



Resuscitation on the Field of Play:

A best-practice guideline



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Resuscitation on the Field of Play: a best-practice guideline

This document provides guidance for those on whom there is a reasonable expectation to organise and provide cardiopulmonary resuscitation (CPR) and defibrillation to athletes who have a sudden cardiac arrest during or shortly after sporting activity.

1. EXECUTIVE SUMMARY

Sudden cardiac arrest on the field of play is a rare event. There is the potential to achieve a very high rate of survival following cardiac arrest in athletes, without serious disability. It is therefore important to optimise processes and practices to maximise the chance of good clinical outcomes.

The focus of this best-practice guideline is on athletes who have a sudden cardiac arrest on the field of play during organised sports when there is a dedicated field-of-play medical team available.

However, there are several elements of this guideline that are applicable to the management of sudden cardiac arrest in someone participating in any sporting activity (with or without a field-of-play medical team available) and, indeed, to all community-based cardiac arrests.

Athletes who have an unexpected collapse and who remain unresponsive should be presumed to have had a sudden cardiac arrest and treated accordingly. Athletes who have had a sudden cardiac arrest may continue to gasp or have breathing movements, have seizure-like activity and have their eyes open. It is important to recognise that these signs can be present and that these athletes need immediate resuscitation. Collapse after cardiac arrest can occur during or shortly after any sporting activity and may happen away from the point of sporting action.

The general principles of cardiopulmonary resuscitation apply. Early recognition followed by early high-quality chest compressions and defibrillation, with either an Automated External Defibrillator (AED) or manual defibrillator, are likely to give the collapsed athlete the best chance of survival.



Safety of the field-of-play medical team, the athlete and other field-of-play personnel is paramount, and this document discusses special considerations for several sports. Traumatic cardiac arrest is a possibility in some circumstances and field-of-play medical teams should train to appreciate and manage this occurrence.

For those athletes who have a shockable cardiac rhythm during cardiac arrest, a minimum of three shocks should be delivered on the field of play if the shockable rhythm persists. Subsequent transfer from the field of play should be well-rehearsed and there should be established protocols for onward transport to designated hospitals.

Established protocols and good communication will facilitate the transfer of athletes to a designated 'cardiac arrest centre', with access to services including percutaneous coronary intervention and extracorporeal CPR.

A comprehensive emergency action plan is essential, and it is the shared responsibility of all those involved in the safe delivery of competitive sport to implement it effectively. It should outline procedures for essential and advanced resuscitation practice, the size and composition of the field-of-play medical team, training, equipment and maintenance, communication and leadership, and interaction with other field-of-play, pre-hospital and hospital teams.

There is a clear opportunity for field-of-play medical teams to use this document to drive excellent practice in resuscitation of athletes who have a sudden cardiac arrest. There is also opportunity for them and the athletes and teams that they support to disseminate excellent practice in essential cardiopulmonary resuscitation skills to the wider community.

2. RATIONALE

Sudden cardiac arrest on the field of play is an infrequent but devastating event. Exercise is protective of health in general, but the risk of sudden collapse and death during and immediately after exercise is slightly higher than during inactivity¹. One estimate suggests that around 1 in 217 000 people per year have a sports-related sudden death, with only 6% of these in 'young competitive athletes' (aged 10–35 years)². The best estimate in athletes up to 40 years old is that between 1 in 40 000 and 1 in 80 000 have a sudden cardiac death each year^{3,4}, with substantially higher risks in certain groups (e.g. men, African-American athletes) and sports (e.g. basketball). However, given difficulties in obtaining data, the true incidence may be underreported^{3,5}.

Survival in the general population from out-of-hospital cardiac arrest is generally poor. Around one in ten people survive to 30 days or leave hospital alive within that period⁶⁻⁸.

In exercise-associated sudden cardiac arrest, rates of bystander CPR, bystander AED use and survival are substantially higher than for the general population⁹.

Therefore, there is the potential for much higher rates of survival in exercise-associated sudden cardiac arrest with prompt recognition, high-quality CPR and early defibrillation¹⁰⁻¹².

Recently there have been several prominent cases of sudden cardiac arrest in professional athletes during organised competition on the field of play that have raised public awareness of these events. This raises expectations that the athletes involved receive the best possible immediate care. Their chances of survival should be extremely high.

We hope that this best-practice guideline will provide an effective common framework for resuscitation of athletes who have a sudden cardiac arrest during organised competition on the field of play. The aim is to ensure that as many people as possible survive their cardiac arrest with a good long-term quality of life, which is an outcome important to cardiac arrest survivors and their loved ones^{13,14}.

3. SCOPE

In this document we have focused particularly on sudden cardiac arrest in athletes during organised sports when:

- ✓ there is a dedicated field-of-play medical team, or another team with specific training, that is expected to respond to medical emergencies on the field of play
- ✓ there is the potential for other factors or competing interests (such as media or crowd safety) to detract from the focus on the wellbeing of an athlete who has collapsed on the field of play.

Therefore, this best-practice guidance is aimed primarily at people organising, leading or participating in a dedicated field-of-play medical team responding to a sudden cardiac arrest.

However, much of the best practice detailed in this document is applicable to those taking part in sporting activity at all levels of competition, particularly when there is some organised medical or first-aid response. This will include team and individual sports and highly organised amateur or mass-participation events (e.g. marathons, cycling sportives, parkrun). Individuals or teams responding to cardiac arrest in these settings should, first and foremost, follow existing guidelines for community-based out-of-hospital cardiac arrest. Responders should follow more advanced practices and use additional equipment described in this document only if they have the appropriate training and expertise to do so.

There may be parts of this document that are also of interest to those participating in sporting activity where there is no organised medical or first-aid response. However, in this setting we recommend that people follow existing guidelines for community-based out-of-hospital cardiac arrest: there are international^{15,16} and UK-specific¹⁷ guidelines. There are also already existing 'special circumstances' guidelines from the European Resuscitation Council (ERC)¹⁸ and Resuscitation Council UK¹⁹ addressing cardiac arrest occurring during sport.

'Resuscitation on the Field of Play: a best-practice guideline' is designed only to complement, rather than supersede, these existing guidelines. Additionally, some sports have specific directions regarding the composition and training of a field-of-play medical team. Again, consider this document as complementary to existing practice.

The essential actions required for successful resuscitation, to achieve survival with a good long-term quality of life, remain unchanged. These include **rapid recognition of cardiac arrest, early high-quality chest compressions with minimal interruptions and early defibrillation**²⁰. Many sudden cardiac arrests will occur during recreational sport, and the prompt use of an accessible AED in these situations will have a big impact on survival. The location of AEDs should be indicated using clear signage that is visible at a distance.

