2022

American Red Cross

Guidelines Highlights

HEALTHCARE

American Red Cross
Training Services

The American Red Cross *Guidelines Highlights 2022* is overseen by the American Red Cross Scientific Advisory Council and is part of the American Red Cross training services programs. The emergency care procedures outlined in these updates and guidelines reflect the standard of knowledge and accepted emergency practices in the United States at the time these updates and guidelines were published. It is the reader's responsibility to stay informed of changes in emergency care procedures.

Science and Technical Content

The scientific content and evidence within the American Red Cross *Guidelines Highlights 2022* are consistent with the most current science and treatment recommendations from:

- The American Red Cross Scientific Advisory Council (ARCSAC)
- The International Liaison Committee on Resuscitation (ILCOR)
- Cardiac Arrest Registry to Enhance Survival (CARES)
- Centers for Disease Control and Prevention (CDC)
- The American Academy of Pediatrics (AAP)
- The American College of Emergency Physicians (ACEP)
- The American College of Obstetrics and Gynecology (ACOG)
- The American College of Surgeons (ACS)
- The American Society of Anesthesiologists (ASA)
- The Brain Trauma Foundation
- The Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN)
- The Committee on Tactical Combat Casualty Care (Co-TCCC)
- The Society for Critical Care Medicine (SCCM)/American College of Critical Care Medicine (ACCM)
- The Stop the Bleed Campaign (STB)
- The Surviving Sepsis Campaign (SSC)
- The World Health Organization (WHO)

Dedication

The American Red Cross *Guidelines Highlights 2022* is dedicated to the nurses, physicians, prehospital professionals, therapists, technicians, law enforcement, fire/rescue, advanced practice professionals, lifeguards, first responders, lay responders and all other professionals and individuals who are prepared and willing to take action when an emergency strikes or when a person is in need of care. These updates and guidelines are also dedicated to the employees and volunteers of the American Red Cross who contribute their time and talent to supporting and teaching lifesaving skills worldwide.

Acknowledgments

Many individuals shared in the development of the American Red Cross *Guidelines Highlights 2022* in various scientific, technical, editorial, creative and supportive ways. Their commitment to excellence made these updates and guidelines possible.

Content Direction

The development of these updates and guidelines would not have been possible without the leadership, valuable insights and dedication of the subject matter experts, who generously shared their time to ensure the highest quality programs.

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American Red Cross Scientific Advisory Council

Since 1909, the American Red Cross has provided best-in-class resuscitation, first aid and safety education and certification, enabling students to obtain the competency required for effective recognition and care and leading to better outcomes for all those treated.

Behind every course stands a team of experts ensuring that what is taught is based on the latest clinical and educational science. This team, known as the American Red Cross Scientific Advisory Council, is a panel of 60+ nationally and internationally recognized experts from a variety of medical, nursing, EMS, scientific, educational and academic disciplines.

With members from a broad range of professional specialties, the Council has an important advantage: a broad, multidisciplinary expertise in evaluating existing and new assessment methodologies and technologies, therapies, and procedures, and the educational methods to teach them. Additionally, with on-the-ground experience, its members bring the know-how for real-world experience. The Council provides authoritative guidance on resuscitation, first aid, CPR, nursing, prehospital medicine, emergency and critical care, rescue practices, emergency preparedness, aquatics, disaster health and education.

We encourage you to visit our Scientific Advisory Resource Center at redcross.org/science.

We would like to extend our gratitude to the members of the American Red Cross Scientific Advisory Council for their guidance and ongoing commitment:

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Special thanks to the program development team for their expertise to bring this program through to completion: Dominick Tolli, Danielle DiPalma, Ryan Wallace, Cindy Tryniszewski, Laurie Willshire, Maureen Pancza, Melanie Dykstra and Iperdesign.

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Introduction

American Red Cross *Guidelines Highlights 2022* is a summary of the key guidelines found in American Red Cross *Focused Updates and Guidelines 2022*. Whereas American Red Cross *Focused Updates and Guidelines 2022* provides a more comprehensive summary of the scientific evidence from recent reviews, the American Red Cross *Guidelines Highlights 2022* reviews selected new guidelines and changes that are most impactful on the delivery of education and resuscitation care. Supporting evidence reviews are unreferenced in this summary publication but can found in the full *Focused Updates and Guidelines 2022*. Readers should refer to American Red Cross *Focused Updates and Guidelines 2022* for evidence summaries and insights into each of these topics. Readers are encouraged to review the full American Red Cross *Focused Updates and Guidelines 2022* to ensure the education delivered and care provided is based on the latest science and American Red Cross guidelines.

American Red Cross *Guidelines Highlights 2022* presents a summary of key guidelines in the topic areas of Basic Life Support, Advanced Life Support, Pediatric Advanced Life Support, Neonatal Life Support and Resuscitation Education Science.

In the *Guidelines Highlights 2022*, each guideline is noted as new, updated or reaffirmed.

- *New*: Guidelines are new for 2022.
- *Updated*: Guidelines have minor wording changes primarily for clarity.
- *Reaffirmed.* Guidelines are those that have undergone an updated systematic review, scoping review or search for new scientific literature and determined to remain valid.

Insights provides a capsule summary of vital evidence and rationale for new or updated ARCSAC guidelines.

In Basic Life Support, new guidelines are presented for minimizing pauses during CPR and for use of passive ventilation techniques during CPR. In Advanced Life Support, new guidelines are presented for intra-cardiac-arrest point-of-care diagnostic ultrasound. In Pediatric Advanced Life Support, updated guidelines are presented for the use of hypertonic saline for acute major traumatic brain injury and for inpatient use of pediatric early warning systems . In Neonatal Life Support, new guidelines are presented for the maintenance of normal body temperature immediately after birth and for the use of tactile stimulation for resuscitation immediately after birth. In Education Science, key guidelines focus on the retention of CPR skills after training and on participation of healthcare professionals who provide resuscitation and life support for their respective disciplines in accredited training for resuscitation and life support.

