances in resuscitation science and study experience since the first report. The conference had wide geographic representation, including participation from members residing in Austria, Australia, Brazil, Canada, Denmark, Germany, the United Kingdom, Korea, Japan, New Zealand, the Netherlands, and the United States of America, representing a number of international organizations. Drowning is a neglected public health issue with a significantly disproportionate burden in low- and middle-income countries.<sup>60</sup> In low- and middle-income nations, rescue, resuscitation, emergency response systems, and hospital care may be immature, rare, or absent. Several participants were acquainted with the problem of drowning in developing countries and contributed factors for



**Figure.** Possible scheme for tracking outcomes.

reporting related to the environment that might be found in developing countries.

The data suggested for reporting in studies of resuscitation from drowning are thought to be important demographic, patient-centered factors, as well as factors related to EMS response and resuscitation. We clarified times and time intervals that are related to outcomes in a separate table (Table 4). Factors related to severity of illness, in-hospital resuscitation, and advanced care are also recommended for reporting. Table 6 now includes data related to hypothermia or temperature management, which could have an impact on mortality and neurological outcomes after spontaneous ventricular fibrillation cardiac arrest, although this remains under investigation with regard to the specific relevance to drowning.<sup>46,61–63</sup>

Many drowning events require only ventilation for resuscitation, and many patients are not transported to the hospital. New data elements have been added to the reporting template that include events in which drowning victims required ventilation only, may have been treated by first responders but not by EMS, or may not have been transported to a hospital (Tables 3 through 5).

The quality of prehospital resuscitation has emerged in the past decade as a factor associated with ROSC and survival to hospital discharge, and it is recommended that those systems capable of collecting data on this factor do so (Table 8). Drowning prevention remains the most important strategy in all nations, regions, and communities to save lives and minimize the tragic impact of drowning.

## Outcomes

A number of outcomes are important after drowning, such as ROSC, admission to hospital, survival to hospital discharge, and short- and long-term neurological function. When death is an outcome, it can be difficult to assign drowning as a specific cause, especially if the person was hospitalized and had other intervening illnesses before death. The original report used the term “death due to drowning” if a person died after drowning, even if other illnesses occurred before death. The present report has revised that term to “drowning-related death” and recommends inclusion of complications during the hospital stay that have contributed to morbidity and mortality. We suggest a possible scheme for tracking outcomes (Figure).

## Summary

A group of international experts agreed on these modifications to the recommended elements for unified reporting of outcome data in studies of resuscitation from drowning. These guidelines are intended to improve the clarity of scientific communication and the comparability of scientific investigations.

The Second International Utstein-style consensus welcomes comments or questions regarding these recommendations.

## Acknowledgments

The Second International Utstein-Style Consensus Conference on Drowning that convened in Potsdam, Germany, was sponsored in part by the Maatschappij tot Redden van Drenkelingen (Society to Rescue People From Drowning, established in Amsterdam in 1767).

## Disclosures

### Writing Group Disclosures

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/Honoraria	Expert Witness	Ownership Interest	Consultant/Advisory Board	Other
Ahamed H. Idris	University of Texas Southwestern Medical Center	NIH†; HeartSine Inc.†	None	None	None	None	HeartSine Inc.*	None
Joost J.L.M. Bierens	Maatschappij tot Redden van Drenkelingen Rokin (the Netherlands)	Several national and international organizations in the field of aquatic safety*	None	None	None	None	None	KNRM (Royal Dutch Lifeboat Institution)*; Several national and international organizations in the field of aquatic safety*
Stephen B. Beerman	University of British Columbia (Canada)	None	None	None	None	None	None	None
Christine M. Branche	Centers for Disease Control and Prevention	None	None	None	None	None	None	None
Cameron Dezfulian	University of Pittsburgh School of Medicine	Mallinckrodt Pharmaceuticals† (PI on an investigator-initiated grant)	None	None	None	None	None	None
Jan-Thorsten Gräsner	Kiel University, University Medical Center of Schleswig-Holstein (Germany)	None	None	None	None	None	None	None

(Continued)

