The British Heart Foundation (BHF), British Red Cross (BRC), Resuscitation Council UK (RCUK) and St John Ambulance (SJA) have prepared the attached joint paper for the Department for Education.

We welcome the provision of AEDs in schools. They provide the opportunity for lives to be saved.

Simple installation is a good start, but it is our view that schools that take a more proactive approach in terms of training and awareness will see even greater benefits for their investment.

This briefing provides information under the following headings:

- Introduction and benefits analysis
- Myths and facts
- Views on implementation
- Costings and recommended suppliers
- Should they be locked or alarmed?
- Reaction from schools
- Training: providers and costs
- Contact list.

We would be happy to provide further information or clarification.

Given the time available we have not reached out to the wider schools AED community. However, we acknowledge the huge contribution of the Arrhythmia Alliance, London Ambulance Service, Oliver King Foundation, SADS UK and Saving Londoners’ Lives, all of which were present at the meeting on 26 February.

British Heart Foundation
British Red Cross
Resuscitation Council UK
St John Ambulance
Paper for the Department for Education to explain the position of the British Red Cross (BRC), St John Ambulance (SJA), the British Heart Foundation (BHF) and Resuscitation Council UK on automatic external defibrillator (AEDs, or simply ‘defibrillators’) placement in schools

Introduction

A cardiac arrest is a medical emergency, occurring when someone’s heart stops pumping blood around the body, they stop breathing and lose consciousness. It is estimated that there are around 60,000 out-of-hospital cardiac arrests in the UK each year. Of these, around 30,000 are discovered in time to help save the victim’s life by another person.

Sadly many lives are lost because the person who witnessed the event or discovered the victim (often referred to as bystanders) didn’t act quickly enough or simply didn’t know what to do. But there is hope – it’s easy to learn how to save a life. Simply calling 999 and performing cardiopulmonary resuscitation (CPR) are key initial parts of the chain of survival below, which can make a difference between life and death:

The third part of the chain is early defibrillation, which means delivering a controlled electric shock to the heart muscle using a public access defibrillator. Advances in technology mean that defibrillators are now available for use by lay members of the public. This type of portable lightweight defibrillator is called an automated external defibrillator (AED). A member of the public does not need to be trained to use an AED as from the moment an AED is switched on the user is given exact instructions by the machine on what to do next. The use of an electric shock is fully automated. The shock is only administered if the AED has identified a life-threatening heart rhythm which requires treatment with an electric shock. The user cannot do any harm with the AED.

The fourth part of the chain of survival is dependent on expert medical help so the sooner the bystanders call 999 the sooner the cardiac arrest victim reaches hospital. All four elements of the chain of survival are crucial and lives depend on each activity being carried
out as quickly as possible.

**Benefits analysis**

- Statistical evidence from the ambulance service

The graph below is taken from the London Ambulance Service NHS Trust’s Cardiac Arrest Annual Report: 2012/13. The full copy of the report accompanies this paper. Whilst the vast majority of the most at-risk groups tend to be adults, it clearly shows that incidences of cardiac arrest occur in children of school age.

![Graph showing patient demographics](image)

3.1. Patient Demographics

The majority of patients in the presumed cardiac group were male (62.1%), with an average age of 66 years compared to females who had an average age of 71.

The table below is an incident log from the South East Coast Ambulance Service NHS Foundation Trust. It is a record of the number of times that an ambulance has been called to a School building for cardiac or respiratory problems in the last year (April 2012 – March 2013).

South East Coast Ambulance Service NHS Foundation Trust covers a geographical area of 3,600 square miles (Brighton & Hove, East Sussex, West Sussex, Kent, Surrey, and North East Hampshire). There are a total of eleven Ambulance Trusts in England.

This is only for Ambulance calls where a school is referenced in the address – this would not include calls in surrounding streets that could potentially access a school’s defibrillator.

<table>
<thead>
<tr>
<th>Incident No</th>
<th>Date/Time</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>21007583</td>
<td>14/04/2012 08:42</td>
<td>On Pathway From Norton Knatchbull School, Gordon Close, Ashford</td>
</tr>
<tr>
<td>21028193</td>
<td>24/04/2012 11:33</td>
<td>Angley School, Angley Road, Cranbrook</td>
</tr>
<tr>
<td>21180476</td>
<td>04/07/2012 14:31</td>
<td>Sevenoaks School 4 High Street, High Street, Sevenoaks</td>
</tr>
<tr>
<td>21200520</td>
<td>14/07/2012 08:16</td>
<td>Chailey Heritage School, Haywards Heath Road, North Chailey_Lewes</td>
</tr>
</tbody>
</table>
Anecdotal cases studies

Information provided by Sudden Arrhythmic Death Syndrome (SADS) UK about incidences where pupils have died from a cardiac arrest in schools show that many occur outside of the school building itself and are sports related.

