Click to verify

إرشادات acls roscoe

A lot of content in ACLS training courses focuses on learning and applying the rhythm-based algorithms, and return of spontaneous circulation (ROSC) is a favorable outcome of those processes. When a patient reaches ROSC, the team reaches a new stage of care in the ACLS algorithm. For an ACLS team, ROSC is cause to celebrate! It means that life-saving interventions have produced some results. However the team must still proceed carefully and follow evidenced-based interventions to manage this new phase. Learning more about ROSC is important for ACLS clinicians to understand the entire continuum of care and how to optimize patient outcomes. What is ROSC? Return of spontaneous circulation (ROSC) is defined as “the resumption of sustained perfusing cardiac activity associated with significant respiratory effort after cardiac arrest.” Team members continuously assess for ROSC by observing the patient’s color, any movement, respiratory effort, and by frequently checking for a pulse. It is important to understand that while ROSC is an event, it is also a phase of care that is unstable and requires team action. In other words, while the initial goal is accomplished — don’t make the mistake of thinking the ACLS event is over. Signs of ROSC The signs that indicate ROSC will be first observed in the patient and then verified by vital signs and cardiac monitoring. Patient spontaneous movement, coughing, sustained breathing, a palpable pulse, and measurable blood pressure all indicate ROSC. Although these signs are indicative that resuscitation efforts have been successful, remember that the patient is still unstable, the cause of the initial arrest may still be present. Plus, the patient likely has multiple medications circulating in their system that will begin to wear off. It is also important to understand that ROSC is not necessarily a linear process. Patients can reach ROSC and then revert back into cardiac arrest. They may even do so multiple times until the underlying cause is corrected. The ACLS team should be able to quickly pivot back to the correct ACLS algorithm based on the patient’s cardiac rhythm. The Lazarus Phenomenon One interesting phenomenon that can occur (although rarely) is called the Lazarus phenomenon. The phenomenon is defined as the delayed return of ROSC after CPR has ceased. There are at least 38 reported cases of this happening since 1982 when the phenomenon was first described in the literature. These anecdotes describe patients “waking up” minutes or even hours after being declared dead — and around 45% of them experienced good neurological recovery. Theories to explain this vary. Delayed action of uncirculated medications is one theory, while a buildup of pressure in the chest from CPR kickstarting the heart is another. The truth is, there is no great explanation for why this occurs. How to Achieve ROSC Several ACLS situations involve loss of circulation, particularly ventricular tachycardia (VT), ventricular fibrillation (VF), pulseless electrical activity (PEA), and asystole. Other conditions that activate an ACLS response, like supraventricular tachycardia (SVT), bradycardia, atrial fibrillation, and various blocks may be symptomatic and require a response, while there is no loss of circulation (pulse and measurable blood pressure). Clearly, the patient in cardiac arrest with no pulse is in dire straits. It is up to the clinical team to provide the quality CPR and ACLS care that gives the patient the best possible chance at ROSC. Tips to Maximize ROSC Success At the point that an ACLS response to cardiac arrest is in progress, there are always two possible outcomes: ROSC, or no ROSC. In that, there are important things that the team can do to maximize the patient’s chance of ROSC and a favorable post-ROSC outcome. High Quality CPR - When a patient is in ROSC, it is important to realize that high-quality CPR is imperative. Vigorous chest compressions with adequate depth and recoil provide the cardiac perfusion pressure (CPP) that acts as a substitute for myocardial perfusion. One study suggests that a minimum of 15 mmHg of CPP was necessary for ROSC, and more importantly, that CPP was predictive of ROSC. To give your patient the very best chance at ROSC, effective CPR is critical. Timely Defibrillation - Prompt defibrillation (if indicated) and first shock success have been linked to increased ROSC rates and higher survival rates. This fact has been supported by several studies and is the primary motivation for placing AEDs in public locations like airports, stadiums, schools, and other places where crowds gather. Administering the Right Medications (at the right times) - Medications are included in the ACLS algorithm specifically because they increase