## Writing Group Disclosures Continued

Writing Group Member	Employment	Research Grant	Other Research Support	Speakers' Bureau/Honoraria	Expert Witness	Ownership Interest	Consultant/Advisory Board	Other
Anthony J. Handley	Colchester General Hospital (United Kingdom)	None	None	None	None	None	Royal Life Saving Society UK*	None
Mary Fran Hazinski	Vanderbilt University	None	None	None	None	None	American Heart Association Emergency Cardiovascular Care†	None
Ulrich Jost	Stv. Bundesarzt (Germany)	None	None	None	None	None	None	None
Bo Løfgren	Aarhus University Hospital (Denmark)	None	None	None	None	None	None	None
Luiz A. Morizot-Leite	Miami-Dade Fire Rescue	None	None	None	None	None	None	None
Peter Morley	University of Melbourne Clinical School (Australia)	None	None	None	None	None	None	None
Vinay Nadkarni	Children's Hospital Philadelphia	None	None	None	None	None	None	None
Masahiko Nitta	Osaka Medical College (Japan)	None	None	None	None	None	None	None
Gavin D. Perkins	Warwick Medical School, Heart and England NHS Foundation (United Kingdom)	None	None	None	None	None	None	None
Linda Quan	University of Washington School of Medicine	None	None	None	None	None	None	None
David Szpilman	Sociedade Brasileira de Salvamento Aquático (Brazil)	None	None	None	None	None	None	None
Alexis Topjian	The Children's Hospital of Philadelphia/University of Pennsylvania School of Medicine	NIH†	None	None	Lawyer*	None	None	None
Allart M. Venema	University Medical Center Groningen, University of Groningen, Groningen (the Netherlands)	None	None	None	None	None	None	None
David S. Warner	Duke University Medical Center	None	None	None	None	None	None	None
Jonathon Webber	The University of Auckland (New Zealand)	None	None	None	None	None	None	None
Volker Wenzel	Innsbruck Medical University (Austria)	None	None	None	None	None	None	None
Chun Song Youn	Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea (Republic of Korea)	None	None	None	None	None	None	None

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.

## Reviewer Disclosures

Reviewer	Employment	Research Grant	Other Research Support	Speakers' Bureau/Honoraria	Expert Witness	Ownership Interest	Consultant/Advisory Board	Other
David M. McMullan	Seattle Children's Hospital	None	None	None	None	None	None	None
Natalie Hood	Monash Medical Centre (Australia)	None	None	None	None	None	Surf LifeSaving Australia (National Medical Advisor)*	None

This table represents the relationships of reviewers that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all reviewers 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.