Sudden cardiac arrest may occur on the field of play during training as well as during competition, and those reading and implementing this best-practice guideline should consider this when planning their emergency response. Athletes may train (at training venues) far more than they play (at a competition venue itself) and the availability of field-of-play medical teams at different venues may not be the same. Emergency response plans should reflect this.

4. METHODOLOGY

Dr Fiona Moore proposed the need for a best-practice guideline to the Community and Ambulance Resuscitation (CARE) Subcommittee of Resuscitation Council UK in September 2021. The Resuscitation Council UK Executive Committee agreed the process to begin developing it in September 2021. The CARE Subcommittee subsequently appointed a task-and-finish group from interested members:

Name	Affiliation
Dr Christopher M Smith (co-chair)	NIHR Clinical Lecturer in Emergency Medicine, University of Warwick; Executive Committee Member (co-opted), Resuscitation Council UK
Dr Fiona Moore (co-chair)	Former Executive Medical Director of South East Coast Ambulance Service NHS FT; Senior Medical Advisor to Air Ambulance Charity Kent Surrey Sussex.
Prof Gavin D Perkins	Vice President, Resuscitation Council UK; Dean, Warwick Medical School, University of Warwick
Dr Judy O’Sullivan	Director of Health Innovation Programmes, British Heart Foundation
Dr David Pitcher	CARE Subcommittee Member; Consultant Cardiologist (retired)
Dr Jasmeet Soar	Consultant in Intensive Care Medicine and Anaesthetics, Southmead Hospital, North Bristol NHS Trust; Chair Advanced Life Support Subcommittee and Executive Committee Member, Resuscitation Council UK
Dr Lynn Thomas	Medical Director, St John Ambulance

and from Resuscitation Council UK staff:

Name	Role
Mr Adam Benson Clarke	Deputy Director of Clinical and Service Development
Mrs Isabelle Hamilton-Bower	Clinical Lead
Mrs Sue Hampshire	Former Director of Clinical and Service Development
Dr James Cant	Chief Executive Officer

The task-and-finish group defined the scope of the enquiry and proposed initial matters for consideration in March and April 2022. The group identified (from existing professional contacts) a group of stakeholders from several sporting organisations across the UK. It identified two cardiac arrest survivors, via Sudden Cardiac Arrest UK, who joined the stakeholder group.

Stakeholder group membership:

Name	Affiliation
Mr Ryan Aird	Sudden Cardiac Arrest UK member; survivor representative
Mr Christopher Johnston	Sudden Cardiac Arrest UK member; survivor representative
Prof Jonathan Drezner	Director, Centre for Sports Cardiology; Professor, Department of Family Medicine, University of Washington; Editor-in-chief British Journal of Sports Medicine
Prof Lisa Hodgson	Medical Education Lead, The Football Association, St George's Park, Burton-on-Trent; Visiting Professor, School of Health, Leeds Beckett University
Dr Mike Patterson	Chief Medical Officer (Venues, Events and Emergency Care), The Football Association; Consultant in Intensive Care and Emergency Medicine
Dr Andy Smith	Emergency Medicine Consultant; Yorkshire Ambulance Service BASICS Doctor; Honorary Secretary Faculty of Pre-Hospital Care, Royal College of Surgeons of Edinburgh; England Rugby Pre-Hospital Immediate Care in Sport Programme Director; Twickenham Match Day Field of Play Clinical/Immediate Care Lead; World Rugby Immediate Care and Medical Compliance Manager
Prof David Zideman	International Olympic Committee Medical and Scientific Commission Games Group

The task-and-finish and stakeholder group had a hybrid (mixture face-to-face and online) meeting on 25 April 2022 to discuss the scope and outline content of the guideline. Subsequently a draft version was produced and revised internally by the task-and-finish group, before distribution to the stakeholder group for further commentary. The task-and-finish and stakeholder groups reviewed the resulting version in a hybrid meeting on 14 September 2022, and clarified key points.

The task-and-finish group finalised updates to the document in October 2022, and sent it to the stakeholders in December 2022. Stakeholders then distributed this to interested contacts in their networks for further commentary and suggestions. We produced a revised document in February 2023.

We then made this document available for public commentary via the Resuscitation Council UK website between 20 April and 3 May 2023. During this time we received 35 comments from ten individuals and one organisation. We reviewed each item of feedback and grouped them into five main themes – content, remit/scope, stakeholder representation, document organisation and typographical errors. One comment was assigned two themes.

There were 28 comments related to the content of the document (AEDs n=6; team leadership n=2; logistics n=9; wording choice n=3; special circumstances n=3; agonal breathing n=1; algorithm n=3; safety n=1), two comments about remit/scope, two comments about stakeholder representation, two comments about document organisation and two comments about typographical errors.

We have listed our responses and any changes we subsequently made to the document in Table 1. The two comments about stakeholder representation commented on the lack of involvement of other charitable organisations with relevant experience and someone from the British Basketball League, especially given our statement about the increased risk in African-Americans and Basketball players in section 2.

The task-and-finish group reviewed the updated document in June and July 2023. Subsequently, Resuscitation Council UK Executive Committee and partner organisations approved the final draft of the document, which was published in December 2023.

This best-practice guideline refers extensively to global treatment recommendations, which are made following an evidence evaluation process by the International Liaison Committee on Resuscitation (ILCOR) – see <https://www.ilcor.org>. We have also referred to national Resuscitation Council UK guidelines, the development of which is described [here](#). Where our recommendations are not explicitly set out in existing guidelines, we reached consensus view from the wealth of clinical expertise and/or lived experience of the group who produced this document. We resolved any differences in opinion by discussion, and all task-and-finish and stakeholder group members listed in section 4 have approved publication of this best-practice guideline.

5. WHEN SUDDEN CARDIAC ARREST OCCURS

We use ‘field of play’ to refer to any sporting or playing venue.

We refer to the care of an ‘athlete’ on the field of play. We appreciate that collapse and cardiac arrest may also occur in other people on or immediately adjacent to the field of play, such as team and match officials, field-of-play marshals and other involved personnel. Wherever we use the term ‘athlete’ the advice given is equally applicable to these groups.

Recognition

Sudden cardiac arrest can be difficult to recognise, particularly for field-of-play medical teams observing an athlete from a distance.

If an athlete on the field of play has an unexpected collapse and remains unresponsive (e.g. does not sit up or appear to move purposefully, does not interact with those around them, does not respond to verbal or tactile stimuli), **the presumption should be that this is sudden cardiac arrest.**

Resuscitation guidelines state that a bystander should recognise sudden cardiac arrest if a collapsed person is unresponsive and is either not breathing or not breathing normally. In the early stages of sudden cardiac arrest there may be slow, laboured breathing (agonal breathing) and/or short episodes of seizure-like movements, which should not be allowed to delay recognition of cardiac arrest.

