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## Special paper

# Utstein Style for emergency care — the first 30 years



Quentin Otto<sup>a,\*</sup>, Jerry P. Nolan<sup>b</sup>, Douglas A. Chamberlain<sup>c</sup>, Richard O. Cummins<sup>d</sup>,  
Jasmeet Soar<sup>e</sup>

<sup>a</sup> Severn Deanery, Bristol, UK

<sup>b</sup> University of Warwick, Warwick Medical School, Coventry, Consultant in Anaesthesia and Intensive Care Medicine, Royal United Hospital, Bath, UK

<sup>c</sup> Brighton and Sussex University Hospitals NHS Trust, Brighton, UK

<sup>d</sup> Department of Emergency Medicine, University of Washington, Seattle, USA

<sup>e</sup> Consultant in Anaesthetics and Intensive Care Medicine, Southmead Hospital, North Bristol NHS Trust, Bristol, UK

## Abstract

**Background:** Utstein Abbey near Stavanger in Norway, hosted a meeting in 1990 on guidelines for the uniform reporting of data from out-of-hospital cardiac arrest. In this paper we describe the last 30 years of the Utstein style.

**Methods:** A systematic literature search identified publications from Utstein-style meetings or groups using the Utstein format.

**Results:** 30 outputs were found, describing primarily resuscitation structure, process and outcome measures. They originated from all over the world and from multiple medical disciplines. Some were co-published in multiple journals.

**Conclusions:** The meeting at Utstein Abbey in 1990 has had a sustained and far-reaching impact, particularly in resuscitation science, implementation and outcomes. The Utstein format will continue to evolve following the key principles from the original meeting and with the ultimate aim of improving patient care and outcomes.

**Keywords:** Utstein, Registries, Cardiac arrest, Resuscitation

## Introduction

Thirty years ago a conference was held at Utstein Abbey in 1990 which resulted in the publication of guidelines for uniform reporting of data from out-of-hospital cardiac arrest (OHCA).<sup>1–3</sup> Subsequently, many further meetings have followed a similar format and methods of this original Utstein meeting, many also returning to the Abbey itself. The term 'Utstein Style' is now synonymous with resuscitation reporting and registries.

Utstein Abbey (See Fig. 1) occupies a strategic position overlooking the entrance to the Norwegian fjords of Ryfylke and the passage southwards toward Stavanger. Initially the residence of King Harald Hårfagre (Fairhair) in 872, there has been an abbey on the

site since 1264. The Augustinian monks came from France, Britain, and Denmark, and were the only physicians in the middle ages providing both health and spiritual care. The sick were brought to the abbey and lodged in the hospice. Rivalries within the Church led to the Bishop of Stavanger's soldiers torching the abbey in 1515. After the Reformation in 1537, the abbey was sacked once again.<sup>4</sup> The current stone building is from around 1750 and has been extensively restored over the last 100 years.

## What is the Utstein style?

Utstein meetings held since the initial consensus meeting in 1990 have been primarily focused on reporting performance and outcomes.

**Abbreviations:** ILCOR, International Liaison Committee on Resuscitation; CPR, Cardiopulmonary Resuscitation; OHCA, out-of-hospital cardiac arrest; IHCA, in-hospital cardiac arrest; EMS, emergency medical services; AED, automated external defibrillator; WHO, World Health Organization.

\* Corresponding author.

E-mail address: [q.otto@nhs.net](mailto:q.otto@nhs.net) (Q. Otto).

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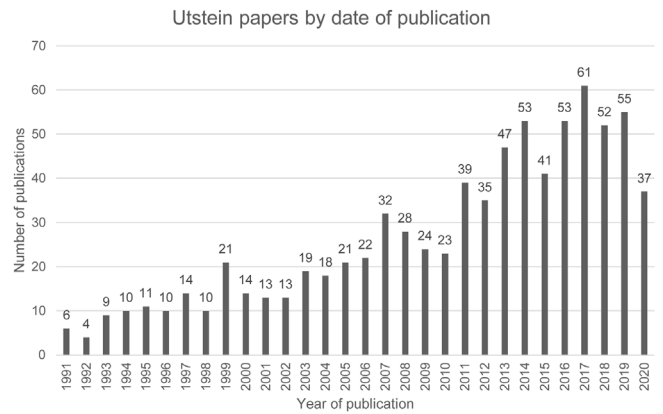
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**Fig. 1 – Photograph of Utstein Abbey.**



**Fig. 2 – Results from literature search for Utstein (in title or abstract) of MEDLINE via PubMed by year of publication.**

Clear definitions and performance indicators enable a collective approach to measuring and improving patient outcomes. A template for reporting these agreed measures with standardised definitions is now known as the Utstein style or just Utstein.

The meetings usually follow a similar format whereby a series of rotating workshops are used to refine and update key definitions and outcome measures from extensive research prior to the meeting. During the meetings a consensus is reached and a plan made for dissemination and follow-up.

