



Executive summary of the main changes since the 2015 Guidelines

Authors

Jonathan Wyllie
Andrew Lockey
Sue Hampshire

Introduction

Guidelines 2021 have been developed as the result of a continuous process over the last 5 years led by the International Liaison Committee on Resuscitation (ILCOR). The process used to produce the Resuscitation Council UK Guidelines 2021 has been previously accredited, and is pending reaccreditation by the National Institute for Health and Care Excellence. The guidelines process includes:

- Systematic reviews with grading of the quality of evidence and strength of recommendations. These reviews formed the basis of the ILCOR Consensus on Science with Treatment Recommendations (CoSTR) summary publications and the CoSTR postings on the ILCOR website (<https://costr.ilcor.org>).
- The involvement of stakeholders from around the world, including members of the public and cardiac arrest survivors.
- Collaboration with the European Resuscitation Council (ERC) and adaption of the ERC Guidelines for use in the UK. Details of the guidelines development process can be found in Resuscitation Council UK's [Guidelines Development Process Manual](#).

Main changes in Guidelines 2021

The main changes in the Guidelines 2021 are summarised at the beginning of

each individual Guideline and are described in the section below.

Education

Accredited life support courses are recommended as they can improve patient outcomes.

Faculty development is important to improve education.

Every person should learn to provide the basic skills to save a life.

Epidemiology of cardiac arrest

This section presents epidemiology and outcomes of cardiac arrest data drawn from UK studies including both in-hospital and out-of-hospital settings.

Out-of-Hospital Cardiac Arrest (OHCA)

The annual incidence of OHCA is approximately 55 per 100,000 inhabitants, half of which are witnessed events. Bystanders attempt resuscitation in 7 out of 10 cases and NHS ambulance services attempt resuscitation in approximately 30,000 people each year. Public access defibrillators are used in less than 1 in 10 OHCA.

There is an initially shockable rhythm in approximately 1 in 4 OHCA (22-25%).

A return of spontaneous circulation (ROSC) is achieved in approximately 30% of attempted resuscitations in the UK. In the Utstein comparator group (presumed cardiac origin, bystander witnessed, initially shockable rhythm) the rate of ROSC is 54%.

Overall, when resuscitation is attempted, fewer than one in ten (9%) people survive to hospital discharge following OHCA (29% in the Utstein comparator group).

There is evidence of health inequality in the incidence of cardiac arrest, bystander CPR and distribution of public access defibrillators. Deprived areas and those with a greater proportion of residents from minority ethnic backgrounds have a higher incidence of cardiac arrest, lower incidence of bystander CPR, and poorer access to public access defibrillators.

In hospital Cardiac Arrest (IHCA)

The annual incidence of IHCA is 1 to 1.5 per 1,000 hospital admissions. Most cardiac arrests (85%) occur on wards and in patients admitted to hospital for medical reasons. ROSC is achieved in half (53%) of those who are treated by a hospital's resuscitation team for IHCA and almost a quarter (23.6%) of those survive to hospital discharge. Of these, most (83%) have a favourable neurological outcome.

Ethics

Guidelines 2021 continue to highlight the importance of integrating decisions about cardiopulmonary resuscitation in overarching advance emergency care treatment plans (e.g. Recommended Summary Plan for Emergency Care and Treatment (ReSPECT) process). The importance of communication strategies and interventions to support discussions with patients and their family members is recognised as is the need for support for offering family members who witness resuscitation attempts. Health systems monitoring outcomes following cardiac arrest are required to help reduce variability in patient outcome.

Systems saving lives

This is a new section for Guidelines 2021, and describes a number of system-level factors that can improve the management of cardiac arrest patients. The intended audience includes governments, managers of health and education systems, healthcare professionals, teachers, students and members of the public.

Social media and smartphone apps should be used to engage the community.

Community initiatives (e.g. Restart a Heart) are critical for the promotion of CPR, and it is recognised that children of all school ages should receive CPR training

each year.