However, it has been observed and reported that some athletes who have had sudden cardiac arrest may continue breathing more regularly (i.e. not just agonal breaths as defined above)²¹⁻²³ and/or have their eyes open²⁴ following collapse.

So, if any athlete collapses and remains unresponsive, **treat this as a sudden cardiac arrest.**

Such unexpected collapse and inadequate recovery may occur:

- at any time during sporting activity (e.g. warm-up, training or practice, in competition, during the post-activity recovery period)
- away from the point of sporting action
- immediately after blunt-force trauma to the chest (‘commotio cordis’ e.g. collision with another athlete or goalpost, a ball hitting the chest).

Anyone who sees this should summon immediate medical attention so that the athlete can be assessed where they are.

Even if the athlete recovers and regains consciousness quickly following an unexpected collapse, they should receive prompt medical attention. They should not continue in their sporting activity. The athlete should be removed from the field of play for more detailed assessment in an appropriate medical facility.



Preparing the response to sudden cardiac arrest

In planning and training for a sudden cardiac arrest:

- ✓ Train anyone in an official capacity on or beside the field of play (such as athletes, team, venue and match officials) to recognise signs of sudden cardiac arrest, as described above.
- ✓ Empower them to immediately alert the field-of-play medical team. Officials should halt play as soon as it is safe to do so, no matter the tactical situation on the field of play.
- ✓ When halting the sport is not necessary (e.g. point-to-point racing or lap/loop-based events where competitors can be directed away from the incident), ensure that field-of-play marshals divert the sporting activity away from the incident.
- ✓ Empower field-of-play medical teams to reach a collapsed athlete's side without delay once it is safe to do so. This may include situations where match officials have not stopped the sporting activity.

Field-of-play medical teams should practise their response to sudden cardiac arrest. This includes the team's location or staging point and role allocation, including the need for a team leader who retains overall control of the resuscitation effort. The team leader has a crucial role in decision-making and co-ordination of these complex situations. They should have relevant experience and expertise leading resuscitation teams in this environment.

There are occasions when initial access to a collapsed athlete is limited to medical personnel employed by the collapsed athlete's own team (e.g. a 'club doctor' or 'club physiotherapist'), rather than dedicated field-of-play medical teams. This is potentially a problem if these personnel do not recognise sudden cardiac arrest or carry the appropriate resuscitation equipment. Therefore, field-of-play medical teams should liaise closely with sports teams. If the teams' own medical personnel reach the collapsed athlete first they must recognise and treat sudden cardiac arrest promptly, and they should allow field-of-play medical teams immediate access to the collapsed athlete.

There should be pre-defined arrangements governing if an ambulance service (also known as Emergency Medical Services, EMS) response is required – if an ambulance is not already on site – and what form this should take. Can the ambulance service enter the field of play directly, or will the field-of-play medical team deliver the athlete to them at an agreed rendezvous point?

Safety concerns (e.g. for the field-of-play medical team, other athletes, officials, other field-of-play personnel and spectators) should be the only barrier to getting to a collapsed athlete as soon as possible.

Prompt access to a collapsed athlete is vital to help save lives. Therefore, it is crucial that competition organisers work together to allow medical teams to assemble near to the field of play and to allow them unimpeded access in case of emergency.

The field-of-play medical team should, where practicable, make competition officials aware of their presence and that their response to a suspected cardiac arrest must override the normal field-of-play access protocols in place for that competition. This should not result in sanctions being imposed on athlete(s) or teams, or them subsequently being considered 'out of competition'. In some sports there is a requirement for medical treatment to be completed within a specified time. This should not apply for suspected cardiac arrest.

6. INITIAL RESUSCITATION OF AN ATHLETE

There may be substantial heterogeneity in the composition of field-of-play medical teams. However, the focus in all circumstances should be on prompt recognition, initiation of high-quality CPR and early use of a defibrillator. Thereafter, field-of-play medical team personnel must act according to their competence.

Approach and, wherever possible, initially treat the athlete in the location where they have collapsed. There may be demand from other parties to move the athlete if they do not immediately understand the seriousness of the situation. Field-of-play medical teams must resist this until they have performed a full assessment and have provided initial life-saving treatment, only moving the athlete before doing this if there are immediate safety concerns. They should communicate to all parties that this is a cardiac arrest.

Perform these initial actions:

- ✓ Assess for signs of life, paying particular attention to the information provided above about recognising sudden cardiac arrest on the field of play.
- ✓ If there are no signs of life, start CPR and attach a defibrillator.
- ✓ Continue resuscitation according to current guidelines – see Resuscitation Council UK Guidelines for basic and advanced life support in adults and children²⁵.

It is important to note that recognition of cardiac arrest, initiation of CPR and use of a defibrillator, if available, are all actions that other athletes and officials on the field of play at the time of the collapse can take. We consider training for people who may witness an athlete collapsing on the field of play in section 9.

Cardiopulmonary resuscitation

- ✓ Start CPR with **high-quality chest compressions**.
- ✓ **Attach a defibrillator immediately or, if one is not immediately available, as soon as it arrives**. A defibrillator should be located at sports venues and training grounds so that a first shock, if appropriate, can be delivered within **two minutes** of the athlete's collapse.
- ✓ High-quality chest compressions should continue whilst defibrillator pads are being attached and should not pause until the defibrillator is ready to analyse the heart rhythm.
- ✓ Continue with high-quality chest compressions and effective rescue breaths according to resuscitation guidelines.
- ✓ Provide continuous high-quality chest compressions if you are unable to give rescue breaths.
- ✓ The priorities should be starting high-quality chest compressions as soon as possible, continuing these with minimal interruptions and attaching a defibrillator immediately, or as soon as it is available.
- ✓ Insert a supraglottic airway (e.g. i-gel or Laryngeal Mask Airway (LMA)) and provide ventilations. If suitable equipment or expertise is not available, provide ventilations using a face mask and self-inflating bag and an oropharyngeal airway. Effective face-mask ventilation may require a two-person technique.
- ✓ Attach supplemental oxygen.

There will be circumstances when the field-of-play medical team should consider whether an athlete has had a traumatic cardiac arrest. This is discussed in section 8.

Using a defibrillator

It is appropriate to respond with an AED. Field-of-play medical teams attending an athlete who has had a possible sudden cardiac arrest should ensure that an AED is immediately available.

In all cases **attach and switch on the AED immediately, or as soon as it is available**. If using an AED, follow the voice instructions.

All field-of-play medical teams should have specific training with the AED with which they will respond. Teams should practise responding with their specific device (or a training analogue) before each competition session.

Field-of-play medical teams may choose to respond using a manual defibrillator if they have appropriate training and expertise and if doing so does not compromise the response to the athlete in cardiac arrest. Manual defibrillators can also be used in AED mode if this facilitates effective team management of the cardiac arrest.