The Utstein Style has had greatest influence in resuscitation, registries, pre-hospital and disaster medicine but more recently has evolved to influence new disciplines, including veterinary resuscitation<sup>5</sup> and even resuscitation in fictional outer space.<sup>6</sup>

In this article we summarise the first 30 years of Utstein Style publications. We provide insights from some of the original Utstein authors (Box 1), focus on some key Utstein outputs and on planned future developments.

## Methods

A literature search was conducted of MEDLINE via PubMed for Utstein in the Title or Abstract on 30th October 2020. There were 704 results. These results had publication dates from 1991 to 2020 and are shown graphically in Fig. 2.

Results were initially screened (QO) against the following inclusion criteria:

Papers documenting output from an Utstein meeting and, or consensus process with published output relating to healthcare. Any language, any date.

Included articles from initial screening (81) were further analysed to consolidate co-publications and duplicates. Abstracts or manuscripts were read to ensure they met the inclusion criteria (QO, JPN, JS). The results were also cross-referenced with a database of Utstein articles hosted by the Laerdal Foundation.

## Results

Results meeting the inclusion criteria are shown in Table 1.

30 publications were identified that documented outputs from Utstein-style meetings or updates, with a broad range of disciplines and subjects represented. Many were co-published in multiple journals.

## Discussion

We have identified 30 key Utstein publications since the first Utstein meeting in 1990 and first publication in 1991. The Utstein process has led to standardised reporting of processes and outcomes for both in and out-of-hospital cardiac arrest, and the templates have been updated in response to changes in resuscitation practice. There are now Utstein publications about laboratory research, trauma, disasters, drowning, education and simulation, newborn resuscitation, veterinary resuscitation and most recently stroke.

The Utstein process and collaborations have had a part in several developments that have been key to improving survival from cardiac arrest globally.

## ILCOR

International collaboration on standards in resuscitation was a movement that was gaining momentum in the late 1980s and early 1990s. The first Utstein meeting in 1990 was a major stimulus to the collaboration of the European Resuscitation Council and the American Heart Association, along with other international resuscitation bodies. In the following years several international meetings were held and in 1992 the International Liaison Committee on Resuscitation was formed following an AHA meeting in the United States, with their own first meeting in November of that year. Douglas Chamberlain and Richard Cummins co-chaired ILCOR until 1999<sup>58</sup> and it reached a major milestone in 2017 with a review of 25 years of activity in the field of resuscitation.<sup>58</sup>

## Cardiac arrest registries

Following on from the original recommendations for reporting in out-of-hospital cardiac arrest,<sup>1–3</sup> many nations, regions and EMS

**Table 1 – Utstein outputs chronologically by subject category.**

Year of publication	Focus of publication	Title	Meeting location/date	Journals and references of primary publication/co-publication
<b>Cardiac arrest</b>				
1991	Out-of-hospital cardiac arrest	Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the Utstein Style	Utstein Abbey, June 1990 There was a second meeting at Pennyhill Park Hotel in Bagshot, Surrey in early December 1990	Annals of Emergency Medicine <sup>1</sup> Circulation <sup>2</sup> Resuscitation <sup>3</sup> European Journal of Anaesthesiology <sup>7</sup>
1995	Paediatric advanced life support	Recommended guidelines for uniform reporting of paediatric advanced life support: the paediatric Utstein style	Task force meeting held June 8, 1994, in Washington, DC, in conjunction with the First International Conference on Pediatric Resuscitation, and a follow-up task force writing group meeting held September 18, 1994, in Chicago, Ill	Annals of Emergency Medicine <sup>8</sup> Circulation <sup>9</sup> Paediatrics <sup>10</sup> Resuscitation <sup>11</sup> Anales de Pediatria <sup>12</sup>
1996	Laboratory CPR research	Utstein-style guidelines for uniform reporting of laboratory CPR research	International Resuscitation Research Conference in Pittsburgh, PA, in May 1994 Utstein III: Setting Guidelines for Laboratory CPR Research, held in Chicago, Ill Oct 1994 Second CPR Congress of the European Resuscitation Council, held in Mainz, Germany Oct 1994	Annals of Emergency Medicine <sup>13</sup> Circulation <sup>14</sup> Resuscitation <sup>15</sup>
1997	In-hospital resuscitation	Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: the in-hospital Utstein style	Utstein' 95 Symposium held June 23–24, 1995, at Utstein Abbey	Academic Emergency Medicine <sup>16</sup> Annals of Emergency Medicine <sup>17</sup> Circulation <sup>18</sup> Resuscitation <sup>19</sup> Notfall <sup>20,21</sup>
2004	Update and simplification of templates	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	April 2002, Melbourne, Australia	Circulation <sup>22</sup> Resuscitation <sup>23</sup>
2005	Post-resuscitation care	Recommended guidelines for reviewing, reporting, and conducting research on post-resuscitation care: the Utstein style	Utstein Abbey, Norway, in September 2003	Resuscitation <sup>24</sup>
2011	Out-of-hospital cardiac arrest – medical dispatch	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	No meeting held	Resuscitation <sup>25</sup>
2013	Survival in resuscitation	The formula for survival in resuscitation	Original meeting Utstein 2006	Resuscitation <sup>26</sup>
2015	Cardiac arrest	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	First meeting Vienna in October 2012 Second Meeting Melbourne in April 2013	Circulation <sup>27</sup> Resuscitation <sup>28</sup>