Summary of Reaffirmed Guidelines/Recommendations (Appendix A) provides a snapshot of guidelines that are not included in the *Focused Updates and Guidelines 2022* but have been reviewed and reaffirmed by the ARCSAC.

The American Red Cross *Guidelines Highlights 2022* includes **infographics** that present key information in a visually compelling and understandable way. The following infographics are included:

- Minimizing Pauses During CPR
- Using Point-of-Care Ultrasound During Resuscitation from Cardiac Arrest
- Pediatric Early Warning Systems (PEWS)
- Routine Suctioning of Amniotic Fluid at Birth
- Retention of CPR Skills After Training

CHAPTER 1

Basic Life Support

CPR Quality During Transport

NEW
- The decision to transport a patient following out-of-hospital cardiac arrest (OHCA) and while cardiopulmonary resuscitation (CPR) is in progress should be made based on emergency medical services protocols and/or in consultation with on-line medical control.

NEW
- Protocols to determine care on-scene versus during transport for OHCA should be evidence-based, and at a minimum, consider local resources, competency of providers and distances to hospital care.
  - There should be separate protocols for adults and for infants and children.

NEW
- When transporting an OHCA patient to a hospital, prehospital healthcare professionals should strive to deliver high-quality CPR.

Insights

Prehospital healthcare professionals responding to OHCAs are sometimes faced with the decision to either continue CPR on-scene or to transport a patient to the hospital while continuing to provide CPR. In addition to safety concerns for healthcare professionals performing CPR in a moving ambulance, there are concerns that CPR quality may be negatively impacted by transport. Studies of CPR metrics report a lower CPR fraction during transport. The decision to continue the resuscitation effort on-scene or to transport with CPR in progress is often based on emergency medical services (EMS) protocols. Whether resuscitation takes place primarily on-scene or in a moving ambulance, prehospital healthcare professionals should strive to deliver high-quality CPR.

Mechanical Chest Compression Devices

NEW
- The routine use of mechanical CPR (mCPR) devices is not recommended.

UPDATED
- Healthcare professionals may consider the use of mCPR devices if the response team is skilled with usage.

REAFFIRMED
- Application of mCPR devices should not delay initiation of manual chest compressions.

Insights

Although mechanical CPR (mCPR) devices are sometimes used for delivering chest compressions, no evidence of improved survival with mCPR devices or superiority to manual CPR for routine use has been shown in recent systematic reviews. Moreover, there is some suggestion of harm with mCPR device use. The lack of evidence of improved survival and the suggestion of harm have led to a new Red Cross guideline that recommends against the routine use of mCPR devices. However, there may be specific indications for mCPR device use when it is challenging to provide high-quality manual compressions, such as with infectious disease concerns, limited personnel and long transport times. Because pauses and delay in starting CPR contribute to lower survival when mCPR devices are used, their application should not delay the start of manual compressions and personnel should thus be skilled with their application and use.

Minimizing Pauses in Chest Compressions

NEW • Pauses during CPR, including peri-shock pauses, changing roles, and moving between ventilations and compressions for a single rescuer, should be as short as possible.

NEW • Chest compression fraction should be as high as possible and at least 60%.

NEW • Where system resources permit, monitoring of peri-shock pauses and chest compression fraction may be considered as part of a comprehensive quality improvement program.

Insights

Chest compression fraction (CCF), which is the proportion of time spent providing chest compressions during resuscitation for cardiac arrest, is a component of high-quality CPR and is directly impacted by interruptions in chest compressions. Studies evaluating survival outcomes for shorter versus longer pre- and peri-shock pauses report conflicting findings; however, the duration of a resuscitation attempt and the cardiac rhythm will ultimately affect the number and proportion of pauses. While a time-based recommendation for limiting pauses is not possible, the physiologic rationale for minimizing pauses (“no-flow events”) and increasing CCF supports guidelines for keeping pre- and post-shock pauses as short as possible and for keeping the CPR time devoted to compressions at least 60% and as high as possible.

Minimizing Pauses During CPR

Chest compression fraction (CCF):

- Is the proportion of time spent doing chest compressions during resuscitation for cardiac arrest.
- Is a component of high-quality CPR.
- Should be as high as possible and at least 60%.

Pauses during chest compressions decrease the CCF and may occur:

- Before, during and immediately after shock delivery.
- While changing roles during CPR.
- When switching from compressions to ventilations (single rescuer).
- During delivery of ventilations with conventional CPR.
- During airway management or rhythm analysis.

KEY POINT

Pauses during chest compressions should be kept as short as possible.

Passive Ventilation Techniques During CPR

NEW

- The use of passive ventilation techniques may be considered by prehospital healthcare professionals as part of a bundle of care to include minimally interrupted cardiac resuscitation.

Insights

Passive ventilation or oxygen insufflation during resuscitation from OHCA offer an attractive alternative to positive pressure ventilation and oxygen delivery. However, the studies evaluating this intervention are very limited. The initial use of passive ventilation compared with bag-mask ventilation has been reported to be associated with higher neurologically intact survival to hospital discharge when combined with minimally interrupted cardiac resuscitation for witnessed ventricular fibrillation/ventricular tachycardia in the out-of-hospital setting. While the routine use of passive ventilation techniques during conventional compression-ventilation CPR is not recommended, this intervention may be considered by EMS systems as part of a bundle of care, including minimally interrupted CPR.

Prehospital Oxygen in Drowning Process Resuscitation

UPDATED

- If available, supplemental oxygen may be provided empirically by responders trained in its use to drowning victims who are conscious and with respiratory symptoms. Once pulse oximetry is available, supplemental oxygen therapy should be appropriately titrated.

UPDATED

- For the drowning victim in cardiopulmonary arrest, supplemental high-flow and high-concentration oxygen should be provided, if available, with ventilations by responders trained in its use.