The ambulance service dispatcher plays a vital role in the recognition of cardiac arrest and provision of instruction to bystanders.

The evolution and importance of cardiac arrest centres is recognised.

Adult basic life support

There are no major changes in the 2021 Basic Life Support Guidelines.

Cardiac arrest recognition remains a key priority as it is the first step in triggering the emergency response to cardiac arrest.

When ringing 999, the ambulance call handler will assist with instructions for confirming cardiac arrest, starting compression-only CPR, and locating, retrieving and using an AED (automated external defibrillator).

Chest compressions should commence as soon as possible after cardiac arrest is confirmed. Someone must fetch an AED and bring it to the scene of the cardiac arrest. The British Heart Foundation database, "[The Circuit](#)", serves as a national resource for the location of AEDs.

Adult advanced life support

There are no major changes in the 2021 Adult ALS Guidelines. High-quality chest compressions with minimal interruption and early defibrillation remain a priority. There is a greater recognition that patients with both in- and out-of-hospital cardiac arrest have premonitory signs, and that many of these arrests may be preventable.

If, following a stepwise approach to airway management an advanced airway is required, only rescuers with a high tracheal intubation success rate should use tracheal intubation. The expert consensus is that a high success rate is over 95% within two attempts at intubation. Adrenaline should be given as soon as access is achieved when the cardiac arrest rhythm is identified as non-shockable. For a shockable cardiac arrest rhythm, adrenaline should be used after 3 defibrillation attempts. Thereafter, adrenaline is given every 3-5 minutes.

Special circumstances

This section aims to ensure identification and appropriate treatment of potentially reversible causes in situations outside the usual cardiac arrest due to ischaemic heart disease. There are no major changes in the 2021 Special Circumstances Guidelines.

New topics include obesity, mass casualty incidents and cardiac arrest in sport - all of which are becoming increasingly frequent.

The recent national update on anaphylaxis has been incorporated into these guidelines.

Post-resuscitation care

There are relatively few changes in the Post-resuscitation care Guidelines in comparison with those published in 2015.

They are now aligned with European Society of Cardiology guidelines for the indications for immediate coronary angiography in post-resuscitation patients without ST-elevation on their 12-lead ECG.

Following return of spontaneous circulation (ROSC), aim to maintain a mean arterial blood pressure of > 65 mmHg. Over this threshold optimal blood pressure targets are likely to need to be optimised.

Levetiracetam and sodium valproate are preferred instead of phenytoin for the treatment of seizures.

Targeted temperature management (TTM) is recommended for adults after cardiac arrest (OHCA or IHCA) with any initial rhythm who remain unresponsive after ROSC. Maintain a target temperature between 32 and 36 °C for at least 24 hours, and avoid fever for at least 72 hours after ROSC.

The multimodal prognostication guidelines have been updated. In a comatose patient with a Glasgow Motor Score of $M \leq 3$ at ≥ 72 h from ROSC, in the absence of confounders, poor outcome is likely when two or more listed predictors are present:

- no pupillary and corneal reflexes at ≥ 72 h

- bilaterally absent N20 SSEP wave at \geq 24 h
- highly malignant EEG (suppressed background or burst suppression) at \geq 24h
- NSE $> 60 \text{ mcg L}^{-1}$ at 48 h and/or 72 h
- status myoclonus \leq 72 h
- or a diffuse and extensive anoxic injury on brain CT/MRI.

Greater emphasis is placed on screening cardiac arrest survivors for physical, cognitive and emotional problems and, where indicated, referring for rehabilitation.

Paediatric basic life support

This guideline applies to all infants and children except newborn babies (unless there is no other option at birth). There are no major changes for 2021.

In the paediatric basic life support sequence, rescuers should perform assessment for signs of life (circulation) simultaneously with breathing assessment and during the delivery of rescue breaths. If there are no signs of life, chest compressions should be started immediately after rescue breaths have been delivered.