the patient’s chances for ROSC. For example, in one study of antiarrhythmic drugs used during cardiac arrest, the proportion of patients who had ROSC decreased as time to amiodarone administration increased. Epinephrine dosing has been extensively studied and has been shown to increase coronary blood flow, which is associated with an increased chance of return of ROSC. Analyzing Possible Causes - While all of these ACLS interventions are ongoing to try and achieve ROSC, the team should also be going through possible causes. Once ROSC is obtained, the patient’s long-term success depends on reversing the cause and maintaining hemodynamic stabilization. The Patient has ROSC, Now What? Now that the patient has reached ROSC, the real work begins. This phase of care is critical to the patient’s long-term chances of survival. Unfortunately, up to two-thirds of patients with return of spontaneous circulation do not survive long enough to be discharged from the hospital. To increase the chances for survival, it’s critical to take quick action according to the best practices. The ACLS Post-Cardiac Arrest Care Algorithm begins with ROSC and divides subsequent activities into two phases: Initial stabilization phase: This includes airway management and hemodynamic stabilization of oxygenation, PaCO2 levels, blood pressure, and MAP. A 12-lead EKG should also be obtained. Continued management and additional emergent activities phase: Consider emergent cardiac intervention if STEMI is present, the patient is in unstable cardiogenic shock, or mechanical circulatory support is required. During this phase, an initial neurological assessment should be conducted to assess a baseline condition, and further testing such as an EEG or brain CT should be considered. Additionally, the algorithm reminds the team to evaluate and treat rapidly reversible causes, commonly termed the “H’s and T’s” for easy recall. Post Cardiac Arrest Syndrome ACLS-trained clinicians should also be aware of post-cardiac arrest syndrome, a complex set of pathophysiological processes that happens after ROSC. Because of this syndrome, careful ICU monitoring should be in place to watch for the following: Post-arrest brain injury Post-arrest myocardial infarction Systemic ischemia Reperfusion response Underlying pathology (acute or chronic) that contributed to the cardiac arrest itself Each facility should have an easily accessible ROSC policy and procedure, usually accompanied by a care plan and checklist. Each member of the ACLS team should be very familiar with the facility’s processes and understand their role(s). All organizational post-ROSC plans of care should include the following components: Targeted temperature management (TTM) - This intervention aims at maintaining the core body temperature at either hypothermia or normothermia, to maximize neurological recovery. Hemodynamic and ventilation optimization - This phase includes titrating ventilator settings for an FI02 > 94% and adjusting IV infusions to maintain SBP > 90. Immediate coronary reperfusion - This includes percutaneous coronary intervention (PCI) for eligible patients as soon as possible. Neurological care - A complete neurological assessment, consulting neurology, and performing recommended tests such as EEG and CT brain scans. Other targeted interventions - (Such as diagnostic testing and line placements). These interventions include, but are not limited to, arterial blood gasses, full metabolic panels, cultures, and ongoing monitoring via arterial lines. Further Research about ROSC Post-ROSC care has been adjusted over the years as new studies emerge, and will likely continue to evolve. The goal of ROSC is always to promote the best possible long-term outcomes for the patient, and there are various sources of information on how to accomplish that. Some of the current topics being studied in relation to ROSC are: How to improve the quality and timing of CPR and post-resuscitation care How to identify the optimal timing and indications for coronary angiography How to use electrocardiogram and other biomarkers to predict ROSC and prognosis How to implement targeted temperature management and other neuroprotective strategies How to optimize the use of extracorporeal life support and other advanced therapies How to enhance the recovery and quality of life of cardiac arrest survivors Learn More About ROSC and ACLS It is easy to become overloaded with information when learning about ROSC and post-resuscitation care. After all, there are a lot of scenarios to think about and a lot of interventions needed. It is important for ACLS clinicians to remember the basics — always using high-quality CPR, following the ACLS algorithms, and practicing effective team dynamics to give the patient the best