Initial shockable rhythm – ventricular fibrillation (VF) or pulseless ventricular tachycardia (pVT)

Deliver one shock per two-minute cycle of CPR. Do not deliver stacked shocks. If the shockable rhythm persists, deliver a minimum of three shocks on the field of play. If the rhythm changes from shockable to non-shockable for more than one cycle of CPR consider moving the athlete (see below).

Thereafter:

- ✔ Continue CPR. Perform further defibrillation as required. The priorities during CPR should be high-quality chest compressions with minimal interruptions.
- ✔ Obtain intravenous (IV) or intraosseous (IO) access on the field of play if there are sufficient appropriately skilled personnel. This must not delay or interrupt chest compressions or use of the defibrillator, and must not delay a decision to safely move the athlete from the field of play.
- ✔ Give adrenaline 1 mg (10 mL of 1:10 000 solution) IV or IO and amiodarone 300 mg IV or IO following the third shock, and before moving the athlete from the field of play.
- ✔ Continue high-quality chest compressions with minimal interruptions during this process.
- ✔ There should be a pre-agreed routine for safely moving an athlete from the field of play. The medical team should consider and regularly practise the safest and most efficient route to move the athlete in cardiac arrest to a designated rendezvous point. This may involve a team carry-off, the use of a buggy or stretcher, or a motorised ambulance vehicle driven onto the field of play.
- ✔ As soon as the field-of-play medical team has transferred the athlete to any transport device or vehicle it may be reasonable to perform a brief repeat rhythm analysis at this point, particularly if the time taken to load the athlete on the transfer device has been prolonged and/or further movement (e.g. to an off-field ambulance) is anticipated to take some time. Deliver **one further shock as required** and immediately resume chest compressions. Note that this further shock may not be possible if using an AED.
- ✔ Move the athlete – when the field-of-play medical team agrees that it is safe and appropriate to do so – to an ambulance for immediate transfer to hospital. Field-of-play medical teams should agree this process with the ambulance service and practise it regularly. There should be a handover using a pre-agreed brief format so as not to delay the transfer of the athlete to definitive medical care.

Initial non-shockable rhythm – pulseless electrical activity (PEA) or asystole

- ✔ Continue CPR. The focus should be high-quality chest compressions with minimal interruptions.
- ✔ Obtain IV or IO access on the field of play and give adrenaline 1 mg (10 mL of 1:10 000 solution) as soon as possible. This must not delay or interrupt chest compressions or use of the defibrillator (if required subsequently), and must not delay a decision to safely move the athlete from the field of play.
- ✔ Move the athlete – when the field-of-play medical team agrees that it is safe and appropriate to do so – to an ambulance for immediate transfer to hospital.
- ✔ If the rhythm changes from non-shockable to shockable deliver a shock. If a shockable rhythm persists for subsequent cycles, deliver **a minimum of three shocks** (one shock per two-minute cycle of CPR) on the field of play.

If return of spontaneous circulation occurs

Post-resuscitation care should start immediately after a sustained return of spontaneous circulation, regardless of an athlete's location.

Follow existing guidelines for post-resuscitation care²⁶, with particular attention to oxygenation, ventilation, blood pressure, temperature control, seizure control, and screening for longer-term physical, cognitive and emotional problems. Field-of-play medical teams should monitor the athlete closely and remain alert to the possibility of recurrent cardiac arrest.

Move the athlete to an ambulance and transport them to a pre-agreed receiving hospital (whose ideal characteristics we discuss in section 8) as soon as the field-of-play medical team agrees that it is safe and appropriate to do so.

7. SPECIAL CONSIDERATIONS

For all sports there should be plans and systems to address sport-specific challenges in safely accessing and treating a collapsed athlete as soon as possible.

Field-of-play medical teams should account for these challenges when responding to an athlete who has collapsed. Regular training of the field-of-play medical team for these situations is essential.

Formally risk-assess any anticipated special circumstances. Agree specific procedures with the field-of-play medical team and officials before competition and include these in emergency action plans. There may be a requirement for additional personnel (e.g. lifeguards for water-based events). There will be considerations about appropriate personal protective equipment and appropriate indemnity (at individual and/or organisational level) for those involved in the field-of-play medical response.



Examples of special circumstances include, but may not be limited to:

—✓ Water-based events, swimming pools:

- Do not attempt chest compressions in the water as they cannot be delivered effectively.
- Move the athlete to the poolside before performing an assessment and starting CPR with high-quality chest compressions.
- A defibrillator can be used at the poolside.

—✓ Water-based events, open water²⁷:

- Do not attempt chest compressions in the water as they cannot be delivered effectively.

- Move the athlete as quickly as possible to dry land or, if this is not practicable, to a rescue boat.
 - Rescue breaths may be provided in the water by a trained rescuer if they determine that the equipment available and distance to boat or land warrant this.
 - Consider rescue-boat size and environment ahead of the sporting event.
 - Provide CPR and use a defibrillator in the rescue boat, but only if there is sufficient space for this. CPR quality may be compromised and – if the athlete cannot be moved directly from the water to dry land – there should be minimal delay in getting the athlete to shore or to a larger boat that can provide a stable platform.
 - If CPR or defibrillator use is not possible in any available boat, the athlete should be moved rapidly to the waterside with an appropriately equipped medical team ready to receive them. It may still be possible to deliver ventilations in the boat.
- ✓ Ice-based events:
- It may be impractical to spend a prolonged period on the ice with an athlete in cardiac arrest. It may be appropriate to plan an earlier move to an off-ice location where the field-of-play medical team can continue resuscitation.
 - The athlete’s ice-skates pose a risk of injury to others during resuscitation. Apply safety covers as soon as practicable.
- ✓ Road-based events (e.g. running, cycling, triathlon):
- Safety of rescuer(s) from traffic is paramount in all road-based events, particularly if they are not held on closed roads. Consider this ahead of the sporting event, in liaison with police and other appropriate authorities.
 - Safety of rescuer(s) from other participants still moving at high speed is paramount.
 - The event may continue if field-of-play marshals can divert other participants and any other traffic away from the incident.
 - The athlete may also have traumatic injuries.
- ✓ Other ‘high-speed’ events (e.g. track cycling, skating or skiing events, motor-vehicle events):
- Safety of rescuer(s) from other participants still moving at high speed is paramount.
 - The event may continue if field-of-play marshals can divert other participants away from the incident.
 - The athlete may also have traumatic injuries.
- ✓ Equestrian events:
- Safety of rescuer(s) from horses is paramount.
 - The event may continue if field-of-play marshals can divert other participants away from the incident.
 - A rider who collapses on a horse and subsequently falls may also have traumatic injuries. Consider trauma as a cause of cardiac arrest if there is uncertainty.
 - Body protectors and air jackets/air vests may reduce the risk of injury from a fall, but must be removed quickly to expose the chest to deliver effective chest compressions. Field-of-play medical teams should train and practise doing this.