## References

- Idris AH, Berg RA, Biersen 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. Recommended guidelines for uniform reporting of data from drowning: the "Utstein style." *Circulation*. 2003;108:2565–2574. doi: 10.1161/01.CIR.0000099581.70012.68.
- Cummins RO, Chamberlain DA, Abramson NS, Allen M, Baskett PJ, Becker L, Bossaert L, Deloos HH, Dick WF, Eisenberg MS. 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.
- 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, Timmerman S, Truitt T, Zideman D, and the ILCOR Task Force on Cardiac Arrest and Cardiopulmonary Resuscitation Outcomes. 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 Councils of Southern Africa). *Circulation*. 2004;110:3385–3397. doi: 10.1161/01.CIR.0000147236.85306.15.
- Peberdy MA, Cretikos M, Abella BS, DeVita M, Goldhill D, Kloeck W, Kronick SL, Morrison LJ, Nadkarni VM, Nichol G, Nolan JP, Parr M, Tibballs J, van der Jagt EW, Young L. Recommended guidelines for monitoring, reporting, and conducting research on medical emergency team, outreach, and rapid response systems: an Utstein-style scientific statement: a scientific statement from the International Liaison Committee on Resuscitation (American Heart Association, Australian Resuscitation Council, European Resuscitation Council, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, and the New Zealand Resuscitation Council); the American Heart Association Emergency Cardiovascular Care Committee; the Council on Cardiopulmonary, Perioperative, and Critical Care; and the Interdisciplinary Working Group on Quality of Care and Outcomes Research. *Circulation*. 2007;116:2481–2500. doi: 10.1161/CIRCULATIONAHA.107.186227.
- 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.
- Dick WF, Baskett PJ, Grande C, Deloos H, Kloeck W, Lackner C, Lipp M, Mauritz W, Nerlich M, Nicholl J, Nolan J, Oakley P, Parr M, Seekamp A, Soreide E, Steen PA, van Camp L, Wolcke B, Yates D. "Recommendations for uniform reporting of data following major trauma—the Utstein style" (as of July 17, 1999): an International Trauma Anaesthesia and Critical Care Society (ITACCS). *Acta Anaesthesiol Belg*. 2000;51:18–38.
- 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.
- Perkins GD, Jacobs IG, Nadkarni VM, Berg RA, Bhanji F, Biarent D, Bossaert LL, Brett SJ, Chamberlain D, de Caen AR, Deakin CD, Finn JC, Gräsner JT, Hazinski MF, Iwami T, Koster RW, Lim SH, Huei-Ming Ma M, McNally BF, Morley PT, Morrison LJ, Monsieurs KG, Montgomery W, Nichol G, Okada K, Eng Hock Ong M, Travers AH, Nolan JP; Utstein Collaborators. 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 [published correction appears in *Circulation*. 2015;132:e168–e169]. *Circulation*. 2015;132:1286–1300. doi: 10.1161/CIR.000000000000144.
- Papa L, Hoelle R, Idris A. Systematic review of definitions for drowning incidents. *Resuscitation*. 2005;65:255–264. doi: 10.1016/j.resuscitation.2004.11.030.
- Eich C, Bräuer A, Timmermann A, Schwarz SK, Russo SG, Neubert K, Graf BM, Aleksic I. Outcome of 12 drowned children with attempted resuscitation on cardiopulmonary bypass: an analysis of variables based on the "Utstein Style for Drowning." *Resuscitation*. 2007;75:42–52. doi: 10.1016/j.resuscitation.2007.03.013.
- Grmec S, Strnad M, Podgorsek D. Comparison of the characteristics and outcome among patients suffering from out-of-hospital primary cardiac arrest and drowning victims in cardiac arrest. *Int J Emerg Med*. 2009;2:7–12. doi: 10.1007/s12245-009-0084-0.
- Youn CS, Choi SP, Yim HW, Park KN. Out-of-hospital cardiac arrest due to drowning: an Utstein Style report of 10 years of experience from St. Mary's Hospital. *Resuscitation*. 2009;80:778–783. doi: 10.1016/j.resuscitation.2009.04.007.
- Venema AM, Groothoff JW, Bierens JJ. The role of bystanders during rescue and resuscitation of drowning victims. *Resuscitation*. 2010;81:434–439. doi: 10.1016/j.resuscitation.2010.01.005.
- Choi SP, Youn CS, Park KN, Wee JH, Park JH, Oh SH, Kim SH, Kim JY. Therapeutic hypothermia in adult cardiac arrest because of drowning. *Acta Anaesthesiol Scand*. 2012;56:116–123. doi: 10.1111/j.1399-6576.2011.02562.x.
- Vähätalo R, Lunetta P, Olkkola KT, Suominen PK. Drowning in children: Utstein style reporting and outcome. *Acta Anaesthesiol Scand*. 2014;58:604–610. doi: 10.1111/aas.12298.