**Table 1 (continued)**

Year of publication	Focus of publication	Title	Meeting location/date	Journals and references of primary publication/co-publication
2018	Cardiac arrest survival in developing EMS systems	Global Resuscitation Alliance Utstein recommendations for developing emergency care systems to improve cardiac arrest survival	Singapore 2017	Resuscitation <sup>29</sup>
2019	In-hospital Cardiac Arrest	Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Template for In-Hospital Cardiac Arrest: A Consensus Report From a Task Force of the International Liaison Committee on Resuscitation	First meeting Melbourne, Australia, in April 2013 Second meeting New Orleans, LA, in November 2016 Third meeting Adelaide, Australia, in May 2017 Fourth meeting in Anaheim, CA, in November 2017 These face-to-face meetings were supplemented by 5 teleconferences that took place during 2016–2018.	Circulation <sup>30</sup> Resuscitation <sup>31</sup>
2020	Out-of-hospital Cardiac Arrest update	Merits of expanding the Utstein case definition for out of hospital cardiac arrest	No meeting held	Resuscitation <sup>32</sup>
<b>Trauma</b>				
1999	Major trauma	Recommendations for uniform reporting of data following major trauma—the Utstein Style: an initiative. International Trauma Anaesthesia and Critical Care Society (ITACCS).	Drafted Mainz, Germany Feb 1998 Finalized 11 <sup>th</sup> ITACCS Annual Symposium Vienna, May 1998	British Journal of Anaesthesia <sup>33</sup> Der Anaesthesist <sup>34</sup> European Journal of Emergency Medicine <sup>35</sup> Prehospital and Disaster Medicine <sup>36</sup> Resuscitation <sup>37</sup>
2008	Major Trauma	The Utstein template for uniform reporting of data following major trauma: a joint revision by SCANTEM, TARN, DGU-TR and RITG	Symposia in May and December 2007 at the Utstein Abbey, Norway	Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine <sup>38</sup>
<b>Prehospital and disaster</b>				
1996	Prehospital and disasters	Disaster medical response research: a template in the Utstein style. Task Force on Quality Control of Disaster Management World Association for Disaster and Emergency Medicine	Utstein Abbey	Prehospital and Disaster Medicine <sup>39</sup>
1999	Disasters	Health disaster management: guidelines for evaluation and research in the Utstein style: executive summary	Steering committee during multiple meetings over the past five years and by invited participants in an International workshop on the Quality Control of Disaster management conducted at the Nordic School of Public Health in Gothenburg, Sweden	Prehospital and Disaster Medicine <sup>40</sup>
2003	Drowning	Recommended guidelines for uniform reporting of data from drowning: the “Utstein style”	Amsterdam, June 2002	Circulation <sup>41</sup> Resuscitation <sup>42</sup>
2007	Emergency, outreach and rapid response teams	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	Teleconferences from June 2005 to August 2006	Circulation <sup>43</sup> Resuscitation <sup>44</sup>
2008	Emergency medical dispatch	Recommended guidelines for reporting on emergency medical dispatch when	In September 2005 a task force of 22 experts from 12 countries met in	Resuscitation <sup>45</sup>

(continued on next page)