- ✓ Other events where the athlete wears protective equipment:
 - Field-of-play medical teams must be able to quickly remove any equipment that prevents effective CPR and prompt use of a defibrillator.
 - Where traumatic injury is a possibility, field-of-play medical teams should be trained and able to quickly remove equipment in such a way as to prevent further injury.
- ✓ Events involving children and young people:
 - There will be size and weight-based differences in cardiac arrest management²⁸.
 - There is a need for specific paediatric resuscitation training and practice.
- ✓ Endurance events and other events where exertional hyperthermia is a risk:
 - Field-of-play medical teams should be aware of the signs of and treatment for exertional hyperthermia²⁹.
 - Consider exertional hyperthermia (+/- electrolyte disturbance) as a precipitant of cardiac arrest.

8. ISSUES ARISING DURING RESUSCITATION EFFORTS

Personal dignity

An athlete who has a sudden cardiac arrest on the field of play will undergo medical treatment that requires exposing parts of their body that they would normally not expose in that environment. There should be:

- ✓ Existing arrangements with media companies not to broadcast live images of any such event. It may be appropriate for the field-of-play medical team to review any media footage after the event to learn and improve their response for future incidents.
- ✓ A plan for the provision of physical screens – or other means, such as officials forming a circle and facing outwards – to shield the athlete from public view, provided this does not interfere with or delay resuscitation efforts.

AEDs and manual defibrillators

We strongly recommend having an on-site AED available and immediately accessible in locations where people are engaging in exercise and/or sporting events. We suggest that sporting organisations also have an AED positioned so that it is always accessible to the wider community (e.g. in an unlocked cabinet on a premises' external wall). The location of AEDs should be indicated using clear signage that is visible at a distance.

The national governing bodies of many sports will require the presence of AEDs at certain levels of competition.

As discussed in section 6, even though there are circumstances where field-of-play medical teams may respond with a manual defibrillator, it is entirely appropriate to respond with an AED to an athlete who has had a sudden cardiac arrest, even at the highest levels of sport.

AEDs can also be used to resuscitate infants and children:

- ✓ Use a paediatric attenuator and paediatric pads for infants and children aged below eight years if these are available.
- ✓ If the age of a collapsed child is uncertain do not delay CPR or defibrillation with the AED. Use adult or paediatric pads based on your best judgement.

- ✓ Do not delay or withhold AED use on a child aged below eight years if paediatric attenuator and paediatric pads are not available. Attach the standard/adult pads.

Airway management

Where possible, use a supraglottic airway for initial airway management. If the appropriate equipment or expertise is not available, provide ventilations using a face mask and self-inflating bag and an oropharyngeal airway. Effective face-mask ventilation may require a two-person technique.

Advanced airway management:

- ✓ Supraglottic airways may be the most appropriate means of providing advanced airway management.
- ✓ Consider tracheal intubation for advanced airway management only in a system where the field-of-play medical team anticipates a high first-pass success rate, and can provide evidence to support this assertion. There is no evidence that early intubation improves survival or survival with favourable functional outcome after adult cardiac arrest in any setting³⁰. Unrecognised oesophageal intubation is invariably associated with failure of a resuscitation attempt.
- ✓ Advanced airway management must not delay or interfere with the provision of high-quality chest compressions and prompt defibrillation.

Oxygen

During CPR, use supplemental oxygen if available. Provide the highest feasible inspired oxygen concentration.

After return of spontaneous circulation, aim to achieve a normal oxygen saturation if this can be reliably monitored^{31,32}. Otherwise, or if there is doubt about the accuracy of oxygen saturation readings, provide the highest feasible inspired oxygen concentration until effective monitoring is available.

Use of mechanical CPR devices

Current resuscitation guidelines do not recommend routine use of mechanical CPR devices^{33,34}. The available evidence shows that providing mechanical chest compressions does not improve survival or survival with good functional outcome compared to providing manual chest compressions³⁵.

Field-of-play medical teams may consider mechanical CPR, particularly when providing high-quality chest compressions is potentially not practicable (e.g. prolonged resuscitation, with field-of-play medical teams of a limited size or when using other carrying devices) or when it might risk rescuer safety (e.g. during emergency ambulance transfer). This may be particularly relevant when transfer times are long and/or there is a limited number of personnel available. Field-of-play medical teams should deploy a mechanical chest compression device only if they undergo regular training in its use. They must take care to avoid interruptions in chest compressions during deployment.

Extracorporeal CPR

Extracorporeal CPR may be considered only as part of a pre-planned, integrated emergency response involving field-of-play medical teams, the ambulance service and the receiving hospital.

Extracorporeal CPR is a potentially life-saving intervention in the right group of patients, but data concerning its effect on survival and survival with good functional outcome are lacking³⁶.

Receiving hospitals may have existing pre-conditions for accepting patients for extracorporeal CPR. Indeed, there is uncertainty about which people should be considered for extracorporeal CPR, but benefit is more likely in the following situations:

- ✓ witnessed sudden cardiac arrest
- ✓ sudden cardiac arrest from a primary cardiac cause
- ✓ early onset of bystander CPR
- ✓ people under the age of 65 years
- ✓ time from collapse to initiation of extracorporeal CPR of no more than 60 minutes.

Most, if not all, of these are likely to apply to an athlete sustaining sudden cardiac arrest on the field of play, particularly at higher levels of competition.

Its successful implementation would require specific training and organisation and effective liaison with the ambulance service and an appropriate receiving hospital.

Traumatic cardiac arrest

There are certain circumstances when the field-of-play medical team may have to decide whether collapse has occurred secondary to trauma (e.g. secondary to massive haemorrhage, tension pneumothorax). It may be necessary to control external haemorrhage as part of cardiac arrest management, or to prevent an impending cardiac arrest.

There are guidelines and algorithms available for management of cardiac arrest in this rare circumstance^{18,19}. Field-of-play medical teams at events where they may have to make this assessment should be experienced in and practise the management of traumatic cardiac arrest.

Impact brain apnoea (cessation of breathing after traumatic brain injury) is another recognised phenomenon that prompt, appropriate airway management can ameliorate³⁷.

Moving athletes from the field of play with ongoing resuscitation

During initial resuscitation described in section 6, restricted access to a collapsed athlete may delay or impede resuscitation and the use of some equipment. This may influence decisions about when it is best to move a collapsed athlete from the field of play.

If moving an athlete off the field of play with ongoing resuscitation there should be a clear, predetermined plan about where the athlete is being moved to.

