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European Resuscitation Council Guidelines for Resuscitation 2005 Section 1. Introduction

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It is five years since publication of the Guidelines 2000 for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC).[1] The European Resuscitation Council (ERC) based its own resuscitation guidelines on this document, and these were published as a series of papers in 2001.[2–7] Resuscitation science continues to advance, and clinical guidelines must be updated regularly to reflect these developments and advise healthcare providers on best practice. In between major guideline updates (about every five years), interim advisory statements can inform the healthcare provider about new therapies that might influence outcome significantly;[8] we anticipate that further advisory statements will be published in response to important research findings.

The guidelines that follow do not define the only way that resuscitation should be achieved; they merely represent a widely accepted view of how resuscitation can be undertaken both safely and effectively. The publication of new and revised treatment recommendations does not imply that current clinical care is either unsafe or ineffective.

Consensus on science

The International Liaison Committee on Resuscitation (ILCOR) was formed in 1993.[9] Its mission is to identify and review international science and knowledge relevant to CPR, and to offer consensus on treatment recommendations. The process for the latest resuscitation guideline update began in 2003, when ILCOR representatives established six task forces: basic life support; advanced cardiac life support; acute coronary syndromes; paediatric life support; neonatal life support; and an interdisciplinary task force to address overlapping topics, such as educational issues. Each task force identified topics requiring evidence evaluation, and appointed international experts to review them. To ensure a consistent and thorough approach, a worksheet template was created containing step-by-step directions to help the experts document their literature review, evaluate studies, determine levels of evidence and develop recommendations.[10] A total of 281 experts completed 403 worksheets on 276 topics; 380 people from 18 countries attended the 2005 International Consensus Conference on ECC and CPR Science with Treatment Recommendations (C2005), which took place in Dallas in January 2005.[11] Worksheet authors presented the results of their evidence evaluations and proposed summary scientific statements. After discussion among all participants, these statements were refined and, whenever possible, supported by treatment recommendations. These summary science statements and treatment recommendations have been published in the 2005 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations (CoSTR).[12]

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From science to guidelines

The resuscitation organisations forming ILCOR will publish individual resuscitation guidelines that are consistent with the science in the consensus document, but will also consider geographic, economic and system differences in practice, and the availability of medical devices and drugs. These 2005 ERC Resuscitation Guidelines are derived from the CoSTR document but represent consensus among members of the ERC Executive Committee. The ERC Executive Committee considers these new recommendations to be the most effective and easily learned interventions that can be supported by current knowledge, research and experience. Inevitably, even within Europe, differences in the availability of drugs, equipment, and personnel will necessitate local, regional and national adaptation of these guidelines.

Demographics

Ischaemic heart disease is the leading cause of death in the world.[13–17] Sudden cardiac arrest is responsible for more than 60% of adult deaths from coronary heart disease.[18] Based on data from Scotland and from five cities in other parts of Europe, the annual incidence of resuscitation for out-of-hospital cardiopulmonary arrest of cardiac aetiology is 49.5—66 per 100,000 population.[19,20] The Scottish study includes data on 21,175 out-of-hospital cardiac arrests, and provides valuable information on aetiology (Table 1.1). The incidence of in-hospital cardiac arrest is difficult to assess because it is influenced heavily by factors such as the criteria for hospital admission and implementation of a do-not-attempt-resuscitation (DNAR) policy. In a general hospital in the UK, the incidence of primary cardiac arrest (excluding those with DNAR and those arresting in the emergency department) was 3.3/1000 admissions;[21] using the same exclusion criteria, the incidence of cardiac arrest in a Norwegian University hospital was 1.5/1000 admissions.[22]

Table 1.1 Out-of-hospital cardiopulmonary arrests (21,175) by aetiology.[19]

Aetiology	Number (%)
Presumed cardiac disease	17451 (82.4)
Non-cardiac internal aetiologies	1814 (8.6)
Lung disease	901 (4.3)
Cerebrovascular disease	457 (2.2)
Cancer	190 (0.9)
Gastrointestinal haemorrhage	71 (0.3)
Obstetric/paediatric	50 (0.2)
Pulmonary embolism	38 (0.2)
Epilepsy	36 (0.2)
Diabetes mellitus	30 (0.1)
Renal disease	23 (0.1)
Non-cardiac external aetiologies	1910 (9.0)
Trauma	657 (3.1)
Asphyxia	465 (2.2)
Drug overdose	411 (1.9)
Drowning	105 (0.5)
Other suicide	194 (0.9)
Other external	50 (0.2)
Electric shock/lightning	28 (0.1)