**Table 1 (continued)**

Year of publication	Focus of publication	Title	Meeting location/date	Journals and references of primary publication/co-publication
		conducting research in emergency medicine: the Utstein style	Stavanger; Norway at the Utstein Abbey	
2009	Pre-hospital airway management	A consensus-based template for uniform reporting of data from pre-hospital advanced airway management	Utstein Abbey	Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine <sup>46</sup>
2011	Physician staffed pre-hospital services	A consensus-based template for documenting and reporting in physician-staffed pre-hospital services	2-day consensus meeting Stavanger, Norway	Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine <sup>47</sup>
2012	Disasters	Utstein-style template for uniform data reporting of acute medical response in disasters	Utstein Abbey, Norway (23–25 November 2010)	PLoS Currents <sup>48</sup>
2017	Drowning	2015 revised Utstein-style recommended guidelines for uniform reporting of data from drowning-related resuscitation: An ILCOR advisory statement	October 2013 in Potsdam, Germany	Circulation Cardiovascular Quality and Outcomes <sup>49</sup> Resuscitation <sup>50</sup>
2018	Pre-hospital airway management	Standardised data reporting from pre-hospital advanced airway management - a nominal group technique update of the Utstein-style airway template	Copenhagen 21 st of May 2017	Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine <sup>51</sup>
<b>Education and simulation</b>				
2003	Education in resuscitation	Education in resuscitation: an ILCOR symposium	Utstein Abbey: Stavanger, Norway: June 22–24, 2001	Circulation <sup>52</sup> Resuscitation <sup>53</sup>
2011	Simulation/Education	Setting a research agenda for simulation-based healthcare education: a synthesis of the outcome from an Utstein style meeting	June 2010 Copenhagen, Denmark	Journal of the Society for Simulation in Healthcare <sup>54</sup>
<b>Veterinary</b>				
2016	Veterinary cardiac arrest	Utstein-style guidelines on uniform reporting of in-hospital cardiopulmonary resuscitation in dogs and cats. A RECOVER statement	April 2013 in San Francisco	Journal of Veterinary Emergency and Critical Care <sup>5</sup>
<b>Newborn and maternal survival</b>				
2017	Newborn/Maternal survival	Successful implementation of Helping Babies Survive and Helping Mothers Survive programs-An Utstein formula for newborn and maternal survival	Utstein Abbey June 2015	PloS One <sup>55</sup>
2018	Perinatal mortality	Global resuscitation alliance consensus recommendations for developing emergency care systems: Reducing perinatal mortality	Singapore 2017	Resuscitation <sup>56</sup>
<b>Stroke</b>				
2020	Stroke	Utstein recommendation for emergency stroke care	5–6 June 2018 at Utstein Abbey in Norway	International Journal of Stroke <sup>57</sup>

systems have kept registries, providing key longitudinal data sets and resulting in hundreds of scientific papers. Examples of cardiac arrest registries can be found all over the world,<sup>59</sup> many of which report using Utstein templates. A recent systematic review of global coverage of cardiac arrest registries found 49 cardiac arrest registries globally.<sup>60</sup>

Japan has hosted a cardiac arrest registry since 2005 – the All-Japan Utstein Registry. The consistency of data recording has enabled studies of cardiac arrest in Japan to generate well over a hundred peer-reviewed research articles. Use of the Utstein registry

has shown year-on-year improvement in outcomes and enabled a 2005–2014 study to show a doubling of survival with favourable neurology but with regional variation.<sup>61</sup> These data facilitate regionally targeted improvements in cardiac arrest response and care.<sup>62</sup>

### The Utstein formula for survival in resuscitation

In 2006 a consensus meeting was held at Utstein Abbey. Thirty-five invited international experts participated in the symposium and a well-

### Box 1. Insights on the original 1990 Utstein meeting and publication.

#### Richard Cummins

In the 1970s and 1980s Mickey Eisenberg, in Seattle Washington, Douglas Chamberlain in Brighton, England and others began publishing studies about the success of emergency medical services (EMS) systems in resuscitating people from sudden, out-of-hospital cardiac arrest. New innovations were taking place internationally throughout Europe, Canada, Australia, New Zealand, the United States, South Africa, and Asia. These important innovations included widespread community-training in basic CPR, initiating telephone CPR, equipping early EMS responders with manual or automatic defibrillators, and staffing response ambulances with highly-trained paramedics, or even physicians. Many questions about the incremental value of these innovations, and about how communities should best be organised to respond to resuscitation emergencies, were asked, but seldom answered with confidence.

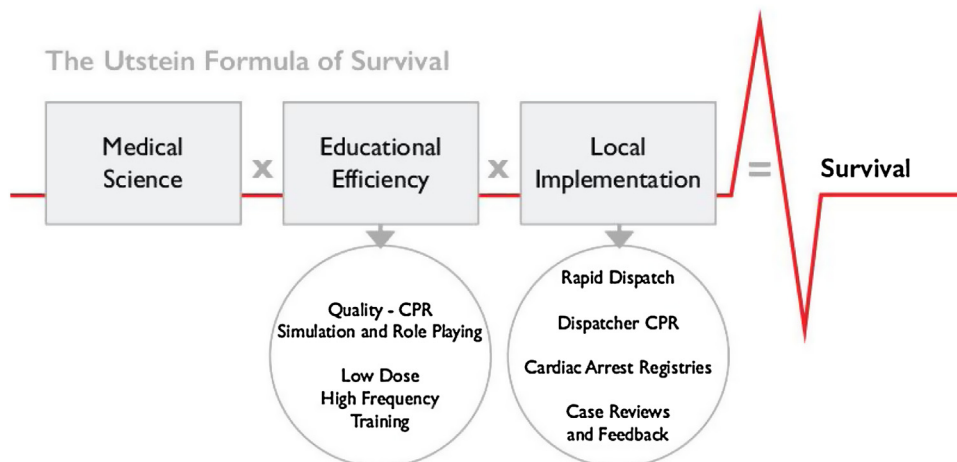
In 1990 the Laerdal Foundation graciously invited a number of resuscitation specialists to a landmark conference in Stavanger, Norway. For many of the participants, this was the first visit to the majestic country of Norway . . . and quite frankly, we all fell in love. The Foundation wisely chose the historic Augustinian monastery, Utstein Abbey, located on the small island of Klosterøy, near Stavanger, Norway, as the setting for the conference. Our initial discussions, led by Douglas Chamberlain, quickly established that to get to a deeper understanding of what worked and what did not work in out-of-hospital resuscitation we needed to get past a classic language and idiom problem. We required uniform definitions of patient variables, clinical outcomes, and system organizations. During a memorable hike to the Preikestolen (Pulpit) rock over the Lysefjord near Stavanger, some of the conference participants were able to continue these discussions with Tore Laerdal of the Laerdal Foundation. We understood that while we had made a good start on developing uniform guidelines for reporting data from out-of-hospital cardiac arrest, further work was needed. We all agreed that the stimulating environment of the Utstein Abbey should be honoured in any of our conference publications—that unique setting had indelibly contributed to our productivity. The Laerdal Foundation has graciously continued a tradition of hosting many subsequent meetings in that wonderful Norwegian island setting.