If a decision has been made to transport the athlete to hospital:

- ✓ Move them from the field of play to an ambulance, unless one is not immediately present at or immediately next to the field of play.
- ✓ If an ambulance is not immediately available, move them to a pre-agreed ambulance rendezvous point, with a view to immediate loading and transfer once the ambulance arrives.
- ✓ Do not usually move them from the field of play to another part of the sports venue (e.g. a separate medical room in a stadium). If there are exceptional reasons for doing this the field-of-play medical team should practise this. Such a move should not delay essential resuscitation efforts nor should it delay transfer to hospital.

There should be a brief handover using a pre-agreed format to avoid delaying the transfer of the athlete to definitive medical care.

Transporting athletes to hospital with ongoing CPR

Field-of-play medical teams can reasonably consider moving an athlete in cardiac arrest to a definitive care facility earlier than would be advised for many people with out-of-hospital cardiac arrest.

There is very-low-certainty evidence about the effect of ambulance transport on CPR quality and clinical outcomes, and it is not specific to those who have a sudden cardiac arrest on the field of play. However, the evidence that exists indicates that CPR quality and survival are both slightly worse in people who are transported in an ambulance with ongoing CPR, rather than when CPR is completed at the scene of their cardiac arrest³⁸.

There should be a sustained focus on high-quality CPR during transport. Also consider the safety risk to people providing manual chest compressions during transport. It is reasonable to consider using a mechanical CPR device in this situation.

There should be a strong justification for transporting an athlete by ambulance to hospital with ongoing CPR. Agree this process with the ambulance service and practise it prior to the event. It should be clear to all involved that such a transfer offers a potential benefit to the patient. However, it seems entirely reasonable that the threshold for transport to hospital is far lower in an athlete following cardiac arrest, even if that has involved a prolonged period of arrest. This is because of athlete factors (they are more likely to be younger and fitter) and other clinical management factors (it is more likely to be a witnessed cardiac arrest with early onset of both essential and more advanced interventions by highly trained teams).

Ideally, take athletes being transported to hospital still in cardiac arrest, and those who gain return of spontaneous circulation, to a designated 'cardiac arrest centre'. It should have expertise in out-of-hospital cardiac arrest management and round-the-clock access to relevant services, such as:

- ✓ cardiac electrophysiology
- ✓ computerised tomography (CT)
- ✓ coronary angiography and percutaneous coronary intervention
- ✓ echocardiography
- ✓ extracorporeal CPR
- ✓ intensive care.

There is evidence for improved outcomes at such centres³⁹. It is important that the field-of-play medical team liaise in advance with the local ambulance service and hospital(s) to identify an appropriate receiving hospital, establish a pre-alert system and, where necessary, protocols to allow bypass of hospitals that may be nearer but without these facilities.

In cases of traumatic cardiac arrest, transfer to a major trauma centre may be more appropriate.



9. ORGANISATION AND TRAINING

The safe delivery of competitive sport requires complex interactions between several different agencies, which may include the host venue, the host team, independent medical providers, NHS resources and national governing bodies. It is the shared responsibility of all such agencies to work together towards the effective implementation of these guidelines.

A comprehensive emergency action plan is a crucial part of the prompt and effective response to an athlete who has had a sudden cardiac arrest⁴⁰. We recommend the development of an emergency action plan based on relevant field-of-play regulations from that sport and its international federation, and up-to-date risk assessments of the sports venue(s) in question.

This plan should have, but not necessarily be limited to, details about:

- ✓ How athletes, team, venue and match officials recognise possible sudden cardiac arrest when someone collapses on the field of play.
- ✓ The location or staging point of the field-of-play medical team, and how they will safely and rapidly gain access to a collapsed athlete.
- ✓ Who will perform CPR and defibrillation.
- ✓ Who will purchase and maintain defibrillator(s), and make them immediately available when needed.
- ✓ Whether to use an AED or a manual defibrillator.
- ✓ How to maintain the safety and dignity of the athlete during initial resuscitation and when moving them from the field of play.
- ✓ How to perform essential interventions on the field of play following sudden cardiac arrest.
- ✓ Which advanced interventions to perform on the field of play, and how to perform them, following sudden cardiac arrest.
- ✓ Moving an athlete from the field of play and transporting them to a hospital:
 - mode of transport
 - positioning of a waiting ambulance relative to the field of play
 - immediate destination after leaving the field of play.

- ✓ How protocols should differ for sport-specific special circumstances, e.g.:
 - moving an athlete to a place of safety and using rescue aids, where necessary, following collapse in water
 - the possibility of traumatic injury and danger to rescuers in equestrian events and high-speed events.
- ✓ How protocols should differ for participant-specific special circumstances, e.g.:
 - children or young people
 - athletes with impairments.
- ✓ The composition of the field-of-play medical team(s):
 - number of people
 - expertise and skills
 - team leadership
 - role during the response and positioning around an athlete who has collapsed
 - provision of appropriate medical equipment
 - positioning of and access to medical equipment, including that carried immediately to a collapsed athlete and more advanced equipment that might be needed subsequently.
- ✓ Communication issues:
 - between team leader and team
 - between different teams
 - devices (e.g. mobile phones, radios etc.), including provision for remote areas and back-ups should primary communication methods fail.
- ✓ Situations when there is more than one field-of-play medical team, requiring clear guidelines about the roles and responsibilities of each team, and how they interact with and support each other.
- ✓ The need to have clear guidelines about the different roles and responsibilities of field-of-play medical team(s) and other team(s) tasked with dealing with medical emergencies in the crowd and/or surrounding environs.
- ✓ The need to have clear guidelines about offering an appropriate debrief and support to athletes, officials and others who have witnessed or helped treat someone in cardiac arrest.

Training

Organisations should also have detailed plans about training for the dedicated teams that respond to an athlete with sudden cardiac arrest, including the content of training and the frequency with which training is provided. Some sports will already have specific directions about the composition and training of the field-of-play medical team(s).

Training should include:

- ✓ knowledge and skills training consistent with current resuscitation guidelines
- ✓ training on any additional or advanced equipment that they may use
- ✓ simulation-based training, whenever possible in the setting where the sports events or training take place

- ✓ sports and participant-specific training
- ✓ role-specific training for each team member.

There should also be plans for training of other people who may witness an athlete collapsing on the field of play, such as team, venue and match officials. These plans should include the frequency and content of refresher training.

This training should include, at a **minimum**:

- ✓ recognition of sudden cardiac arrest on the field of play
- ✓ delivery of high-quality chest compressions
- ✓ familiarisation with and use of an AED.

Field-of-play officials and venue managers should have at least an understanding of the resuscitation process, principles guiding transfer of a collapsed athlete from the field of play and the need for ambulance provision for transport to hospital.