16. Kieboom JK, Verkade HJ, Burgerhof JG, Bierens JJ, Rheenen PF, Kneyber MC, Albers MJ. Outcome after resuscitation beyond 30 minutes in drowned children with cardiac arrest and hypothermia: Dutch nationwide retrospective cohort study. *BMJ*. 2015;350:h418. doi: 10.1136/bmj.h418.
17. Joanknecht L, Argent AC, van Dijk M, van As AB. Childhood drowning in South Africa: local data should inform prevention strategies. *Pediatr Surg Int*. 2015;31:123–130. doi: 10.1007/s00383-014-3637-0.
18. Hunsucker JL, Davison SJ. Analysis of rescue and drowning history from a lifeguarded waterpark environment. *Int J Inj Contr Saf Promot*. 2011;18:277–284. doi: 10.1080/17457300.2011.566619.
19. Allan PF, Fang R, Martin KD, Glenn M, Conger NG. Combat-associated drowning. *J Trauma*. 2010;69(suppl 1):S179–S187. doi: 10.1097/TA.0b013e3181e45df1.
20. Ma WJ, Nie SP, Xu HF, Xu YJ, Song XL, Guo QZ, Zhang YR. An analysis of risk factors of non-fatal drowning among children in rural areas of Guangdong Province, China: a case-control study. *BMC Public Health*. 2010;10:156. doi: 10.1186/1471-2458-10-156.
21. Fink A, Kosecoff J, Chassin M, Brook RH. Consensus methods: characteristics and guidelines for use. *Am J Public Health*. 1984;74:979–983.
22. Keeney S, Hasson F, McKenna H. Consulting the oracle: ten lessons from using the Delphi technique in nursing research. *J Adv Nurs*. 2006;53:205–212. doi: 10.1111/j.1365-2648.2006.03716.x.
23. Tipton MJ, Golden FS. A proposed decision-making guide for the search, rescue and resuscitation of submersion (head under) victims based on expert opinion. *Resuscitation*. 2011;82:819–824. doi: 10.1016/j.resuscitation.2011.02.021.
24. Tipton M, Golden F, Morgan P. Drowning: guidelines extant, evidence-based risk for rescuers? *Resuscitation*. 2013;84:e31–e32. doi: 10.1016/j.resuscitation.2012.08.339.
25. Harrison JE, Kreisfield R, Henley G. Drowning and other injuries related to aquatic activities at ages 55 years and older in Australia. Canberra, Australia: Australian Institute of Health and Welfare; 2009. NISU briefing No. 15. Cat. No. INJCAT 125.
26. Bierens JJLM, ed. *Drowning: Prevention, Rescue, Treatment*. Heidelberg, Germany: Springer Verlag; 2014.
27. Orłowski JP, Abulleil MM, Phillips JM. The hemodynamic and cardiovascular effects of near-drowning in hypotonic, isotonic, or hypertonic solutions. *Ann Emerg Med*. 1989;18:1044–1049.
28. Orłowski JP. Drowning, near-drowning, and ice-water drowning. *JAMA*. 1988;260:390–391.
29. Orłowski JP. Drowning, near-drowning, and ice-water submersions. *Pediatr Clin North Am*. 1987;34:75–92.
30. Travers AH, Perkins GD, RA Berg, Castren M, Considine J, Escalante R, Gazmuri RJ, Koster RW, Lim SH, Nation KJ, Olasveengen TM, Sakamoto T, Sayre MR, Sierra A, Smyth MA, Stanton D, Vaillancourt C; on behalf of the BLS Chapter Collaborators. Part 3: adult basic life support and automated external defibrillation: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. *Circulation* 2015;132(suppl 1):S51–S83. doi: 10.1161/CIR.0000000000000272.
31. American College of Surgeons Committee on Trauma. *Advanced Trauma Life Support for Doctors*. 6th ed. Chicago, IL: American College of Surgeons; 1997.
32. Teasdale G, Jennett B. Assessment of coma and impaired consciousness: a practical scale. *Lancet*. 1974;2:81–84.
33. Szpilman D. Near-drowning and drowning classification: a proposal to stratify mortality based on the analysis of 1,831 cases. *Chest*. 1997;112:660–665.
34. Szpilman D, Bierens JJ, Handley AJ, Orłowski JP. Drowning. *N Engl J Med*. 2012;366:2102–2110. doi: 10.1056/NEJMra1013317.
35. Truhlář A, Deakin CD, Soar J, Khalifa GE, Alfonso A, Bierens JJ, Brattebø G, Brugger H, Dunning J, Hunyadi-Antičević S, Koster RW, Lockey DJ, Lott C, Paal P, Perkins GD, Sandroni C, Thies KC, Zideman DA, Nolan JP; Cardiac Arrest in Special Circumstances Section Collaborators. European Resuscitation Council Guidelines for Resuscitation 2015: section 4: cardiac arrest in special circumstances. *Resuscitation*. 2015;95:148–201. doi: 10.1016/j.resuscitation.2015.07.017.
36. Quan L, Kinder D. Pediatric submersions: prehospital predictors of outcome. *Pediatrics*. 1992;90:909–913.
37. Suominen P, Baillie C, Korpela R, Rautanen S, Ranta S, Olkkola KT. Impact of age, submersion time and water temperature on outcome in near-drowning. *Resuscitation*. 2002;52:247–254.
38. Quan L, Wentz KR, Gore EJ, Copass MK. Outcome and predictors of outcome in pediatric submersion victims receiving prehospital care in King County, Washington. *Pediatrics*. 1990;86:586–593.
39. Mosesso VN Jr. The most neglected tool in EMS: the clock. *Ann Emerg Med*. 1993;22:1311–1312.