- Oliver King, 12, collapsed during a sports lesson at King David High School in Liverpool
- Ciaran Geddes, seven, died after playing with football on school field
- 7 year old Benjamin died playing football at school, Kent
- Lily Webster 15, died in school PE lesson, Stowmarket
- Billericay Schoolgirl, Leonie Nice 12, killed after being struck in the chest by a rugby ball
- Luke Chapman 15 died after collapsing on field during school rugby match, Kidderminster
- Nicky Paine, 15, died during game of rounders at Angley School, Kent
- Sixth former Ibrahim Bash Taqi 17yrs old died during basketball practice

This is important to note when planning the chain of survival strategy for schools that we are recommending should accompany the placement of the AED. Training teachers and students in CPR is a ‘portable’ skill which goes where they go - including the playing fields and swimming pools. There is evidence from medical research that a defibrillator is less likely to be effective if it CPR has not been carried out before it arrives.

It also highlights the need to carefully consider the location of an AED within school grounds, as instances of cardiac arrest in young people can often be triggered by physical activity. Therefore the location of the AED should not impede access to it during an emergency.

Additional case studies below provided by SADS UK highlight the benefit of bystanders starting the chain of survival before the emergency services arrive.
Surviving cardiac arrest because a school AED was on the scene within minutes

A teenager whose heart stopped while he was playing football is helping to raise awareness of heart health during the ambulance service’s Heart Takeover week. Rahul Patel, 16, from Luton, had a cardiac arrest at Lea Manor High School in last year.

George Turner was the first paramedic on scene from the East of England Ambulance Service NHS Trust (EEAST). He said: “Everyone was doing a fantastic job when we arrived. They did everything they could have done including CPR and administering a shock from a defibrillator – which they’d had installed just two weeks before. If it wasn’t for them Rahul probably wouldn’t have survived.

“Once we arrived we had to administer three further shocks with our defibrillator as his heart kept stopping, and as we rushed him to hospital we didn’t know if he would pull through.”

Schoolgirl, 17, collapsed following a cardiac arrest – an AED was used to save her

Tabatha McElligott, then 17, was caught by a teacher after sneaking out of school with friends to buy chocolate. Her fear triggered an undiagnosed rare heart condition.

Teachers dialled 999 and carried out CPR until an emergency first aider arrived at Westcliff High School for Girls in Essex within three minutes.

He was able to restart her heart in the playground with a defibrillator before an ambulance arrived. Doctors discovered that Miss McElligott, from Leigh-on-Sea, was born with ‘anomalous left coronary artery from the pulmonary artery’, which could have killed her at any time. The congenital condition causes her body to pump blood around her heart the wrong way.

- Wider benefits for the community.

As we have already seen, the incidence of cardiac arrest amongst school age children incidence is relatively low. It is vital, therefore, that schools place AEDs where they can be easily accessed by members of the public at any time of the day or night (as we have seen from the South East Coast Ambulance service, some of the calls occurred outside school hours). Placing the defibrillator where it is accessible means that it can be deployed in instances of cardiac arrest near the school grounds, helping improve outcomes from cardiac arrests in the wider community.

Placing an AED must be accompanied by efforts to help maximise the chances it will be used in an emergency. Research by Professor Charles Deakin published last month examined responses to out-of-hospital cardiac arrests in Hampshire. The paper highlighted that in areas where AEDs are placed there can still be a lack of bystander willingness to use an AED in an emergency situation – which the authors speculated could be down to poor ‘visibility’ or accessibility of the AED, mistaken concerns over legal liabilities and poor levels of community knowledge about AEDs. It is therefore essential to improve education of AED use to minimise reluctance of their use when placed. The relevant papers are included and should be read alongside this.
As discussed throughout this paper all four parts of the chain of survival are crucial. If education is available in all the elements of the chain of survival school staff and pupils could, as well as telling others there is a defibrillator located at their school, be encouraged to promote the chain of survival in their own homes and the wider community. Therefore an approach which includes both training students and teachers in CPR as well as placing an AED on the grounds would help improve survival rates from out of hospital cardiac arrests in the community.