Use of mobile phones with speaker function is emphasised to facilitate bystander access to dispatcher guided cardiopulmonary resuscitation (CPR) and to summon emergency medical services (EMS) without leaving the child or infant. Ensuring high quality CPR is emphasised.

Paediatric advanced life support

This guideline applies to all infants and children except newborn babies and includes a number of changes of which the following are the most important.

During the management of a paediatric cardiorespiratory arrest, once a tracheal tube is in place, continuous chest compressions should be given. In this case, ventilations should approximate to the lower limit of normal rate for age:

- Infants: 25 breaths per minute
- Children 1-8 years old: 20 breaths per minute
- Children 8-12 years old: 15 breaths per minute

- Children > 12 years old: 10-12 breaths per minute

Capnography should be used in all intubated children and infants for early detection of mal- or displacement of the tracheal tube.

In children and infants with shock, use a 10 mL kg^{-1} fluid bolus. There is an emphasis on smaller bolus volume with careful re-assessment after each bolus to enable early identification of signs and symptoms of fluid overload (hepatomegaly, bilateral basal lung crackles, and jugular venous distention). Use balanced isotonic crystalloids as first choice of fluid bolus, if available. If not, normal saline (0.9%) is an acceptable alternative. In haemorrhagic shock, keep crystalloid boluses to a minimum (max 20 mL kg^{-1}). Consider early blood products in children and infants with severe trauma and circulatory failure, using a strategy that focuses on improving coagulation.

Children and infants with a febrile illness and no signs of shock should not receive fluid bolus therapy. In children and infants with persistent decompensated circulatory failure after multiple fluid boluses, vasoactive drugs should be started early, as a continuous infusion via either a central or peripheral line.

Use either noradrenaline or adrenaline as first line vasoactive drugs (dopamine is no longer recommended but can be used if adrenaline and noradrenaline are not available). Paediatric ALS providers should be competent in the use of these drugs during the first hour of stabilisation of a child or infant in circulatory failure.

Newborn resuscitation and support of transition of infants at birth

Whilst there are no major changes for 2021 there are a number of minor alterations and changes in emphasis for practice which are summarised here.

In the management of the umbilical cord, it is recommended that clamping does not occur until after at least 60 seconds, but if this is not possible, cord milking is an option in babies > 28 weeks gestation. In non-vigorous infants born through meconium, immediate laryngoscopy with or without suction after delivery is now not recommended. In order to support ventilation, a laryngeal mask may be considered in infants of ≥ 34 weeks gestation ($> 2000\text{g}$) if face mask ventilation or tracheal intubation are unsuccessful. Absence of a response to initial inflations despite an open airway should prompt consideration of increasing the inflation

pressure. The initial pressure when supporting ventilation of premature babies (< 32 weeks gestation) should now be 25 cm H₂O.

The initial delivered oxygen concentration now varies according to gestation with those at term starting in air and those < 28 weeks starting in 30%.

In the rare situation requiring emergency vascular access, the intraosseous route is an acceptable alternative if umbilical access is not possible. The initial and subsequent doses of adrenaline are now rationalised at 20 micrograms kg⁻¹ (0.2 mL kg⁻¹ of 1:10,000 adrenaline (1000 micrograms in 10 mL)). In the absence of a response, this is repeated every 3-5 minutes.

Stopping resuscitation should be considered and discussed if there has been no response after 20 minutes and exclusion of reversible problems.

Future iterations

It is intended that there will continue to be a Guideline summary and update for courses every five years, however, the ILCOR evidence evaluation process will be continuous as evidence evolves. It is intended that Resuscitation Council UK Guidelines will only change within the five-year cycle if there is a significant resuscitation intervention identified through the ILCOR process which affects outcome into a significant degree. These Guidelines 2021 will be implemented in courses from July and August 2021.

References

ERC Guidelines 2021: <https://cprguidelines.eu/>

Downloads

[Guidelines Equality Impact Assessment.pdf](#)99.87 KB