40. Cordell WH, Olinger ML, Kozak PA, Nyhuis AW. Does anybody really know what time it is? Does anybody really care? *Ann Emerg Med*. 1994;23:1032–1036.
41. Ornato JP, Doctor ML, Harbour LF, Peberdy MA, Overton J, Racht EM, Zauhar WG, Smith AP, Ryan KA. Synchronization of timepieces to the atomic clock in an urban emergency medical services system. *Ann Emerg Med*. 1998;31:483–487.
42. Winkle RA, Mead RH, Ruder MA, Smith NA, Buch WS, Gaudiani VA. Effect of duration of ventricular fibrillation on defibrillation efficacy in humans. *Circulation*. 1990;81:1477–1481.
43. Weaver WD, Cobb LA, Hallstrom AP, Fahrenbruch C, Copass MK, Ray R. Factors influencing survival after out-of-hospital cardiac arrest. *J Am Coll Cardiol*. 1986;7:752–757.
44. Sanders AB, Kern KB, Atlas M, Bragg S, Ewy GA. Importance of the duration of inadequate coronary perfusion pressure on resuscitation from cardiac arrest. *J Am Coll Cardiol*. 1985;6:113–118.
45. Ranieri VM, Rubenfeld GD, Thompson BT, Ferguson ND, Caldwell E, Fan E, Camporota L, Slutsky AS; ARDS Definition Task Force. Acute respiratory distress syndrome: the Berlin Definition. *JAMA*. 2012;307:2526–2533. doi: 10.1001/jama.2012.5669.
46. Nielsen N, Wetterslev J, Cronberg T, Erlinge D, Gasche Y, Hassager C, Horn J, Hovdenes J, Kjaergaard J, Kuiper M, Pellis T, Støttrup P, Wanscher M, Wise MP, Åneman A, Al-Subaie N, Boesgaard S, Bro-Jeppesen J, Brunetti I, Bugge JF, Hingston CD, Juffermans NP, Koopmans M, Køber L, Langørgen J, Lilja G, Møller JE, Rundgren M, Rylander C, Smid O, Werer C, Winkel P, Friberg H; TTM Trial Investigators. Targeted temperature management at 33°C versus 36°C after cardiac arrest. *N Engl J Med*. 2013;369:2197–2206. doi: 10.1056/NEJMoa1310519.
47. Wijdicks EF, Bamlet WR, Maramattom BV, Manno EM, McClelland RL. Validation of a new coma scale: the FOUR score. *Ann Neurol*. 2005;58:585–593. doi: 10.1002/ana.20611.
48. Fugate JE, Rabinstein AA, Claassen DO, White RD, Wijdicks EF. The FOUR score predicts outcome in patients after cardiac arrest. *Neurocrit Care*. 2010;13:205–210. doi: 10.1007/s12028-010-9407-5.
49. Brugger H, Durrer B, Elsensohn F, Paal P, Strapazzon G, Winterberger E, Zafren K, Boyd J; ICAR MEDCOM. Resuscitation of avalanche victims: evidence-based guidelines of the International Commission for Mountain Emergency Medicine (ICAR MEDCOM): intended for physicians and other advanced life support personnel. *Resuscitation*. 2013;84:539–546. doi: 10.1016/j.resuscitation.2012.10.020.
50. Brain Resuscitation Clinical Trial I Study Group. A randomized clinical study of cardiopulmonary-cerebral resuscitation: design, methods, and patient characteristics. *Am J Emerg Med* 1986;4:72–86.
51. Fiser DH. Assessing the outcome of pediatric intensive care. *J Pediatr*. 1992;121:68–74.
52. UK-TIA Study Group. United Kingdom Transient Ischemic Attack (UK-TIA) Aspirin Trial: interim results. *Br Med J (Clin Res Ed)*. 1988;296:316–320.
53. van Swieten JC, Koudstaal PJ, Visser MC, Schouten HJ, van Gijn J. Interobserver agreement for the assessment of handicap in stroke patients. *Stroke*. 1988;19:604–607.
54. Christenson J, Andrusiek D, Everson-Stewart S, Kudenchuk P, Hostler D, Powell J, Callaway CW, Bishop D, Vaillancourt C, Davis D, Aufderheide TP, Idris A, Stouffer JA, Stiell I, Berg R; Resuscitation Outcomes Consortium Investigators. Chest compression fraction determines survival in patients with out-of-hospital ventricular fibrillation. *Circulation*. 2009;120:1241–1247. doi: 10.1161/CIRCULATIONAHA.109.852202.
55. Idris AH, Guffey D, Aufderheide TP, Brown S, Morrison LJ, Nichols P, Powell J, Daya M, Bigham BL, Atkins DL, Berg R, Davis D, Stiell I, Sopko G, Nichol G; Resuscitation Outcomes Consortium (ROC) Investigators. Relationship between chest compression rates and outcomes from cardiac arrest. *Circulation*. 2012;125:3004–3012. doi: 10.1161/CIRCULATIONAHA.111.059535.
56. Idris AH, Guffey D, Pepe PE, Brown SP, Brooks SC, Callaway CW, Christenson J, Davis DP, Daya MR, Gray R, Kudenchuk PJ, Larsen J, Lin S, Menegazzi JJ, Sheehan K, Sopko G, Stiell I, Nichol G, Aufderheide TP; Resuscitation Outcomes Consortium Investigators. Chest compression rates and survival following out-of-hospital cardiac arrest. *Crit Care Med*. 2015;43:840–848. doi: 10.1097/CCM.0000000000000824.
57. Stiell IG, Brown SP, Nichol G, Cheskes S, Vaillancourt C, Callaway CW, Morrison LJ, Christenson J, Aufderheide TP, Davis DP, Free C, Hostler D, Stouffer JA, Idris AH; Resuscitation Outcomes Consortium Investigators. What is the optimal chest compression depth during out-of-hospital