Insights

The use of supplemental oxygen, when available during and after CPR, is an accepted practice in drowning resuscitation. There are no studies, however, evaluating the use of oxygen in victims of cardiac arrest following drowning compared with standard care without oxygen prior to hospital arrival. Studies are also lacking on the use of oxygen for victims of drowning without cardiac arrest or following return of spontaneous circulation (ROSC). The unique pathophysiology of the drowning process, including decreased oxygen diffusion capacities of the lungs following aspiration of water, provides a rationale for the administration of oxygen, when available, to drowning victims with respiratory symptomatology. Oxygen may be titrated once pulse oximetry is available and a reliable reading can be obtained. The Red Cross guidelines have been updated to reflect the recommendation that responders who administer oxygen must be trained in its use and that supplemental oxygen therapy for drowning victims who are conscious and with respiratory symptoms should be titrated based on oximetry, when available.

CHAPTER 2

Advanced Life Support

Vasopressin with Corticosteroids for Cardiac Arrest

REAFFIRMED • There is insufficient evidence to recommend the combined use of vasopressin with corticosteroids for in-hospital cardiac arrest.

NEW • The combined use of vasopressin with corticosteroids is not recommended for out-of-hospital cardiac arrest.

Insights

The combined use of vasopressin with corticosteroids for in-hospital cardiac arrest has been shown to increase rates of return of spontaneous circulation (ROSC) but without improved survival to hospital discharge or for favorable functional outcome at hospital discharge. No studies have been identified that evaluate the combined use of vasopressin with corticosteroids in the out-of-hospital setting, and the Red Cross guidelines have been updated to reflect this lack of evidence. Further research is needed to assess the use of this intervention in both in-hospital and out-of-hospital settings.

Mannitol or Hypertonic Saline for Acute Major Traumatic Brain Injury

- Mannitol or hypertonic saline may be given to patients with:
  - REAFFIRMED Traumatic brain injury (TBI) who have a monitored elevation in intracranial pressure (ICP).
  - REAFFIRMED Signs of transtentorial herniation prior to ICP monitoring.
  - UPDATED Progressive neurological deterioration not due to extracranial causes.
- REAFFIRMED Mannitol is effective for control of raised ICP at doses of 0.25 to 1 gram per kilogram of body weight (0.25 g/kg to 1 g/kg).
- NEW Arterial hypotension (systolic blood pressure less than 90 mmHg) should be avoided in patients with intracranial hypertension.

Insights

Mannitol and hypertonic saline are osmotic diuretics commonly used to treat cerebral edema and increased ICP in patients with TBI. Both agents are effective in reducing elevated ICP, although in some studies, a greater benefit has been reported with hypertonic saline. A difference in mortality at 6 months or for poor outcome has not been shown for hypertonic saline compared with mannitol. The Red Cross guidelines reflect this clinical equipoise for adult patients. Systematic reviews included both children and adults with TBI, but there is insufficient data for subgroup analyses of outcomes by age group.

Intra-Cardiac Arrest Point-of-Care Diagnostic Ultrasound

UPDATED
- Point-of-care ultrasonography may be considered by healthcare professionals competent in its performance as an additional diagnostic tool for assessment of suspected reversible etiologies of cardiac arrest but should not interfere with resuscitation or providing high-quality CPR.

REAFFIRMED
- Point-of-care ultrasonography should not have a role in prognostication for cardiac arrest.

Insights

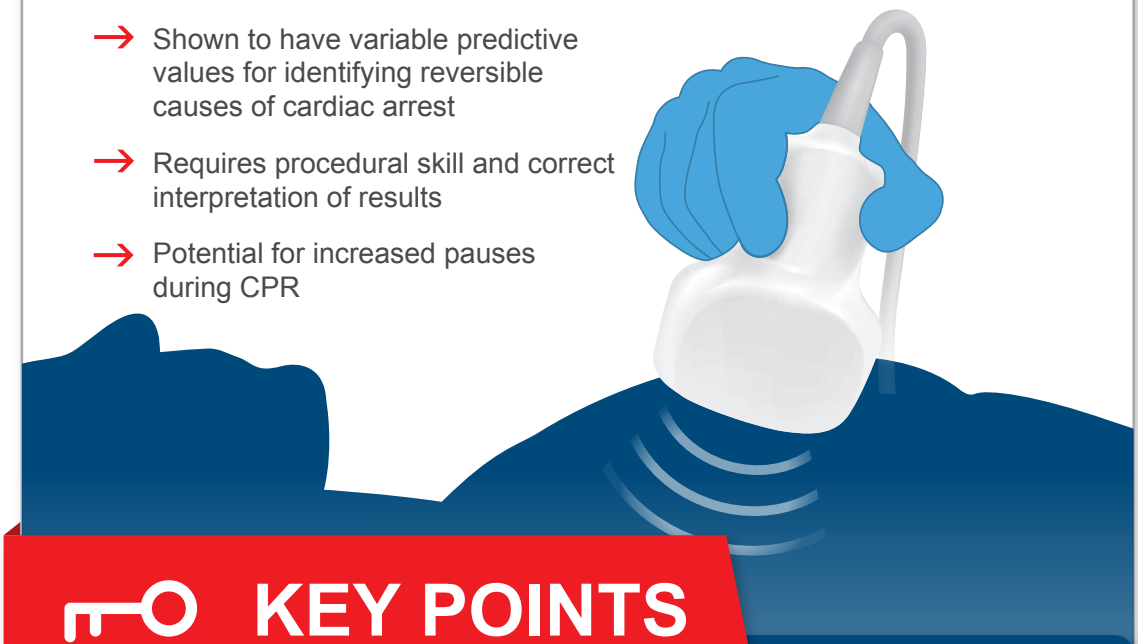
Previous reviews have determined that point-of-care ultrasound during cardiac arrest should not have a role in prognostication. In observational studies, the positive predictive values for the use of point-of-care ultrasonography in the diagnosis of cardiac tamponade, pericardial effusion, myocardial infarction and other reversible causes of cardiac arrest vary considerably. The variability in predictive values may reflect both operator procedural skill and interpretation of results. Point-of-care ultrasound may also increase the length of pauses during chest compressions, thus reducing the chest compression fraction (CCF). While the routine use of point-of-care ultrasound during CPR is not recommended to diagnose reversible causes of cardiac arrest, this procedure may be considered when performed by experienced personnel as an additional diagnostic tool when there is clinical suspicion for a specific reversible cause. Point-of-care ultrasound use should not interfere with resuscitation or the provision of high-quality CPR.