But what does the term Utstein style actually mean? What exactly is the “style” being referred to with this terminology? For myself, it originally was intended to capture the spirit of the Vancouver style for formatting references in scientific papers. People would know at once that an Utstein style publication was the product of a process, well-defined and consensus. Key elements in this process included established experts, brought together face-to-face, focused on a topic, to discuss and reach consensus on uniform definitions and reporting variables. From our initial meetings, there was an emphasis on developing evidence-based recommendations, that would be reasonable, focused on the science, and helpful to the world’s resuscitation communities. This emphasis has been successfully maintained in the many subsequent Utstein styles. It has been my privilege to play a small part in these activities.

#### Douglas Chamberlain

Although an interest in resuscitation had been increasing since the mid-1960s, no attempt was made to coordinate efforts internationally until 1990. Several enthusiasts came together for the first time in June of that year at Utstein Abbey in Norway under the auspices of the Laerdal Foundation in order to standardise nomenclature. Mutual understanding is a prerequisite for successful cooperation. A document was produced in the same year that included the first recommendations on the practice of resuscitation. These proposals were published shortly afterwards in several international journals under headings that included the words Utstein Style.

The American Heart Association invited members to their National Congress on Cardiopulmonary Resuscitation in 1992 where a decision was made to form a permanent group that became known as the International Liaison Committee on Resuscitation (ILCOR). A document was produced in the same year that included the first recommendations on the practice of resuscitation. These proposals were published shortly afterwards in several international journals under headings that included the words Utstein Style.



**Fig. 3 – The Utstein Formula for Survival.**



### Box 2. Global Resuscitation Alliance programs.

- Program 1: Establish a cardiac arrest registry
- Program 2: Begin telephone-CPR with ongoing training and quality improvement
- Program 3: Begin high-performance EMS CPR with ongoing training and quality improvement
- Program 4: Begin rapid dispatch
- Program 5: Measure professional resuscitation using the defibrillator recording
- Program 6: Begin an AED program for first responders, including police officers, guards and other security personnel
- Program 7: Use smart technologies to extend CPR and public access defibrillation programs to notify volunteer bystanders who can respond to nearby arrest to provide early CPR and defibrillation
- Program 8: Make CPR and AED training mandatory in school and the community
- Program 9: Work toward accountability – submit annual reports to the community
- Program 10: Work toward a culture of excellence

described Utstein rotating group format was used to consolidate work that had been conducted in devising a formula for survival in resuscitation.<sup>26</sup>

The Utstein Formula for Survival is now a widely recognised model which includes three elements in hypothesising potential survival rates from cardiac arrest: medical science, educational efficiency and local implementation (Fig. 3).

The generic nature and simplicity of the formula make it is a useful tool to appraise strengths and weaknesses in systematic approaches to education in resuscitation and services that manage cardiac arrest. Ultimately, this should improve outcomes from cardiac arrest.

### Global resuscitation alliance

In 2015, a global meeting of 36 emergency medical services (EMS) leaders, researchers, and experts took place at Utstein Abbey to address the challenge of how to increase community cardiac arrest survival and achieve implementation of best practices and worthwhile programs. This resulted in the formation of The Global Resuscitation Alliance. This global effort promotes best practices and offers help with implementation of successful cardiac arrest emergency management systems and communities.<sup>63</sup> A further Utstein-style meeting was held in Singapore in 2017 and the guidance was updated.<sup>64</sup>

Guidance and support is provided for 10 key programs outlined in Box 2.

This systematic method has more recently been adapted for stroke care<sup>57</sup>.

### Emerging themes

In the last few years more fields of medical science have adapted and adopted some of the key principles of the Utstein methodology that are now well established in resuscitation, disaster and pre-hospital medicine. The most recent meetings have focused on maternal and perinatal medicine<sup>55,56</sup> and stroke,<sup>57</sup> and the output of a 2019 meeting on patient safety during surgery, obstetrics and anaesthesia is awaiting publication.