- cardiac arrest resuscitation of adult patients? *Circulation*. 2014;130:1962–1970. doi: 10.1161/CIRCULATIONAHA.114.008671.
58. Cheskes S, Schmicker RH, Verbeek PR, Salcido DD, Brown SP, Brooks S, Menegazzi JJ, Vaillancourt C, Powell J, May S, Berg RA, Sell R, Idris A, Kampp M, Schmidt T, Christenson J; Resuscitation Outcomes Consortium (ROC) investigators. The impact of peri-shock pause on survival from out-of-hospital shockable cardiac arrest during the Resuscitation Outcomes Consortium PRIMED trial. *Resuscitation*. 2014;85:336–342. doi: 10.1016/j.resuscitation.2013.10.014.
  59. Meaney PA, Bobrow BJ, Mancini ME, Christenson J, de Caen AR, Bhanji F, Abella BS, Kleinman ME, Edelson DP, Berg RA, Aufderheide TP, Menon V, Leary M; on behalf of the CPR Quality Summit Investigators, the American Heart Association Emergency Cardiovascular Care Committee, and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. Cardiopulmonary resuscitation quality: [corrected] improving cardiac resuscitation outcomes both inside and outside the hospital: a consensus statement from the American Heart Association [published corrections appear in *Circulation*. 2013;128:e120 and *Circulation*. 2013;128:e408]. *Circulation*. 2013;128:417–435. doi: 10.1161/CIR.0b013e31829d8654.
  60. *Global Report on Drowning: Preventing a Leading Killer*. Geneva, Switzerland: World Health Organization; 2014.
  61. Hypothermia after Cardiac Arrest Study Group. Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest [published correction appears in *N Engl J Med*. 2002;346:1756]. *N Engl J Med*. 2002;346:549–556.
  62. Bernard SA, Gray TW, Buist MD, Jones BM, Silvester W, Gutteridge G, Smith K. Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. *N Engl J Med*. 2002;346:557–563. doi: 10.1056/NEJMoa003289.
  63. Topjian AA, Berg RA, Bierens JJ, Branche CM, Clark RS, Friberg H, Hoedemaekers CW, Holzer M, Katz LM, Knape JT, Kochanek PM, Nadkarni V, van der Hoeven JG, Warner DS. Brain resuscitation in the drowning victim. *Neurocrit Care*. 2012;17:441–467. doi: 10.1007/s12028-012-9747-4.