Using Point-of-Care Ultrasound During Resuscitation from Cardiac Arrest

Research Findings*

Point-of-Care Ultrasound:

- Shown to have variable predictive values for identifying reversible causes of cardiac arrest
- Requires procedural skill and correct interpretation of results
- Potential for increased pauses during CPR



KEY POINTS

Point-of-Care Ultrasound Use:

- Should not be routinely used during CPR to diagnose reversible causes (i.e., tamponade).
- Should not have a role in prognostication.
- Should not interrupt high-quality CPR.
- May be considered as an additional diagnostic tool to assess for suspected, reversible causes of cardiac arrest by healthcare professionals skilled in its use.

*Reynolds JC, Nicholson T, O'Neil B, Drennan IR, Issa M, Welsford M. Diagnostic test accuracy of point-of-care ultrasound during cardiopulmonary resuscitation to indicate the etiology of cardiac arrest: A systematic review. *Resuscitation.* Mar 2022;172:54-63. doi:10.1016/j.resuscitation.2022.01.006

CHAPTER 3

Pediatric Advanced Life Support

Public Access Defibrillation Programs for Infants, Children and Adolescents

UPDATED

- Public access defibrillation may be used in infants, children and adolescents for out-of-hospital cardiac arrest. If available, pediatric-specific automated external defibrillator pads or electrical settings should be used for infants and children 8 years of age or younger or weighing 25 kilograms or less.

Insights

Out-of-hospital cardiac arrest (OHCA) is rare in children and infants. Unlike adults, OHCA is less likely to be due to a primary cardiac event and more likely to be the result of a respiratory issue or trauma. While evidence is limited, data shows significantly improved survival outcomes if an automated external defibrillator (AED) is applied to children 1 to 12 years of age and adolescents 13 to 18 years of age. For infants less that 1 year of age, there is insufficient data to demonstrate a benefit with AED use. However, shockable rhythms do occur in this population and there is no evidence to suggest harm from their use. While the application of an AED may cause a slight pause in CPR, that determinant is outweighed by the lifesaving benefit in children and infants with shockable rhythms. The Red Cross therefore continues to include infants in its guidelines for the use of AEDs in public access defibrillation programs.

Pediatric Early Warning Systems

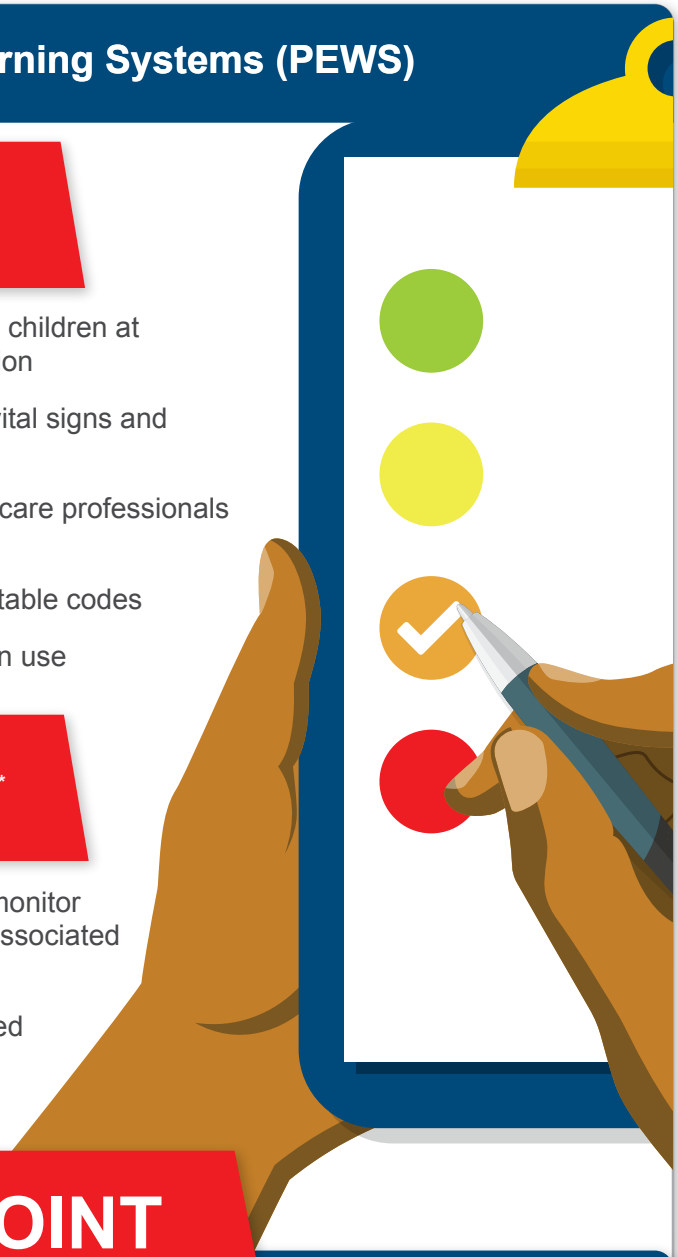
NEW

- Pediatric early warning systems may be used as part of a larger framework to reduce serious safety events by identifying and responding to hospitalized infants, children and adolescents who may either be at risk for deterioration or be deteriorating clinically.

Pediatric Early Warning Systems (PEWS)

About PEWS

- Tool to identify hospitalized children at increased risk of deterioration
- Scoring system based on vital signs and clinical findings
- Uses criteria to alert healthcare professionals and trigger response
- Goal is to eliminate preventable codes
- Many variations of PEWS in use



Research Findings*

- Implementing a PEWS to monitor hospitalized children was associated with:
  - A reduction in unplanned code events
  - Reduced mortality

KEY POINT

PEWS should support, NOT replace, clinical judgement!