### The future of Utstein

Several of the Utstein papers included in this review have conducted their meetings at the Utstein Abbey itself or mirrored the meeting style in other locations. Currently planned meetings at Utstein Abbey include:

- 2021 a WHO convened meeting on strengthening emergency systems
- 2021–22 World Federation of Societies of Anaesthesia (WFSA)/Lancet global surgery commission: follow up meeting on surgical, obstetric and anaesthesia care

Several groups in this review have used a remote process to conduct their meetings, and the recent coronavirus pandemic has stimulated the rapid and widespread development and adoption of remote video conferencing. Several Utstein projects have already been successfully conducted virtually and it is likely that there will be many more virtual projects in the future. Although many participants will be eager to meet face-to-face, the considerably reduced costs of virtual meetings and the ability to include a much greater diversity of participants makes videoconferencing or hybrid meetings very attractive.

## Conclusion

The historic meeting of members of the international resuscitation community at Utstein Abbey in 1990 has had a sustained, important and far-reaching impact over the last 30 years. The Utstein format will inevitably evolve but will hopefully maintain the key principles that have kept it applicable and relevant for so long, with the ultimate aim of improving patient care and outcomes.

## Conflicts of interest

QO, DAC, ROC—No conflicts.

JPN and JS are Editors of the journal Resuscitation and receive a payment from the publisher Elsevier.

## Author credit statement

The review was conceived by Jerry P. Nolan and Jasmeet Soar. The literature search was performed by Quentin Otto and ratified by Jerry P. Nolan and Jasmeet Soar. The main article was drafted by Quentin Otto, with contributions from Douglas A. Chamberlain and Richard O. Cummins. The manuscript was revised and edited by Jerry P. Nolan and Jasmeet Soar with final approval from all authors.