possible chance for attaining ROSC. Rather than an end goal, ROSC should be considered a milestone. From there, even more work begins to monitor the patient’s hemodynamic status and seek to optimize outcomes. If you would like to learn more about the drugs, ECG rhythms, clinical scenarios, and other topics related to ACLS, AMRI has study materials to help you develop a better understanding. Accredited by the National Board of Emergency Care Certifications (NBECC), AMRI has helped more than one million medical professionals become certified or recertified in ACLS, BLS, and PALS since 1983. Register for your exam with AMRI today to gain access to premium study materials and our widely accepted certification program. ROSC (or the return of spontaneous circulation) is the resumption of sustained perfusing cardiac activity associated with significant respiratory effort after cardiac arrest. Signs of ROSC include moving, coughing, or breathing, along with signs of a palpable pulse or a measurable blood pressure. Both cardiopulmonary resuscitation and defibrillation increase the chances of a patient experiencing ROSC. While the return of circulation is a favorable sign, it does not predict or indicate a favorable long-term outcome, as many patients have died not long after their circulation has returned. ROSC can be delayed and occur after failed cardiopulmonary resuscitation efforts have ended, which is also known as the Lazarus phenomenon. Therefore, passive monitoring is recommended for 10 minutes after resuscitation attempts have stopped. ROSC and Post Cardiac Arrest Care Post cardiac arrest care is crucial after a patient achieves ROSC. Therefore, healthcare institutions must implement a comprehensive and multidisciplinary system of care universally and consistently for the treatment of post-cardiac arrest patients to assure the very best of outcomes. This post-cardiac arrest system of care should include: Targeted temperature management (TTM) Hemodynamic and ventilation optimization Immediate coronary reperfusion Percutaneous coronary intervention (PCI) for eligible patients Neurological care and prognostication Other structured interventions Post Cardiac Arrest Syndrome Patients who have experienced ROSC after cardiac arrest, regardless of the setting, have a complex combination of pathophysiological processes that are described as post-cardiac arrest syndrome. Examples of post-cardiac arrest syndrome include the following: Post arrest brain injury Post arrest myocardial dysfunction Systemic ischemia Reperfusion response Persistent, acute, and chronic pathologies that may have participated in the cardiac arrest itself ROSC and the Importance of Diagnosing and Treating Underlying Causes Cardiac arrest will sometimes be caused by an underlying and potentially reversible condition. If ACLS providers can quickly identify a specific condition that is causing or contributing to the patient’s cardiac arrest and correct it, the patient may be able to achieve ROSC. Identifying underlying causes is of particular importance in cases of PEA and asystole. When ACLS providers search for underlying causes, they should do the following: Consider the H’s and T’s Analyze the ECG for clues to any underlying cause Recognize signs of hypovolemia Recognize signs of drug overdose or poisonings If a patient begins showing signs of ROSC, post-cardiac arrest care should be initiated immediately. How to Improve the Chances of ROSC The importance of high-quality CPR cannot be overstated for all patients experiencing a cardiac emergency, and this includes minimizing interruptions once CPR has been initiated. CPP is aortic relaxation pressure minus right atrial relaxation pressure. During CPR, CPP correlates with both myocardial blood flow and ROSC. In one human study, ROSC did not occur unless a CPP 15 mm Hg or greater was achieved during CPR. This relationship of high-quality CPR to coronary perfusion pressure (CPP) demonstrates the need to minimize interruptions in chest compressions. It’s also important to resume CPR while the defibrillator is charging. Shortening this interval between the last compression and the shock by just a few seconds can improve the patient’s chances of achieving ROSC. Therefore, healthcare providers must practice efficient coordination between CPR and defibrillation to minimize the hands-off interval between stopping compressions and administering the shock. Healthcare providers should also consider giving antiarrhythmic drugs, either before or after administering a shock. Amiodarone is typically the first antiarrhythmic agent given in cardiac arrest because it has been clinically demonstrated to improve the rate of ROSC and hospital admission in adults with refractory VFib/pulseless V-tach. However, if amiodarone