- Used as part of a larger framework
- To reduce serious safety events
- By identifying/ responding to hospitalized children
- Who maybe at risk for clinical deterioration

*Chong SL, Goh MSL, Ong GY, et al. Do paediatric early warning systems reduce mortality and critical deterioration events among children? A systematic review and meta-analysis. *Resusc Plus.* Sep 2022;11:100262. doi:10.1016/j.resplu.2022.100262

Insights

A significant percentage of in-hospital pediatric serious events and deaths have been shown to be associated with a failure to detect and respond to clinical deterioration. Pediatric early warning systems (PEWS) are one component of an organizational strategy to help healthcare professionals recognize children who are either at risk for clinical deterioration or who are clinically deteriorating. These tools have been specifically designed for use in healthcare settings to alert healthcare professionals to clinical deterioration through periodic observation of physiologic parameters, application of a scoring system and use of criteria for triggering communication and an appropriate response.

Implementation of PEWS by healthcare systems has been associated with reduced mortality and unplanned code events, but no differences in the rate of cardiopulmonary arrests or clinical deterioration events have been shown. However, it is important to note that many variations of PEWS exist and they have a wide range of sensitivities and specificities for detecting clinical deterioration.

Mannitol or Hypertonic Saline for Acute Major Traumatic Brain Injury

- Mannitol or hypertonic saline may be given to patients with:
  - REAFFIRMED Traumatic brain injury (TBI) who have a monitored elevation in intracranial pressure (ICP).
  - REAFFIRMED Signs of transtentorial herniation prior to ICP monitoring.
  - UPDATED Progressive neurological deterioration not due to extracranial causes.
- NEW Arterial hypotension (systolic blood pressure less than 90 mmHg) should be avoided in patients with intracranial hypertension.
- For pediatric patients with major TBI and acute intracranial hypertension:
  - NEW Hypertonic saline is preferred over mannitol to lower the ICP to less than 20 mmHg.
  - NEW A bolus of hypertonic saline (3%) is recommended at a dose between 2 and 5 milliliters per kilogram of body weight (2 mL/kg to 5 mL/kg) over 10 to 20 minutes.
  - NEW A continuous infusion of 3% hypertonic saline is suggested at a rate between 0.1 mL/kg and 1.0 mL/kg per hour. The minimum dose needed to maintain ICP less than 20 mmHg is suggested.
  - NEW A bolus of 23.4% hypertonic saline is suggested for refractory ICP. The suggested dose is 0.5 mL/kg with a maximum of 30 mL.
  - NEW A serum sodium level of greater than 170 milliequivalents per liter (mEq/L) for a sustained period (greater than 72 hours) should be avoided to preclude complications of thrombocytopenia and anemia, and a sustained serum sodium greater than 160 mEq/L should be avoided to preclude the complication of deep venous thrombosis.
  - UPDATED Mannitol may be considered to lower the ICP in situations where hypertonic saline cannot be used. A bolus of 0.25 to 1 gram per kilogram of body weight (0.25 g/kg to 1 g/kg) over 10 minutes is suggested.

Insights

Mannitol and hypertonic saline are osmotic diuretics commonly used to treat cerebral edema and increased ICP in patients with TBI. A recent trial comparing the effect of bolus doses of 3% hypertonic saline versus mannitol on ICP in children with severe TBI found a modest decrease in ICP with hypertonic saline bolus administration and increased cerebral perfusion pressure. During periods of increased ICP, greater improvements in outcomes were observed with 3% hypertonic saline than with mannitol. A hyperosmolar state can be induced by hypertonic saline and is associated with a higher risk of kidney injury, congestive heart failure, pulmonary edema and, after repeated doses, with hyperchloremic acidosis. The Red Cross guidelines reflect these potential complications and are informed by the Brain Trauma Foundation Guidelines for management of severe pediatric TBI.

Treatment of Bradycardia: Drugs and Transcutaneous Pacing

REAFFIRMED • For infants and children with bradycardia with inadequate perfusion, assurance of adequate oxygenation and ventilation must be the initial intervention.

REAFFIRMED • For infants and children with bradycardia with inadequate perfusion and a heart rate of 60 beats per minute or less despite adequate oxygenation and ventilation, chest compressions should be initiated.

REAFFIRMED • For infants and children with bradycardia with inadequate perfusion that is unresponsive to oxygenation and ventilation, drug therapy may begin with epinephrine.

REAFFIRMED • For infants and children with bradycardia with inadequate perfusion in the setting of increased vagal tone or atrioventricular (AV) block, or if there is no response to epinephrine, atropine may be considered.

REAFFIRMED • Transcutaneous pacing may be considered for some types of bradycardias, such as in the setting of complete AV block and/or if there is no response to drug therapy.

Insights

When bradycardia in children and infants is accompanied by inadequate perfusion, after assuring adequate oxygenation and ventilation, chest compressions should be initiated for a heart rate of 60 beats per minute or less. Findings from the most recent studies of outcomes for pediatric patients with bradycardia treated with epinephrine do not impact standing guidelines, and epinephrine remains the cornerstone of drug therapy. For bradycardia with inadequate perfusion and a suspected increase in vagal tone or cholinergic drug toxicity, atropine continues to be recommended. Transcutaneous pacing has long been recommended for bradycardia caused by complete heart block or abnormal sinus node function but has not been shown effective in children with bradycardia in the post-arrest setting with myocardial ischemia or with respiratory failure and hypoxia. There is no new evidence related to transthoracic pacing for bradycardia in the pediatric population and existing guidelines are reaffirmed.

CHAPTER 4

Neonatal Life Support

Suctioning Clear Amniotic Fluid at Birth

NEW
- The routine suctioning of clear amniotic fluid from the mouth and nose of newborn infants immediately after birth is not indicated.

UPDATED
- For suspected airway obstruction, immediate airway repositioning is indicated and suctioning should be considered. Suctioning should be brief and begin with the mouth before the nose.

Insights

The routine suctioning of clear or meconium-stained amniotic fluid from the mouth and nose in newborns was once a common practice intended to clear the upper airway of amniotic fluid and support breathing. However, this practice has not been recommended for over a decade due to possible associated cardiorespiratory complications. Studies continue to show a lack of benefit from suctioning compared with no suctioning, while other studies report lower oxygen saturations in infants receiving suctioning. Previous recommendations for suspected airway obstruction are updated and include immediate airway repositioning and consideration of brief suctioning, beginning with the mouth before the nose.