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## REFERENCES

- Cummins RO, Chamberlain DA, Abramson NS, et al. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the Utstein Style. Task Force of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, and the Australian Resuscitation Council. *Ann Emerg Med* 1991;20:861–74.
- Cummins RO, Chamberlain DA, Abramson NS, et al. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the Utstein Style. A statement for health professionals from a task force of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, and the Australian Resuscitation Council. *Circulation* 1991;84:960–75.
- Chamberlain D, Cummins RO, Abramson N, et al. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the 'Utstein style': Prepared by a Task Force of Representatives from the European Resuscitation Council, American Heart Association, Heart and Stroke Foundation of Canada, Australian Resuscitation Council. *Resuscitation* 1991;22:1–26.
- Nolan J, Soar J. Images in Resuscitation: Utstein Abbey. *Resuscitation* 2005;64:5–6.
- Boller M, Fletcher DJ, Brainard BM, et al. Utstein-style guidelines on uniform reporting of in-hospital cardiopulmonary resuscitation in dogs and cats. A RECOVER statement. *J Vet Emergency Crit Care (San Antonio Tex: 2001)* 2016;26:11–34.
- Hörburger D, Haslinger J, Bickel H, et al. Where no guideline has gone before: retrospective analysis of resuscitation in the 24th century. *Resuscitation* 2014;85:1790–4.
- Chamberlain D, Cummins RO. Recommended guidelines for uniform reporting of data from out-of-hospital cardiac arrest: the "Utstein style". European Resuscitation Council, American Heart Association, Heart and Stroke Foundation of Canada and Australian Resuscitation Council. *Eur J Anaesthesiol* 1992;9:245–56.
- Zaritsky A, Nadkarni V, Hazinski MF, et al. Recommended guidelines for uniform reporting of pediatric advanced life support: the pediatric Utstein style. *Ann Emergency Med* 1995;26:487–503.
- Zaritsky A, Nadkarni V, Hazinski MF, et al. 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. Writing Group. *Circulation* 1995;92:2006–20.
- Zaritsky A, Nadkarni V, Hazinski MF, et al. 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. *Pediatrics* 1995;96:765–79.
- Zaritsky A, Nadkarni V, Hazinski MF, et al. 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.
- López-Herce Cid J, Domínguez Sampedro P, Rodríguez Núñez A, et al. Cardiorespiratory arrest in children with trauma. *Anales Pediatría (Barcelona, Spain: 2003)* 2006;65:439–47.
- Idris AH, Becker LB, Ornato JP, et al. Utstein-style guidelines for uniform reporting of laboratory CPR research: a statement for health care 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. *Ann Emergency Med* 1996;28:527–41.
- Idris AH, Becker LB, Ornato JP, et al. 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. Writing Group. *Circulation* 1996;94:2324–36.
- Idris AH, Becker LB, Ornato JP, et al. 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. *Resuscitation* 1996;33:69–84.
- Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: the in-hospital "Utstein style". A statement for health care 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. *Acad Emergency Med* 1997;4:603–27.
- Cummins RO, Chamberlain D, Hazinski MF, et al. Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: the in-hospital "Utstein style". American Heart Association. *Ann Emergency Med* 1997;29:650–79.
- Cummins RO, Chamberlain D, Hazinski MF, et al. Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: the in-hospital "Utstein style". American Heart Association. *Circulation* 1997;95:2213–39.
- Cummins RO, Chamberlain D, Hazinski MF, et al. 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;34:151–83.
- Cummins RO, Chamberlain D, Hazinski MF, et al. Der innerklinische Utstein-Style (Teil I). *Notfall* 1998;1:87–101.
- Cummins RO, Chamberlain D, Hazinski MF, et al. Der innerklinische Utstein-Style (Teil II). *Notfall* 1998;1:157–75.
- Jacobs I, Nadkarni V, the ILCOR Task Force on Cardiac Arrest and Cardiopulmonary Resuscitation Outcomes, et al. 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;110:3385–97.
- Jacobs I, Nadkarni V, Bahr J, et al. 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;63:233–49.
24. Langhelle A, Nolan J, Herlitz J, et al. Recommended guidelines for reviewing, reporting, and conducting research on post-resuscitation care: the Utstein style. *Resuscitation* 2005;66:271–83.
  25. Castrén M, Bohm K, Kvam AM, et al. 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;82:1496–500.
  26. Søreide E, Morrison L, Hillman K, et al. The formula for survival in resuscitation. *Resuscitation* 2013;84:1487–93.
  27. Perkins GD, Jacobs IG, Nadkarni VM, et al. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update of the Utstein Resuscitation Registry Templates for Out-of-Hospital Cardiac Arrest: a statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation (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. *Circulation* 2015;132:1286–300.
  28. Perkins GD, Jacobs IG, Nadkarni VM, et al. Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Templates for Out-of-Hospital Cardiac Arrest. *Resuscitation* 2015;96:328–40.
  29. Nadarajan GD, Tiah L, Ho AFW, et al. Global resuscitation alliance utstein recommendations for developing emergency care systems to improve cardiac arrest survival. *Resuscitation* 2018;132:85–9.
  30. Nolan JP, Berg RA, Andersen LW, et al. Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Template for In-Hospital Cardiac Arrest: A Consensus Report 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). *Circulation* 2019;140:e746–57.
  31. Nolan JP, Berg RA, Andersen LW, et al. Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Template for In-Hospital Cardiac Arrest. *Resuscitation* 2019;144:166–77.
  32. Shin J, Chocron R, Rea T, Kudenchuk P, McNally B, Eisenberg M. Merits of expanding the Utstein case definition for out of hospital cardiac arrest. *Resuscitation* [Internet] 2020. . [cited 2020 Nov 25]; Available from: <http://www.sciencedirect.com/science/article/pii/S0300957220305554>.
  33. Dick WF, Baskett PJ, Grande C, et al. Recommendations for uniform reporting of data following major trauma—the Utstein style. An International Trauma Anaesthesia and Critical Care Society (ITACCS) initiative. *Br J Anaesth* 2000;84:818–9.
  34. Dick WF, Baskett P. [Recommendations for uniform documentation according to trauma severity—the Utstein style. An international initiative of the International Trauma Anesthesia and Critical Care Society (ITACCS)]. *Der Anaesthesist* 2000;49:255–68.
  35. Dick WF, Baskett PJ, Grande C, et al. Recommendations for uniform reporting of data following major trauma—the Utstein Style. An International Trauma Anaesthesia and Critical Care Society (ITACCS) initiative. *Eur J Emergency Med* 1999;6:369–87.
  36. Recommendations for uniform reporting of data following major trauma—the Utstein Style: an initiative. International Trauma Anaesthesia and Critical Care Society (ITACCS). *Prehospital Disaster Med* 1999;14:118–45.
  37. Dick WF, Baskett PJ. Recommendations for uniform reporting of data following major trauma—the Utstein style. A report of a working party of the International Trauma Anaesthesia and Critical Care Society (ITACCS). *Resuscitation* 1999;42:81–100.
  38. Ringdal KG, Coats TJ, Lefering R, et al. The Utstein template for uniform reporting of data following major trauma: a joint revision by SCANTEM, TARN, DGU-TR and RITG. *Scand J Trauma Resuscitation Emergency Med* 2008;16:7.
  39. Disaster medical response research: a template in the Utstein style. Task Force on Quality Control of Disaster Management World Association for Disaster and Emergency Medicine. *Prehospital Disaster Med* 1996;11:82–90.
  40. Sundnes KO. Health disaster management: guidelines for evaluation and research in the Utstein style: executive summary. Task Force on Quality Control of Disaster Management. *Prehospital Disaster Med* 1999;14:43–52.
  41. Idris AH, Berg RA, Bierens J, et al. Recommended guidelines for uniform reporting of data from drowning: the “Utstein style”. *Circulation* 2003;108:2565–74.
  42. Idris AH, Berg RA, Bierens J, et al. Recommended guidelines for uniform reporting of data from drowning: the “Utstein style.”. *Resuscitation* 2003;59:45–57.
  43. Peberdy MA, Cretikos M, Abella BS, et al. 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;116:2481–500.
  44. Peberdy MA, Cretikos M, Abella BS, et al. Recommended guidelines for monitoring, reporting, and conducting research on medical emergency team, outreach, and rapid response systems: an Utstein-style scientific statement. *Resuscitation* 2007;75:412–33.
  45. Castrén M, Karlsten R, Lippert F, et al. Recommended guidelines for reporting on emergency medical dispatch when conducting research in emergency medicine: the Utstein style. *Resuscitation* 2008;79:193–7.
  46. Sollid SJ, Lockey D, Lossius HM. Pre-hospital advanced airway management expert group. A consensus-based template for uniform reporting of data from pre-hospital advanced airway management. *Scand J Trauma Resuscitation Emergency Med* 2009;17:58.
  47. Krüger AJ, Lockey D, Kurola J, et al. A consensus-based template for documenting and reporting in physician-staffed pre-hospital services. *Scand J Trauma Resuscitation Emergency Med* 2011;19:71.
  48. Debacker M, Hubloue I, Dhondt E, et al. Utstein-Style Template for Uniform Data Reporting of Acute Medical Response in Disasters. *PLoS Curr* [Internet] 2012. . [cited 2020 Oct 30]; Available from: <https://currents.plos.org/disasters/index.html%3Fp=1051.html>.
  49. Idris AH, Bierens JJLM, Perkins GD, et al. 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:.
  50. Idris AH, Bierens JJLM, Perkins GD, et al. 2015 revised Utstein-style recommended guidelines for uniform reporting of data from drowning-related resuscitation: an ILCOR advisory statement. *Resuscitation* 2017;118:147–58.
  51. Sunde GA, Kottmann A, Heltne JK, et al. Standardised data reporting from pre-hospital advanced airway management - a nominal group technique update of the Utstein-style airway template. *Scand J Trauma, Resuscitation Emergency Med* 2018;26:46.
  52. Chamberlain DA, Hazinski MF, European Resuscitation Council, et al. Education in resuscitation: an ILCOR symposium: Utstein Abbey: Stavanger, Norway: June 22-24, 2001. *Circulation* 2003;108:2575–94.
  53. Chamberlain DA, Hazinski MF. Education in resuscitation. *Resuscitation* 2003;59:11–43.