is not available, healthcare providers can administer lidocaine instead. And finally, epinephrine is a commonly used drug in resuscitation efforts but its effects on ROSC are questionable. Epinephrine administration seems to improve the chances for ROSC and hospital admission rates. However, large studies have not been conducted to evaluate whether survival is improved. Lastly, proper chest compressions can also increase the patient’s chances of achieving ROSC. PETCO2, CPP, and SCVO2 correlate with cardiac output and myocardial blood flow during CPR. When chest compressions fail to achieve identified threshold values, ROSC is rarely achieved. The main determinant of PETCO2 during CPR is blood delivery to the lungs. Persistently low PETCO2 values less than 10 mm Hg during CPR in intubated patients is a good indicator that achieving ROSC will be unlikely. The NICE Clinical Knowledge Summaries (CKS) site is only available to users in the UK, Crown Dependencies and British Overseas Territories. CKS content is produced by Clarity Informatics Ltd (trading as Agilio Software | Primary Care). It is available to users outside the UK via subscription from the Agilio | Prodigy website. If you believe you are seeing this page in error please contact us. Resuscitation Council UK is pleased to announce the publication of our 2021 Resuscitation Guidelines. These are evidence-based, expert written, revised Guidelines for best practice and clinical excellence in resuscitation. They cover all age groups, and we ask all healthcare organisations and individuals to plan to implement the changes into practice within the next 12 months. The implementation and use of these revised Guidelines are essential to ensuring people receive the right care. Providing guidance for health and social care and public settings, they will give people their best chance of successful outcomes from cardiac arrest or improve patient and family experience in conversations, decisions and planning for end-of-life care. Guidelines 2021 have been developed as the result of a continuous process over the last five years led by the International Liaison Committee on Resuscitation (ILCOR). They distil the work of many international collaborators within ILCOR, the European Resuscitation Council and Resuscitation Council UK. 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 (NICE). Read our Executive Summary to learn more about the process used to produce these revised Guidelines, and to learn more about the main changes in each section. You can easily view all of the 2021 Guidelines and revised algorithms in the 2021 Guidelines section of our website. “Resuscitation Council UK is pleased to be publishing these Guidelines,” says Jonathan Wyllie, RCUK President, “and we are grateful to those who gave up their time amidst the challenges posed by the COVID-19 pandemic to ensure that best practice and excellence in resuscitation remain on top of the agenda when it comes to positive outcomes from cardiac arrests and decision-making in emergency care planning.” “We look forward to these Guidelines being implemented across the United Kingdom, and value the potential impact they have to further improve patient survival and care.” RCUK courses and course materials are being updated as a result of the 2021 Guidelines publication, and we look forward to welcoming Candidates to the updated courses this summer. Our 2021 Adult courses, ALS and ILS, will begin running from 5 July 2021, and our 2021 Paediatric and Newborn courses, EPALS, PILS, NLS and ARNI, will begin running from 9 August 2021. All Candidates on our courses from these dates receive a 2021 course manual as part of their course preparation. Anyone not attending a course, but wanting to increase their knowledge with a 2021 manual, can order it from our shop. The new ALS and ILS manuals are now available for pre-order in our shop, and the EPALS, PILS, NLS and ARNI manuals will be available for pre-order in our shop from 24 May 2021. Toggle all There are no major changes in the 2021 Adult ALS Guidelines. High-quality chest compressions with minimal interruption and early defibrillation remain priorities. 