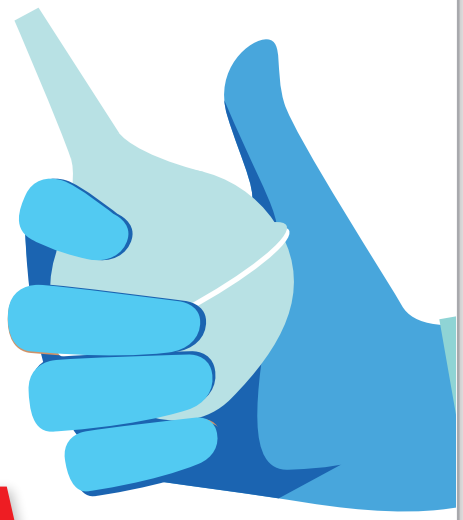
Tactile Stimulation for Resuscitation Immediately After Birth

NEW
- For newborn infants greater than 32 weeks' gestation with absent, intermittent or shallow respirations immediately after birth, it is reasonable to use tactile stimulation in addition to initial care including drying, stimulation and additional care to maintain temperature.

NEW
- Tactile stimulation should not delay the initiation of positive pressure ventilations for newborn infants who continue to have inadequate respiratory effort after birth despite initial care.

Routine Suctioning of Amniotic Fluid at Birth

- Was once a common practice to clear amniotic fluid from upper airway
- Not recommended because of possible association with cardiorespiratory complications
- May stimulate vagally-mediated bradycardia
- May delay start of ventilations in nonbreathing newborn



Research Findings*

- No clinical benefit from suctioning clear amniotic fluid following birth
- Some suggestion of oxygen desaturation with suctioning

KEY POINTS

- Routine suctioning of clear amniotic fluid from the mouth and nose of newborns immediately after birth is not indicated.
- For suspected airway obstruction, immediately reposition the airway and consider a brief trial of suctioning beginning with the mouth before the nose.

*Fawke J, Wyllie J, Udaeta E, et al. Suctioning of clear amniotic fluid at birth: A systematic review. *Resusc Plus.* Dec 2022;12:100298. doi:10.1016/j.resplu.2022.100298

Insights

Tactile stimulation has historically been used in the initial management of newborns with inadequate respiratory effort. Stimulation may include rubbing the chest, sternum, back or soles of the feet, and flicking the soles of the feet. Very limited evidence suggests a reduction in tracheal intubation of newborns on continuous positive airway pressure who receive tactile stimulation (compared with no tactile stimulation). The use of repetitive stimulation compared with a single stimulation may be associated with lower oxygen requirements. The optimal method and duration of tactile stimulation remains uncertain. There are concerns that tactile stimulation may delay the start of ventilation at birth, cause soft tissue injury, or increase the risk of intraventricular hemorrhage in preterm infants with a gestational age of less than 32 weeks. Due to these concerns, the Red Cross guidelines limit the use of tactile stimulation to newborns at greater than 32 weeks' gestational age.

Maintenance of Normal Body Temperature Immediately After Birth

NEW
- Where feasible, a room temperature of 23° C is suggested compared with 20° C at birth for late preterm and term newborn infants (34 weeks' gestation or more) to maintain normothermia.

NEW
- Skin-to-skin care with a parent is encouraged immediately after birth to maintain normothermia in late preterm and term newborn infants (34 weeks' gestation or more) who are at low risk of needing resuscitation. Skin-to-skin care can be done with initial care (i.e., drying and stimulation).

NEW
- The use of a plastic bag or wrap and other measures may be considered in situations where skin-to-skin care, maintaining temperature under a radiant warmer or a room temperature at 23° C is not feasible.

Insights

Newborns are at a greater risk of heat loss immediately after birth due to their large surface area to body mass ratio, decreased subcutaneous fat and other characteristics. Body temperature may fall by 2° C to 4° C in the first 10 to 20 minutes after birth. Hypothermia puts newborns at risk for several potentially life-threatening complications. In addition to drying the newborn, there are many different methods to maintain normal body temperature immediately after birth. Multiple studies have compared these methods in newborns not receiving resuscitation or at high risk for needing resuscitation. Results support the use of room temperatures at birth of 23° C (compared with 20° C), use of skin-to-skin contact with a parent immediately after birth, and, if skin-to-skin care or a room temperature of 23° C is not possible, to consider the use of a plastic wrap/bag or other measures such as a radiant warmer to maintain normal body temperature.

CHAPTER 5

Resuscitation Education Science

Retention of CPR Skills After Training

REAFFIRMED • CPR skills must be refreshed periodically but not less than 12 months from initial training.

UPDATED • More frequent CPR refresher intervals are suggested for healthcare professionals with low frequency use of CPR skills. Interval timing should be tailored to competency, scope of practice and clinical exposure.

Insights

Bystander CPR is associated with increased rates of survival following cardiac arrest. Skill decay within 3 months of training has been demonstrated. Previous recommendations have been made for retraining at 1 to 2 years. New modes of training and teaching CPR material and skills have been introduced to accommodate different student needs, but no form of primary instruction has been shown to be superior in preventing degradation of skills. Lack of standardized testing of skill retention and heterogeneity between studies and modes of learning/training make it difficult to say with certainty what should be the optimal retraining schedule. Because there is evidence of skills decay within 3 to 12 months after basic life support training, as well as evidence that frequent training improves CPR skills, the Red Cross suggests that individuals who encounter cardiac arrest less often consider more frequent training.

Patient Outcome and Resuscitation Team Members Attending Advanced Life Support Courses

NEW • Healthcare professionals who provide resuscitation and life support for adults, adolescents, children, infants or neonates should receive accredited training in resuscitation and life support for their respective discipline(s).