## 2015 Revised Utstein-Style Recommended Guidelines for Uniform Reporting of Data From Drowning-Related Resuscitation: An ILCOR Advisory Statement

Ahamed H. Idris, Joost J.L.M. Bierens, Gavin D. Perkins, Volker Wenzel, Vinay Nadkarni, Peter Morley, David S. Warner, Alexis Topjian, Allart M. Venema, Christine M. Branche, David Szpilman, Luiz Morizot-Leite, Masahiko Nitta, Bo Løfgren, Jonathon Webber, Jan-Thorsten Gräsner, Stephen B. Beerman, Chun Song Youn, Ulrich Jost, Linda Quan, Cameron DeZfulian, Anthony J. Handley and Mary Fran Hazinski

*Circ Cardiovasc Qual Outcomes.* 2017;10:

doi: 10.1161/HCQ.0000000000000024

*Circulation: Cardiovascular Quality and Outcomes* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2017 American Heart Association, Inc. All rights reserved.

Print ISSN: 1941-7705. Online ISSN: 1941-7713

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://circoutcomes.ahajournals.org/content/10/7/e000024>

Data Supplement (unedited) at:

<http://circoutcomes.ahajournals.org/content/suppl/2017/07/17/HCQ.0000000000000024.DC1>

**Permissions:** Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Circulation: Cardiovascular Quality and Outcomes* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