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. During CPR, start with basic airway techniques and progress stepwise according to the skills of the rescuer until effective ventilation is achieved. If 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. When adrenaline is used, it should be used as soon as possible when the cardiac arrest rhythm is non-shockable, and after 3 defibrillation attempts for a shockable cardiac arrest rhythm. The guidelines recognise the increasing role of point-of-care ultrasound (POCUS) in peri-arrest care for diagnosis, but emphasises that it requires a skilled operator, and the need to minimise interruptions during chest compression. The guidelines reflect the increasing evidence for extracorporeal CPR (eCPR) as a rescue therapy for selected patients with cardiac arrest when conventional ALS measures are failing and to facilitate specific interventions (e.g. coronary angiography and percutaneous coronary intervention (PCI), pulmonary thrombectomy for massive pulmonary embolism, rewarming after hypothermic cardiac arrest) in settings in which it can be implemented. These guidelines have followed European and international guidelines for the treatment of peri-arrest arrhythmias. Guidelines 2021 are based on the International Liaison Committee on Resuscitation 2020 Consensus on Science and Treatment Recommendations for Advanced Life Support and the European Resuscitation Council Guidelines for Resuscitation (2021) Advanced Life Support. Refer to the ERC guidelines publications for supporting reference material. Management of cardiac arrest in patients with known or suspected COVID-19 is not specifically included in these guidelines, but is covered within the separate COVID-19 guidance which is accessible from the RCUK website. The process used to produce the Resuscitation Council UK Guidelines 2021 is accredited by the National Institute for Health and Care Excellence (NICE). The guidelines process includes: systematic reviews with grading of the certainty of evidence and strength of recommendations. This led to the International Liaison Committee on Resuscitation (ILCOR) Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. the involvement of stakeholders from around the world including members of the public and cardiac arrest survivors. Details of the guidelines development process can be found in the Resuscitation Council UK Guidelines Development Process Manual. RCUK supports shared decision making and advanced care planning which integrates resuscitation decisions with emergency care treatment plans to increase clarity of treatment goals and also prevent inadvertent deprivation of other indicated treatments, besides CPR. These plans should be recorded in a consistent manner (See Ethics section). Hospitals should use a track and trigger early warning score system for the early identification of patients who are critically ill or at risk of clinical deterioration. Hospitals should train staff in the recognition, monitoring and immediate care of the acutely ill patient. Hospitals should empower all staff to call for help when they identify a patient at risk of physiological deterioration. This includes calls based on clinical concern, rather than solely on vital signs. Hospitals should have a clear policy for the clinical response to abnormal vital signs and critical illness. This may include a critical care outreach service and/or emergency team (e.g. medical emergency team, rapid response team). Hospital staff should use structured communication tools to ensure effective handover of information. Patients should receive care in a clinical area that has the appropriate staffing, skills, and facilities for their severity of illness. Hospitals should review cardiac arrest events to identify opportunities for system improvement and share key learning points with hospital staff. Symptoms such as syncope (especially during exercise, while sitting or supine), palpitations, dizziness and sudden shortness of breath that are consistent with an arrhythmia should be investigated. Apparently healthy young adults who suffer sudden cardiac death (SCD) can also have signs and symptoms (e.g. syncope/pre-syncope, chest pain and palpitations) that should alert healthcare professionals to seek expert help to prevent cardiac arrest. Young adults presenting with characteristic symptoms of arrhythmic syncope should have a specialist cardiology assessment, which should include an electrocardiogram (ECG) and in most cases echocardiography and an exercise test. Systematic evaluation in a clinic specialising in the care of those at risk for SCD is recommended in family members of young victims of SCD or those with a known cardiac disorder resulting in an increased risk of SCD. Identification of individuals with inherited conditions and screening of family members can help prevent deaths in young people with inherited heart disorders. Follow current European Society of Cardiology (ESC) guidelines for the diagnosis and management of syncope. Hospital systems should aim to recognise cardiac arrest, start CPR immediately, and defibrillate rapidly (8 cm away from the device, or use an alternative pad position. Also consider an alternate pad position when the patient is in the prone position (bi-axillary), or in a refractory shockable rhythm (see below). A shock can be safely delivered without interrupting