Insights

The prior participation of one or more members of the resuscitation team in an accredited advanced life support course improves the odds for return of spontaneous circulation and improves the odds of survival to hospital discharge and survival to 30 days in adults following in-hospital cardiac arrest. For neonatal resuscitation training, limited evidence shows a survival benefit. Although evidence has not been identified related to training for resuscitation of children and infants, the new Red Cross guideline reflects the potential life-saving benefit from accredited training in pediatric resuscitation and life support.

Retention of CPR Skills After Training

Bystander CPR Can Be Lifesaving!

Research Findings

- CPR skills degrade within 3 to 12 months after training.
- Optimum retraining interval is uncertain but frequent training improves CPR skills.
- Different modes of CPR training/instruction show equal CPR skills degradation.

KEY POINTS

- CPR skills must be refreshed periodically, but not less than 12 months from initial training.
- Timing should be tailored to competency, scope of practice and clinical exposure.
- More frequent refresher intervals are needed for those who encounter cardiac arrest infrequently.

Appendix A: Focused Updates and Guidelines 2022: Summary of Unchanged Guidelines/Recommendations

Basic Life Support		
Topic	**Red Cross Guidelines**	**Last Review or Update**
DISPATCHER/TELECOMMUNICATOR-ASSISTED CPR		
Dispatcher Recognition of Cardiac Arrest	• Dispatch centers should employ standardized and evidence-based protocols for recognition of cardiac arrest. (Reaffirmed) • Dispatch centers should monitor the diagnostic accuracy of recognition of cardiac arrest from use of any specific dispatch criteria or algorithms. (Reaffirmed)	2022
Harm to Those Performing CPR	• Although the risk of harm while performing CPR is considered low, precautions should be taken to minimize the risk of transmission of infectious disease or defibrillator-associated injury. This may include, but is not limited to: (Reaffirmed) ° Using standard precautions to provide patient care in all settings, to include performance of hand hygiene and use of personal protective equipment (PPE), that is, gloves, gown and a face mask, based on activities being performed and the risk assessment. ° Using additional PPE, including an N95 or higher level respirator, and eye protection (goggles or face shield) for aerosol-generating procedures or resuscitation of patients. Disposable N95 respirators should be discarded after leaving the patient's room or care area. ° Using an inline filter for mouth-to-mask or bag-mask ventilation. ° Performing hand hygiene after removal and disposal of PPE or after providing CPR without PPE. ° Avoiding touching a person in cardiac arrest when advised by automated external defibrillator prompts prior to the delivery of a shock.	2022
Dispatcher-Assisted Compression-Only CPR Versus Conventional CPR	• Dispatchers should provide instructions to perform compression-only CPR for suspected out-of-hospital cardiac arrest to those untrained in CPR or who are unable to recall CPR performance steps. (Reaffirmed) • Dispatchers should provide support as needed for performance of compression-ventilation CPR by those trained in standard CPR who are able to recall CPR performance steps. (Reaffirmed)	2022
CPR TECHNIQUES AND SEQUENCE		
CPR Start Sequence (A-B-C versus C-A-B) (Adult and Pediatric)	• Once cardiac arrest is recognized, resuscitation should begin with compressions. (Reaffirmed) • Healthcare professionals may consider rescue breaths or manual ventilations first in pediatric patients with primary respiratory etiologies of cardiac arrest. (Reaffirmed) • For the drowning process resuscitation, once cardiac arrest is recognized, resuscitation should begin with rescue breaths or manual ventilations. (Reaffirmed)	2022

Appendix A: Focused Updates and Guidelines 2022: Summary of Unchanged Guidelines/Recommendations

Basic Life Support

Topic	Red Cross Guidelines	Last Review or Update
CPR TECHNIQUES AND SEQUENCE *(continued)*		
Chest Compression-Only CPR Versus Compression-Ventilation CPR: Lay Responders	• Compression-only CPR (CO-CPR) may be used as an alternative to CPR with compressions and ventilations when a lay responder is unwilling or unable to provide ventilations. (Reaffirmed)	2022
Chest Compression Rate	• Chest compressions should be performed at a rate of 100 to 120 per minute for adults, children and infants. (Reaffirmed)	2022
Chest Compression Depth	• During CPR, an adult chest should be compressed to a depth of at least 2 inches. (Reaffirmed) • During CPR, a child's and infant's chest should be compressed to a depth of at least one-third the anteroposterior diameter of the chest (about 2 inches for a child and about 1½ inches for an infant). (Reaffirmed)	2022
Chest Wall Recoil	• During compressions for adults, children and infants, the chest wall should be allowed to fully recoil, and compression and recoil times should be approximately equal. (Reaffirmed)	2022
Pulse Check During CPR	• When performing CPR, if signs of return of spontaneous circulation (ROSC) are observed: (Reaffirmed) ° Stop CPR and automated external defibrillator use. ° Check for breathing and a carotid or femoral pulse. ° Pauses should be minimized to less than 10 seconds. • Routine pulse checks without signs of ROSC are not recommended. (Reaffirmed)	2022
CPR Prior to Defibrillation	• CPR should be performed prior to the availability of an automated external defibrillator and analysis of rhythm. (Reaffirmed)	2022
Rhythm Check Timing	• Immediately after a shock is delivered, CPR should be resumed for 2 minutes before pausing compressions to conduct a rhythm check. (Reaffirmed) • Based on the clinical situation, performing rhythm analysis after defibrillation may be considered by healthcare professionals. (Reaffirmed) • After every 2 minutes of CPR, the rhythm should be reassessed (while minimizing interruptions to CPR). (Reaffirmed) • If there are physiologic signs of ROSC, briefly pausing compressions for rhythm analysis may be considered. (Reaffirmed)	2022
Optimal Surface for CPR	• It is reasonable to perform manual chest compressions on a firm surface when possible. (Reaffirmed) • It is suggested that a person in cardiac arrest in the hospital setting not be moved from their bed to the floor to improve chest compression depth. (Reaffirmed) • If a person in cardiac arrest is in a bed with CPR mode to increase mattress stiffness, it is reasonable to activate this mode. (Reaffirmed)	2022
Head-Up CPR	• Head-up CPR should not be routinely used for cardiac arrest. (Reaffirmed)	2022