The Chain of Survival

The actions linking the victim of sudden cardiac arrest with survival are called the Chain of Survival. They include early recognition of the emergency and activation of the emergency services, early CPR, early defibrillation and early advanced life support. The infant-and-child Chain of Survival includes prevention of conditions leading to the cardiopulmonary arrest, early CPR, early activation of the emergency services and early advanced life support. In hospital, the importance of early recognition of the critically ill patient and activation of a medical emergency team (MET) is now well accepted.[23] Previous resuscitation guidelines have provided relatively little information on treatment of the patient during the post-resuscitation care phase. There is substantial variability in the way comatose survivors of cardiac arrest are treated in the initial hours and first few days after return of spontaneous circulation (ROSC). Differences in treatment at this stage may account for some of the interhospital variability in outcome after cardiac arrest.[24] The importance of recognising critical illness and/or angina and preventing cardiac arrest (in- or out-of-hospital), and post resuscitation care has been highlighted by the inclusion of these elements in a new four-ring Chain of Survival. The first link indicates the importance of recognising those at risk of cardiac arrest and calling for help in the hope that early treatment can prevent arrest. The central links in this new chain depict the integration of CPR and defibrillation as the fundamental components of early resuscitation in an attempt to restore life. The final link, effective post resuscitation care, is targeted at preserving function, particularly of the brain and heart (Figure 1.1).[25,26]

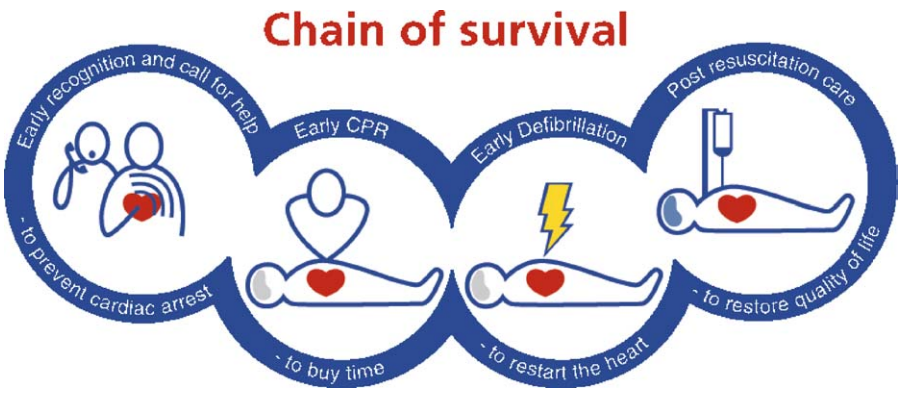

Figure 1.1 ERC Chain of Survival.

The universal algorithm

The adult basic, adult advanced and paediatric resuscitation algorithms have been updated to reflect changes in the ERC Guidelines. Every effort has been made to keep these algorithms simple yet applicable to cardiac arrest victims in most circumstances. Rescuers begin CPR if the victim is unconscious or unresponsive, and not breathing normally (ignoring occasional gasps). A single compression—ventilation (CV) ratio of 30:2 is used for the single rescuer of an adult or child (excluding neonates) out of hospital, and for all adult CPR. This single ratio is designed to simplify teaching, promote skill retention, increase the number of compressions given and decrease interruption to compressions. Once a defibrillator is attached, if a shockable rhythm is confirmed, a single shock is delivered. Irrespective of the resultant rhythm, chest compressions and ventilations (2 min with a CV ratio of 30:2) are resumed immediately after the shock to minimise the 'no-flow' time. Advanced life support interventions are outlined in a box at the centre of the ALS algorithm (see Section 4). Once the airway is secured with a tracheal tube, laryngeal mask airway (LMA) or Combitube, the lungs are ventilated at a rate of 10 min^{-1} without pausing during chest compressions.

Quality of CPR

Interruptions to chest compressions must be minimised. On stopping chest compressions, the coronary flow decreases substantially; on resuming chest compressions, several compressions are necessary before the coronary flow recovers to its previous level.[27] Recent evidence indicates that unnecessary interruptions to chest compressions occur frequently both in and out of hospital.[28—31] Resuscitation instructors must emphasise the importance of minimising interruptions to chest compressions.

Summary

It is intended that these new guidelines will improve the practice of resuscitation and, ultimately, the outcome from cardiac arrest. The universal ratio of 30 compressions to two ventilations should decrease the number of interruptions in compression, reduce the likelihood of hyperventilation, simplify instruction for teaching and improve skill retention. The single-shock strategy should minimise 'no-flow' time. Resuscitation course materials are being updated to reflect these new guidelines.

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