10. DISSEMINATION OF BEST PRACTICE

Sports teams and organisations should consider the positive impact that successful resuscitation of high-profile athletes may have on the wider community. There are clear opportunities to disseminate best practice and to:

- ✓ Teach people to promptly recognise sudden cardiac arrest to avoid delays to appropriate life-saving treatment.
- ✓ Emphasise that agonal breathing and brief seizure-like activity may often occur during the initial stages of sudden cardiac arrest.
- ✓ Empower people to perform bystander CPR and to use a community-based AED.
- ✓ Encourage the placement of AEDs in sporting venues and other public locations. Ideally, these should be accessible 24/7 to members of the public.

All of these have the potential to improve survival and long-term quality of life for people who have a sudden cardiac arrest, both on the field of play and in the general community.

Table 1: Public comments and subsequent changes to the document

Respondent	Theme	Comment	Our response	Change(s) made
Charitable organisation	Remit/scope	Consider producing two versions of the report aimed at elite-level and recreational sport.	The group has extensively discussed the scope, which will remain unchanged.	No change.
	Stakeholder representation	The stakeholder group lacked representation and input from organisations/charities with relevant experience – author commented that they found out about this public consultation only by chance.	The task-and-finish group included representation from Resuscitation Council UK, British Heart Foundation and St John Ambulance, all of whom are organisations with substantial expertise and experience in the field of resuscitation. The stakeholder group included cardiac arrest survivors and sports medicine experts with interests across various sports.	We acknowledge in Section 4 that there are other charitable organisations with expertise and representatives from certain sports that were not consulted during the preparation of this document.

Respondent	Theme	Comment	Our response	Change(s) made
Charitable organisation	Content - AEDs	To add text about having an AED sited on sports/club premises that is available to the wider community when not in use. (Suggested addition in section 8 and section 10).	Text added.	<p>Section 8. Added: “We suggest that sporting organisations also have an AED positioned so that it is always accessible to the wider community (e.g. in an unlocked cabinet on a premises’ external wall).”</p> <p>Section 10. Added: “Ideally, these should be accessible 24/7 to members of the public.” after: “encourage the placement of AEDs in sporting venues and other public locations.”</p>
	Content - AEDs	To highlight that most cardiac arrests occur in recreational sports, and to emphasise the life-saving potential of AEDs in this circumstance.	Text added.	<p>Section 3. Added: “Many sudden cardiac arrests will occur during recreational support, and the prompt use of an accessible AED in these situations will have a big impact on survival.”</p>

Respondent	Theme	Comment	Our response	Change(s) made
Charitable organisation	Content - wording choice	Use of the word “athlete” when cardiac arrest can affect participants and non-participants at sporting venues.	We have already explained our rationale for the use of the word ‘athlete’ in section 5.	No change.
Individual	Content - wording choice	“Field-of-play” implies outdoor sports only.	Text added.	Section 5. Added: “We use ‘field of play’ to refer to any sporting or playing venue.”
	Content - wording choice	Use “heart attack centre” as alternative name to “cardiac arrest centre.”	“Cardiac arrest centre” is widely recognised terminology. Introducing the term “heart attack” in addition risks confusion.	No change.
	Stakeholder representation	No representation from Chief Medical Officer of British Basketball League despite document reporting literature about increased risk of sudden cardiac arrest in sports for male athletes, African-Americans and basketball players.	We acknowledge this as a limitation.	We acknowledge this as a limitation in this table and in the text in Section 4.

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - logistics	Important that the medical team have clear views of the full playing surface.	Text added/changed.	<p>Section 6. Added: “This includes the team’s location or staging point...” after: “Field-of-play medical teams should practise their response to sudden cardiac arrest.”</p> <p>Section 9 Changed: “...how the field-of-play medical team will safely and rapidly gain access to the field of play and a collapsed athlete.” to: “...the location or staging point of the field-of-play medical team, and how they will safely and rapidly gain access to a collapsed athlete.”</p>

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - logistics	Consider moving a collapsed athlete to a designated medical room in certain circumstances.	<p>The group has discussed this.</p> <p>The risk is in introducing unnecessary delay to resuscitation and definitive care.</p> <p>We already specify in section 8: “do not usually move them from the field of play to another part of the sports venue (e.g. a separate medical room in a stadium).”</p>	No change.
	Content - logistics	Communicate with broadcast provider that there has been a sudden cardiac arrest, and not to show live transmission for at least 10 minutes.	<p>We already specify in section 8: “There should be existing arrangements with media companies...”</p> <p>The exact nature of these arrangements are beyond the remit of this document.</p>	No change.

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Typographical error.	There is an incomplete sentence in section 8.	Error rectified.	Section 8. Text corrected to: “Impact brain apnoea (cessation of breathing after traumatic brain injury) is another recognised phenomenon that prompt, appropriate airway management can ameliorate.”
	Content - logistics	Further comment on the potential benefit of moving a collapsed athlete to a designated medical room, contrasting patient access with transport in an ambulance (with poorer access to the patient than a medical room).	The risk is in introducing unnecessary delay to resuscitation and definitive care. There must be a clear justification for transporting an athlete still in cardiac arrest. We have added text to clarify this further.	Section 8. Added: “It should be clear to all involved that such a transfer offers a potential benefit to the patient.” after: “There should be a strong justification for transporting an athlete via ambulance to hospital with ongoing CPR. Agree this process with the ambulance service and practise it prior to the event.”

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - agonal breathing	Emphasise the importance of agonal breathing as a sign of cardiac arrest.	<p>This is stressed in section 5.</p> <p>We have strengthened the wording in section 10 (dissemination of best practice).</p>	<p>Section 10.</p> <p>Changed: “educate people about how to recognise sudden cardiac arrest, with an emphasis on the awareness of agonal breathing and brief seizure-like activity, so that they do not delay appropriate life-saving treatment”</p> <p>to: “teach people to promptly recognise sudden cardiac arrest to avoid delays to appropriate life-saving treatment” and “emphasise that agonal breathing and brief seizure-like activity may often occur during the initial stages of sudden cardiac arrest.”</p>

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content – logistics Reomit/scope	<p>The recommendation to transfer to a cardiac arrest centre may conflict with existing ambulance protocols.</p> <p>This is a laudable objective but might not be appropriate in a national guideline.</p>	<p>This document is ‘best practice guidance’. The current suggestion aligns with best available evidence.</p> <p>We have altered wording to emphasise that the field-of-play medical team (and not just the ambulance service) should be aware in advance about pre-alert and bypass protocols.</p>	<p>Section 8. Changed: “It is important to identify an appropriate receiving hospital in advance...” to: “It is important that the field-of-play medical team liaise in advance with the local ambulance service and hospital(s) to identify an appropriate receiving hospital.”</p>
	Content - AEDs	Clearly indicate the location of an AED, specifically suggesting a ‘feather flag’ using a design developed by the commenter.	<p>Good visibility of AEDs is crucial - we have added text. Resuscitation Council UK already has guidance on standard signs for AEDs: https://www.resus.org.uk/library/additional-guidance/guidance-defibrillators/guidance-standard-sign.</p>	<p>Section 3. Added: “The location of AEDs should be indicated using clear signage that is visible at a distance.”</p>