mechanical chest compression. During manual chest compressions, ‘hands-on’ defibrillation, even when wearing clinical gloves, is a risk to the rescuer. Energy levels and number of shocks Use single shocks where indicated, followed by a 2 minute cycle of chest compressions. The use of up to three-stacked shocks may be considered only if initial ventricular fibrillation/pulseless ventricular tachycardia (VF/pVT) occurs during a witnessed, monitored cardiac arrest with a defibrillator immediately available e.g. during cardiac catheterisation or in a high-dependency area. A range of defibrillation energy levels have been recommended by manufacturers and previous guidelines, ranging from 120-360 J. In the absence of any clear evidence for the optimal initial and subsequent energy levels, any energy level within this range is acceptable for the initial shock, followed by a fixed or escalating strategy up to maximum output of the defibrillator. Recurrent or refractory VF Consider escalating the shock energy, after a failed shock and for patients where refibrillation occurs. For refractory VF, consider using an alternative defibrillation pad position (e.g. anterior- posterior). Do not use dual (double) sequential defibrillation for refractory VF outside of a research setting. Airway and ventilation During CPR, start with basic airway techniques and progress stepwise according to the skills of the rescuer until effective ventilation is achieved. If 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. Aim for less than a 5 second interruption in chest compression for tracheal intubation. Use direct or video laryngoscopy for tracheal intubation according to local protocols and rescuer experience. Use waveform capnography to confirm tracheal tube position. Give the highest feasible inspired oxygen during CPR. Give each breath over 1 second to achieve a visible chest rise. Once a tracheal tube or a supraglottic airway (SGA) has been inserted, ventilate the lungs at a rate of 10 min-1 and continue chest compressions without pausing during ventilations. With a SGA, if gas leakage results in inadequate ventilation, pause compressions for ventilation using a compression-ventilation ratio of 30:2. Drugs and fluids Vascular access Attempt intravenous (IV) access first to enable drug delivery in adults in cardiac arrest. Consider intraosseous (IO) access if attempts at IV access are unsuccessful or IV access is not feasible. Vasopressor drugs Give adrenaline 1 mg IV (IO) as soon as possible for adult patients in cardiac arrest with a non-shockable rhythm. Give adrenaline 1 mg IV (IO) after the 3rd shock for adult patients in cardiac arrest with a shockable rhythm. Repeat adrenaline 1 mg IV (IO) every 3-5 minutes whilst ALS continues. Antiarrhythmic drugs Give amiodarone 300 mg IV (IO) for adult patients in cardiac arrest who are in VF/pVT after three shocks have been administered. Give a further dose of amiodarone 150 mg IV (IO) for adult patients in cardiac arrest who are in VF/pVT after five shocks have been administered. Lidocaine 100 mg IV (IO) may be used as an alternative if amiodarone is not available or a local decision has been made to use lidocaine instead of amiodarone. An additional bolus of lidocaine 50 mg can also be given after five defibrillation attempts. Thrombolytic drugs Consider thrombolytic drug therapy when pulmonary embolus is the suspected or confirmed as the cause of cardiac arrest. Consider CPR for 60-90 minutes after administration of thrombolytic drugs. Fluids Give IV (IO) fluids only where the cardiac arrest is caused by or possibly caused by hypovolaemia. Waveform capnography during advanced life support Use waveform capnography to confirm correct tracheal tube placement during CPR. Use waveform capnography to monitor the quality of CPR. An increase in ETCO2 during CPR may indicate that ROSC has occurred. However, chest compression should not be interrupted based on this sign alone. Although high and increasing ETCO2 values are associated with increased rates of ROSC and survival after CPR, do not use a low ETCO2 value alone to decide if a resuscitation attempt should be stopped. Use of ultrasound imaging during advanced life support Only skilled operators should use intra-arrest point-of-care ultrasound (POCUS). POCUS must not cause additional or prolonged interruptions in chest compressions. POCUS may be useful to diagnose treatable causes of cardiac arrest such as cardiac tamponade and pneumothorax. Right ventricular dilation in isolation during cardiac arrest should not be used to diagnose massive pulmonary embolism. Do not use POCUS for assessing contractility of the myocardium as a sole indicator for terminating CPR. Mechanical chest compression devices Consider mechanical chest compressions only