Appendix A: Focused Updates and Guidelines 2022: Summary of Unchanged Guidelines/Recommendations

Basic Life Support

Topic	Red Cross Guidelines	Last Review or Update
CPR TECHNIQUES AND SEQUENCE *(continued)*		
Alternative Cardiac Resuscitation Techniques (cough, precordial thump, fist pacing)	• A precordial thump and percussion pacing should not be used for cardiac arrest. (Reaffirmed) • "Cough CPR" should not be used for cardiac arrest. (Reaffirmed)	2022
Tidal Volumes and Ventilation Rates	• For adults with a pulse but insufficient respiratory effort, and during CPR with an advanced airway in place, 1 rescue breath/manual ventilation should be provided every 6 seconds. (Reaffirmed) • For children and infants with a pulse but insufficient respiratory effort, and during CPR with an advanced airway in place, 1 rescue breath/manual ventilation should be provided every 2 to 3 seconds. (Reaffirmed) • Rescue breaths and manual ventilations should be delivered over 1 second in adults, children and infants and with a volume that produces visible initiation of chest rise. (Reaffirmed)	2022
Harm from CPR to Persons Not in Cardiac Arrest	• Dispatchers should provide guidance to bystanders to begin CPR based on their assessment and without concern for harm to persons not in cardiac arrest. (Reaffirmed)	2022
DEFIBRILLATION		
Defibrillator Electrode Pad Size and Placement	• Use adult defibrillator electrode pads and energy levels on adult patients. Defibrillator pad size and selection should be as recommended by the defibrillator manufacturer. (Reaffirmed) • Adult electrode pads should be applied per defibrillator manufacturer instructions in either an anterolateral or an anteroposterior position. (Reaffirmed) • Defibrillator electrode pads should not incorporate any breast tissue. (Reaffirmed)	2022
OPIOID-ASSOCIATED EMERGENCIES		
Suspected Opioid-Associated Emergency Resuscitation	• CPR and automated external defibrillator (AED) use remain the first interventions for cardiac arrest in opioid overdose and should not be delayed or interrupted. (Reaffirmed) • For suspected cardiac arrest due to opioids, naloxone should be administered as soon as possible without disrupting or delaying CPR and AED use. (Reaffirmed)	2022

Appendix A: Focused Updates and Guidelines 2022: Summary of Unchanged Guidelines/Recommendations

Advanced Life Support		
Topic	**Red Cross Guidelines**	**Last Review or Update**
CARDIOPULMONARY RESUSCITATION: TECHNIQUES AND PROCESS		
Rhythm Analysis During Chest Compressions	• Immediately after a shock is delivered, CPR should be resumed for 2 minutes before pausing compressions to check for or analyze a rhythm. (Reaffirmed) • Based on the clinical situation, performing rhythm analysis after defibrillation may be considered by healthcare professionals. (Reaffirmed) • Compressions should be paused for rhythm analysis, even when using devices with artifact-filtering algorithms. (Reaffirmed) • After every 2 minutes of CPR, the rhythm should be reassessed (while minimizing interruptions to CPR for no more than 10 seconds). (Reaffirmed) • If there are physiologic signs of return of spontaneous circulation (ROSC), briefly pausing compressions for rhythm analysis may be considered. (Reaffirmed)	2022
POST-CARDIAC ARREST CARE		
Post Cardiac Arrest Temperature Control	• For patients who remain unconscious after return of spontaneous circulation (ROSC) from cardiac arrest, it is reasonable to actively prevent fever and maintain a core temperature of 37.5° C (99.5° F) or less for at least 72 hours. (Reaffirmed) • While a normothermic temperature control approach is preferred, patients with mild hypothermia who remain unconscious after ROSC should not be actively warmed to achieve normothermia. (Reaffirmed) • Surface or endovascular temperature control techniques may be considered when temperature control is used in patients who remain unconscious after ROSC. (Reaffirmed) • Temperature control devices that include a feedback system based on continuous temperature monitoring are preferred to maintain a target temperature in post-cardiac arrest patients who remain unconscious after ROSC. (Reaffirmed) • Hypothermic temperature control may be considered in certain subpopulations of cardiac arrest patients who remain unconscious after ROSC. (Reaffirmed) • Rapid infusion of large volumes of cold intravenous fluid immediately after ROSC should not be used for prehospital cooling of post-cardiac arrest patients. (Reaffirmed)	2022

Appendix A: Focused Updates and Guidelines 2022: Summary of Unchanged Guidelines/Recommendations

Pediatric Advanced Life Support		
Topic	**Red Cross Guidelines**	**Last Review or Update**
DRUG THERAPY AND VASCULAR ACCESS		
Intravenous Versus Intraosseous Administration of Drugs During Cardiac Arrest	• Intraosseous access may be considered as an acceptable alternative to intravenous access in children and infants. (Reaffirmed)	2022
POST-CARDIAC ARREST CARE		
Post-Cardiac Arrest Temperature Control	• For children and infants who remain unconscious after return of spontaneous circulation (ROSC) from cardiac arrest, it is reasonable to actively prevent fever and maintain a core temperature of 37.5° C (99.5° F) or less. (Reaffirmed) • While a normothermic approach is preferred, patients with mild hypothermia who remain unconscious after ROSC should not be actively warmed to achieve normothermia. (Reaffirmed) • Surface or endovascular temperature control techniques may be considered when temperature control is used in patients who remain unconscious after ROSC. (Reaffirmed) • Temperature control devices that include a feedback system based on continuous temperature monitoring are preferred to maintain a target temperature in post-cardiac arrest patients who remain unconscious after ROSC. (Reaffirmed) • Hypothermic temperature control may be considered in certain clinical presentations for children and infants after out-of-hospital and in-hospital cardiac arrest and who remain unconscious after ROSC. (Reaffirmed) • Rapid infusion of large volumes of cold intravenous fluid immediately after ROSC should not be used for prehospital cooling of post-cardiac arrest patients. (Reaffirmed)	2022