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content – team leadership	Emphasise that there should be clearly defined role of ‘team leader’ and that this role should be based on experience / expertise and not just prior professional role.	Text added.	<p>Section 5. Added: “The team leader has a crucial role in decision-making and co-ordination of these complex situations. They should have relevant experience and expertise leading resuscitation teams in this environment.”</p> <p>Section 9: Added: “team leadership.” to bullet point: “the composition of the field-ofplay medical teams.”</p>
	Content - algorithm	The recommendation to perform a repeat rhythm analysis after removal of athlete from field of play to transport vehicle does not specify timing of this rhythm check relative to previous rhythm checks.	Text changed.	<p>Section 6. Changed: “As soon as the field-of-play medical team has transferred the athlete to any transport device or vehicle perform a repeat rhythm analysis.” to: “As soon as the field-of-play medical team has transferred the athlete to any transport device or vehicle it is reasonable to perform a brief repeat rhythm analysis (regardless of timing of last rhythm check).”</p>

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Typographical error	There is an incomplete sentence in section 8.	Error rectified.	Section 8.
	Content-special circumstances	Add a section about heat-related illness.	Text added. Detailed management of heat-related illness is beyond the scope of this document.	Section 7. Added: <ul style="list-style-type: none"> • Endurance events and other events where exertional hyperthermia is a risk: o Field-of-play medical teams should be aware of the signs of and treatment for exertional hyperthermia. o Consider exertional hyperthermia (+/- electrolyte disturbance) as a precipitant of cardiac arrest.
	Content-logistics	Better emphasise not moving a patient with ongoing manual chest compressions and the use of mechanical CPR during both transport and also extrication using carry devices.	Routine use of mechanical chest compressions is not recommended. We have added the use of carrying devices as a circumstance where it might be reasonably considered.	Section 8. Added: “or when using carrying devices” after: “Field-of-play medical teams may consider mechanical CPR, particularly when providing high-quality chest compressions is potentially not practicable – e.g. prolonged resuscitation or with field-of-play medical teams of a limited size.”

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - algorithm	Include a flowchart, similar to current ALS algorithms.	This is 'best-practice' guidance to be tailored to local circumstances and does not lend itself to a one-size-fits-all algorithm.	No change.
	Document organisation	Move the opening paragraph of section 6 (which is about initial resuscitation) to section 5 (more about practice and preparation of teams).	Text moved.	Move from section 6 to section 5: “Field-of-play medical teams should practise their response to sudden cardiac arrest. This includes the team’s location or staging point, team leadership and role allocation, including the need for a team leader who retains overall control of the resuscitation effort.”
	Document organisation	Move sentence about defibrillator location from section 6 to section 5.	Here, discussion about defibrillator location is directly relevant to the recommendation to “attach a defibrillator immediately or, if one is not immediately available, as soon as it arrives.”	No change.

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - logistics	There is no guidance on when to move a patient in an 'initial non-shockable rhythm' in section 6.	<p>We cover this under 'initial shockable rhythm' by stating "If the rhythm changes from shockable to non-shockable for more than one cycle of CPR consider moving the athlete."</p> <p>We have made it clearer under 'initial non-shockable rhythm'.</p>	<p>Section 6. Added text to 'initial non-shockable rhythm' (duplicate from 'initial shockable rhythm'): "Move the athlete – when the field-of-play medical team agrees that it is safe and appropriate to do so – to an ambulance for immediate transfer to hospital."</p>
	Content - safety	There should be more emphasis on safety of responder.	<p>This is a specific comment on the following sentence "Move the athlete – when the field-of-play medical team agrees that it is safe and appropriate to do so – to an ambulance for immediate transfer to hospital." There are several other references to responder safety throughout.</p>	No change.

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - logistics	It is hard to enforce arrangements not to broadcast live images of a cardiac arrest event.	This is best-practice guidance and it is reasonable to recommend such arrangements / agreements.	No change.
	Content - AEDs	Is a “strong recommendation” to have an on-site AED available and accessible enough?	We have no legal standing to mandate AED presence.	No change.
	Content - team leadership	Further collaboration is required to enhance the requirement by sporting governing bodies to require presence of AEDs at certain levels of competition.	This is work that many of the stakeholders are already involved in. However, it is beyond the scope of this document.	No change.

Respondent	Individual	Theme	Content - algorithm	Comment	In response to “Deliver one shock per two-minute cycle of CPR.” If the shockable rhythm persists, deliver a minimum of three shocks on the field of play”, should 3 stacked shocks be considered or not.	Our response	Stacked shocks are recommended only for witnessed, MONITORED arrests - this does not apply here.	Change(s) made	No change.
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Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - logistics	<p>Repeat rhythm analysis when moving to transport device would not be possible with an AED (rather than manual defibrillation).</p> <p>If, for shockable rhythms, the plan is 3 shocks, adrenaline, move, what is the added value of an additional rhythm check at this point?</p>	Text changed.	<p>Section 6. Changed: “As soon as the field-of-play medical team has transferred the athlete to any transport device or vehicle perform a repeat rhythm analysis.”</p> <p>to: “As soon as the field-of-play medical team has transferred the athlete to any transport device or vehicle it may be reasonable to perform a brief repeat rhythm analysis at this point, particularly if the time taken to load the athlete on the transfer device has been prolonged and/or further movement (e.g. to an off-field ambulance) is anticipated to take some time.”</p> <p>Added: “Note that this further shock may not be possible if using an AED.” after: “Deliver one further shock as required and immediately resume chest compressions.”</p>

Respondent	Theme	Comment	Our response	Change(s) made
Individual	Content - AEDs	Suggestion to use an AED that has a rhythm display.	There is no evidence of benefit to this approach. Suitably trained teams have the option to use a manual defibrillator if required, and we state this in the document.	No change.
	Content - special circumstances	Take into consideration equipment that different players wear: gives the example of ice hockey players wearing helmet/visor, body brace.	We already consider and have a bullet point for “events where the athlete wears protective equipment” in section 7.	No change.

Respondent		Theme	Comment	Our response	Change(s) made
Individual		Content - special circumstances	Consider the challenges of cardiac arrest on ice, particularly the risks of hypothermia to the athlete and difficulties of performing prolonged resuscitation efforts in-situ.	Text added.	<p>Section 7. Added:</p> <ul style="list-style-type: none"> • ice-based events: <ul style="list-style-type: none"> o It may be impractical to spend a prolonged period on the ice with an athlete in cardiac arrest. o It may be appropriate to plan an earlier move to an off-ice location where the field-of-play medical team can continue resuscitation. o The athlete’s ice-skates pose a risk of injury to others during resuscitation. Apply safety covers as soon as practicable.

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