54. Issenberg SB, Ringsted C, Ostergaard D, Dieckmann P. Setting a research agenda for simulation-based healthcare education: a synthesis of the outcome from an Utstein style meeting. *Simul Healthcare* 2011;6:155–67.
55. Ersdal HL, Singhal N, Msemo G, et al. Successful implementation of helping babies survive and helping mothers survive programs-an Utstein formula for newborn and maternal survival. *PLoS One* 2017;12:e0178073.
56. Chong S-L, Laerdal T, Cordero J, et al. Global resuscitation alliance consensus recommendations for developing emergency care systems: reducing perinatal mortality. *Resuscitation* 2018;133:71–4.
57. Rudd A, Bladin C, Carli P, et al. Utstein recommendation for emergency stroke care. *Int J Stroke* 2020;15:555–64.
58. Perkins GD, Neumar R, Monsieurs KG, et al. The International Liaison Committee on Resuscitation—Review of the last 25 years and vision for the future. *Resuscitation* 2017;121:104–16.
59. Ten Programs – Global Resuscitation Alliance [Internet]. [cited 2020 Dec 4]; Available from: <https://www.globalresuscitationalliance.org/ten-programs/>.
60. Paratz ED, Rowsell L, Zentner D, et al. Cardiac arrest and sudden cardiac death registries: a systematic review of global coverage. *Open Heart* [Internet] 2020. . [cited 2020 Dec 4]; 7(1). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6999684/>.
61. Fukuda T, Ohashi-Fukuda N, Matsubara T, et al. Trends in outcomes for out-of-hospital cardiac arrest by age in Japan: an observational study. *Medicine* 2015;94:e2049.
62. Okubo M, Kiyohara K, Iwami T, Callaway CW, Kitamura T. Nationwide and regional trends in survival from out-of-hospital cardiac arrest in Japan: A 10-year cohort study from 2005 to 2014. *Resuscitation* 2017;115:120–8.
63. Eisenberg M, Lippert FK, Shin SD, et al. Improving Survival from Out-of-Hospital Cardiac Arrest: A Call to Establish a Global Resuscitation Alliance [Internet]. [cited 2020 Nov 25]; Available from: . <https://foundation915.files.wordpress.com/2016/07/a-call-to-establish-a-global-resuscitation-alliance-2016.pdf>.
64. Eisenberg M, Lippert FK, Castren M, et al. Improving Survival from Out-of-Hospital Cardiac Arrest - Acting on the Call. 2018 Update from the Global Resuscitation Alliance [Internet]. [cited 2020 Nov 25]; Available from: . <https://www.globalresuscitationalliance.org/resources/>.