**Reprints:** Information about reprints can be found online at:

<http://www.lww.com/reprints>

**Subscriptions:** Information about subscribing to *Circulation: Cardiovascular Quality and Outcomes* is online at:

<http://circoutcomes.ahajournals.org/subscriptions/>

Data Supplement. Results of Delphi process round two

Data Element	Revise Yes/No		Priority Rank					Core N (%)	Supplemental N (%)
	NO, N (%)	YES, N (%)	1 to 5, 1 is highest importance for research						
RECOMMENDED DATA TO REPORT			1	2	3	4	5	TOTAL (N)	
			N (%)	N (%)	N (%)	N (%)	N (%)		
<b>VICTIM INFORMATION</b>									
Victim identifier	12 (92)	1 (8)	9 (60)	4 (27)	0	0	2 (13)	15	17 (100)
Gender	13 (93)	1 (8)	13 (82)	1 (6)	1 (6)	0	1 (6)	16	17 (100)
Age	13 (93)	1 (8)	12 (80)	2 (13)	1 (7)	0	0	15	17 (100)
Incident date and time of day	13 (93)	1 (8)	8 (53)	4 (27)	2 (13)	0	1 (7)	15	17 (100)
Precipitating event	9 (56)	7 (44)	9 (60)	3 (20)	2 (13)	1 (7)	0	15	14 (82) 3 (18)
Race or Ethnic Category	11 (85)	2 (15)	3 (20)	4 (27)	4 (27)	2 (13)	2 (13)	15	4 (24) 13 (76)
Resident of City, county	11 (85)	2 (15)	3 (20)	1 (6)	4 (27)	3 (20)	4 (27)	15	2 (12) 15 (88)
Pre-existing illness	8 (62)	5 (38)	10 (64)	2 (12)	2 (12)	2 (12)		16	13 (76) 4 (24)
<b>SCENE INFORMATION</b>									
Was the event witnessed	14 (93)	1 (7)	13 (87)	2 (13)				15	17 (100)
Body of water (type)	13 (87)	2 (13)	11 (79)	2 (14)		1 (7)		14	15 (88) 2 (12)
Loss of consciousness	10 (71)	4 (29)	8 (73)	1 (9)	2 (18)			11	16 (94) 1 (6)
Pre-EMS resuscitation	7 (50)	7 (50)	14 (93)			1 (7)		15	17 (100)
EMS called	14 (100)		10 (72)	2 (14)	1 (7)		1 (7)	14	16 (94) 1 (6)
Initial EMS vital signs	9 (64)	5 (36)	10 (67)	2 (13)	2 (13)	1 (7)		15	15 (88) 2 (12)
Time of first EMS resuscitation attempt	12 (75)	4 (25)	10 (67)	2 (13)	2 (13)	1 (7)		15	15 (88) 2 (12)
Neurological status	6 (46)	7 (54)	10 (77)	2 (15)	1 (8)			13	16 (94) 1 (6)
Type of water/liquid	7 (70)	3 (30)	1 (8)		7 (54)	4 (30)	1 (8)	13	10 (59) 7 (41)
water temperature	8 (57)	6 (43)	6 (46)	4 (30)	2 (16)	1 (8)		13	13 (76) 4 (24)
Time of submersion	10 (71)	4 (29)	6 (46)	1 (8)	4 (30)	2 (16)		13	10 (62) 6 (38)
Time of removal	11 (85)	2 (15)	4 (30)	2 (16)	5 (38)	2 (16)		13	6 (35) 11 (65)
EMS vehicle dispatched	10 (77)	3 (23)	3 (25)	3 (25)	1 (9)	3 (25)	2 (16)	12	3 (23) 10 (77)
Time of first EMS assessment	10 (83)	2 (17)	4 (33)	2 (17)	1 (8)	2 (17)	3 (25)	12	6 (38) 10 (62)
Cyanosis	5 (38)	8 (62)	1 (8)	1 (8)	3 (25)	3 (25)	4 (34)	12	3 (22) 11 (78)
Method of CPR	5 (42)	7 (58)	11 (74)	2 (13)	2 (13)			15	14 (88) 2 (12)
Pupillary reaction	3 (21)	11 (79)	2 (18)	1 (9)	7 (64)		1 (9)	11	6 (38) 10 (62)
<b>EMERGENCY DEPARTMENT TREATMENT</b>									
Vital signs	9 (64)	5 (36)	13 (87)		2 (13)			15	17 (100)
O2 hemoglobin saturation	13 (93)	1 (7)	10 (77)	1 (8)	2 (15)			13	13 (85) 2 (15)
Arterial blood gas analysis	14 (82)	3 (18)	9 (65)	3 (21)	1 (7)	1 (7)		14	14 (88) 2 (12)
Initial neurological function	10 (71)	4 (29)	13 (93)	1 (7)				14	16 (100)
Airway and ventilation requirements	9 (60)	6 (40)	10 (67)	3 (20)	1 (6)	1 (6)		15	14 (93) 1 (7)
pupillary reaction	7 (54)	6 (46)	3 (23)	1 (8)	7 (53)	1 (8)	1 (8)	13	6 (40) 9 (60)
toxicology testing	12 (80)	3 (20)	1 (9)	4 (30)	5 (38)		3 (23)	13	3 (23) 10 (77)
<b>HOSPITAL COURSE</b>									
Airway and ventilation requirements	7 (50)	7 (50)	9 (75)	2 (17)		1 (8)		12	9 (90) 1 (10)
Serial neurological function	10 (67)	5 (33)	5 (50)	2 (20)	3 (30)			10	6 (60) 4 (40)
Complicating illness of drowning	10 (71)	4 (29)	5 (30)	3 (30)	1 (10)	1 (10)		10	4 (44) 5 (56)
<b>DISPOSITION</b>									
Death: date, time, place	13 (100)		13 (100)					13	16 (100)
Hospital discharge date	14 (100)		9 (75)	3 (25)				12	16 (100)
Neurological outcome at discharge	10 (77)	3 (23)	11 (85)	2 (15)				13	16 (100)
Quality of life	8 (57)	6 (43)	5 (42)	5 (42)		1 (8)	1 (8)	12	6 (75) 2 (25)
If death, cause of death	10 (77)	3 (23)	7 (54)	2 (16)	4 (30)			13	9 (53) 8 (47)
How was cause determined	11 (79)	3 (21)	2 (17)	2 (17)	8 (66)			12	4 (25) 12 (75)
Autopsy	12 (86)	2 (14)	3 (25)	1 (8)	7 (58)	1 (8)		12	9 (60) 6 (40)
Forensic investigation	14 (93)	1 (7)	2 (16)	3 (25)	5 (42)	1 (8)	1 (8)	12	8 (57) 6 (43)
Forensic cause:	15 (94)	1 (6)	3 (25)	3 (25)	3 (25)	1 (8)	2 (17)	12	1 (7) 14 (93)
Other injuries and illnesses	10 (83)	2 (17)	2 (15)	5 (38)	4 (31)	1 (8)	1 (8)	13	2 (34) 12 (86)