if high-quality manual chest compression is not practical or compromises provider safety. When a mechanical chest compression device is used, minimise interruptions to chest compression during device use by using only trained teams familiar with the device. Extracorporeal CPR Consider extracorporeal CPR (eCPR) as a rescue therapy for selected patients with cardiac arrest when conventional ALS measures are failing and to facilitate specific interventions (e.g. coronary angiography and percutaneous coronary intervention (PCI), pulmonary thrombectomy for massive pulmonary embolism, rewarming after hypothermic cardiac arrest) in settings in which it can be implemented. Peri-arrest arrhythmias The assessment and treatment of all arrhythmias addresses the condition of the patient (stable versus unstable) and the nature of the arrhythmia. Life-threatening features in an unstable patient include: shock – appreciated as hypotension (e.g. systolic blood pressure < 90 mmHg) and symptoms of increased sympathetic activity and reduced cerebral blood flow syncope – as a consequence of reduced cerebral blood flow severe heart failure – manifested by pulmonary oedema (failure of the left ventricle) and/or raised jugular venous pressure (failure of the right ventricle) myocardial ischaemia – may present with chest pain (angina) or may occur without pain as an isolated finding on the 12-lead ECG (silent ischaemia). Tachycardias Electrical cardioversion is the preferred treatment for tachyarrhythmia in the unstable patient displaying potentially life-threatening adverse signs. Conscious patients require anaesthesia or sedation, before attempting synchronised cardioversion. To convert atrial or ventricular tachyarrhythmias, the shock must be synchronised to occur with the R wave of the electrocardiogram (ECG). For atrial fibrillation: An initial synchronised shock at maximum defibrillator output rather than an escalating approach is a reasonable strategy based on current data. For atrial flutter and paroxysmal supraventricular tachycardia: Give an initial shock of 70 - 120 J. Give subsequent shocks using stepwise increases in energy. For ventricular tachycardia with a pulse: Use energy levels of 120-150 J for the initial shock. Consider stepwise increases if the first shock fails to achieve sinus rhythm. If cardioversion fails to restore sinus rhythm and the patient remains unstable, give amiodarone 300 mg intravenously over 10–20 minutes (or procainamide 10–15 mg kg-1 over 20 minutes) and re-attempt electrical cardioversion. The loading dose of amiodarone can be followed by an infusion of 900 mg over 24 hours. If the patient with tachycardia is stable (no life-threatening adverse signs or symptoms) and is not deteriorating, pharmacological treatment may be possible. Consider amiodarone for acute heart rate control in AF patients with haemodynamic instability and severely reduced left ventricular ejection fraction (LVEF). For patients with LVEF < 40% consider the smallest dose of beta-blocker to achieve a heart rate less than 110 min-1. Add digoxin if necessary. Bradycardia If bradycardia is accompanied by life-threatening adverse signs, give atropine 500 mcg IV (IO) and, if necessary, repeat every 3–5 minutes to a total of 3 mg. If treatment with atropine is ineffective, consider second line drugs. These include isoprenaline (5 mcg min−1 starting dose), and adrenaline (2–10 mcg min−1). For bradycardia caused by inferior myocardial infarction, cardiac transplant or spinal cord injury, consider giving aminophylline (100–200 mg slow intravenous injection). Consider giving glucagon if beta-blockers or calcium channel blockers are a potential cause of the bradycardia. Do not give atropine to patients with cardiac transplants – it can cause a high-degree AV block or even sinus arrest – use aminophylline. Consider pacing in patients who are unstable, with symptomatic bradycardia refractory to drug therapies. If transcutaneous pacing is ineffective, consider transvenous pacing. Whenever a diagnosis of asystole is made, check the ECG carefully for the presence of P waves because unlike true asystole, this is more likely to respond to cardiac pacing. If atropine is ineffective and transcutaneous pacing is not immediately available, fist pacing can be attempted while waiting for pacing equipment. Debriefing Use data-driven, performance-focused debriefing of rescuers to improve CPR quality and patient outcomes. Effect of resuscitation education on patient outcome We suggest healthcare systems ensure staff with a duty to provide ALS receive accredited RCUK ALS provider training (See Education Guidelines) Candidate, Instructor and Centre Admin's access to ALS, ARNI, EPALS, NLS, ILS, ILSi, PILS, and FEEL course content and important resources.