School investment in the chain of survival is also an important and positive step towards growing the resilience of that school and its community. It is a hook for local media coverage of the importance of and potential for effective bystander intervention in medical emergencies and provides an obvious opportunity for schools to develop their own education programmes around first aid and public health. Evidence shows that primary school aged children can effectively learn first aid interventions which could save lives. This type of public health education is particularly important at this time of increasing pressure on emergency services and the placement of defibrillators in schools will be a practical and tangible contribution to the current crisis.

It is important that schools speak to the local NHS ambulance service before placing an AED to ensure the model chosen is supported by them. The local ambulance service will also register the AED the school has chosen on their system so that they can remind callers within or near the school building that there is an AED there. The 999 operators are trained to support the bystander throughout the rescue.

**Myths and facts**

**The AED alone save lives**

As highlighted above, AEDs form a key third stage of the chain of survival. In order to effectively save a life, all four links in the chain need to be deployed. AEDs treat cardiac arrest victims where the rhythm can be treated with an electric shock (ventricular fibrillation or pulseless ventricular tachycardia). In some cases the disturbance to the heart rhythm will not respond to an electric shock (this is known as asystole) and CPR until the emergency services arrive is absolutely vital if that person’s life is to be saved.

**You need to be comprehensively trained to use the machine**

There are many circumstances where people have used AEDs successfully and saved lives without previous training. We would, however, make the point that people who have had training are more confident in using the machines and more likely to step forward to use them should the need arise. A school community provides the ideal situation to provide that training and confidence.

**Using the machine on someone who does not need a shock could kill**

Modern AEDs are very reliable and will not allow a shock to be given unless it is needed. The software in them is incredibly accurate at analysing heart rhythms. They are also designed to be safe and present minimal risk of a rescuer receiving a shock.

**You could be sued for incorrectly using the machine**

In English law, for someone to be held liable it would have to be shown that the intervention
had left the victim in a worse situation than if there had been no intervention. This would not be the case in a situation where an AED would provide a shock, because the person who had had the cardiac arrest would be technically dead. There is no case in England where action has successfully been taken against someone who rendered first aid to someone.

**The machines need regular maintenance or they won’t be useful**

Most AEDs currently offered for sale have a minimum life expectancy of ten years. The batteries and pads have a long shelf life, allowing the AED to be left unattended for long intervals. They regularly test themselves without intervention ensuring that they are constantly ready for use.

**The machines will be stolen**

Evidence from London Ambulance Service is that very few machines are stolen (one or two per year). The cost of replacing those machines that were stolen is less than it would have been to lock them up.

**Views on implementation**

In our view, there are a number of ways the Department for Education could implement a policy to strengthen the chain of survival. Given the wish not to over-burden schools, a minimal option is possible, although we take the view that there are considerable benefits from schools taking a more proactive approach.

- **Do nothing**
  
  This should be rejected. This is a low cost intervention with the potential for a high return on investment.

- **CPR training only**

  Training teachers and students to deliver CPR training would help protect at risk teachers and students during school hours, it would also be of benefit to the wider community and can be delivered in as little as 30 minutes.

- **CPR training and AEDs**

  Doing both will support bystanders in starting the chain of survival before the emergency services arrive. If this option is chosen then we recommend the AED should be located where the public can access. Schools must register their AED with the local Ambulance Trust.

- **AED and AED awareness**

  We know that you do not need to be trained to use an AED but awareness is required to give people the confidence to use them. This option would ensure that staff and pupils are aware of the AEDs location and of how it can help – further maximising the chances of it being successfully used. As we have seen from the Deakin paper (in the *Wider benefits to the community* section), placing an AED in a location alone does not guarantee its use – it is vital that people are aware of its presence. This additional awareness could be added to the training of the school’s workplace first aiders, and undertaken during a school assembly.

- **AED and AED awareness and training**
This further increases the likelihood that an AED will be successfully used should the need arise. Sessions can be provided to all pupils at a suitable point during the school timetable (e.g. PE lessons). It takes only a few minutes for each pupil to have hands-on experience of an AED, which will help remove any unwillingness to act.

- **AED, CPR training and AED awareness**

As per the chain of survival, to ensure the maximum number of lives are saved as a result of defibrillators being placed in schools it is highly recommended that, as well as AED awareness, teachers and pupils are trained in calling for help and CPR. This will maximise the chances of a positive outcome, and also maximise the impact of AED installation. By including first aid techniques, pupils will even be able to act in a wider range of situations, including at home and in their communities.

- **Community access**

We strongly recommend that wherever possible the AED should be situated where it can be accessed by the wider community. (It follows that the location should be widely known within the community.) This will enable the highest return of investment for the placement of an AED in a school and contribute to wider healthcare outcomes. It will also reinforce the position of the school as the centre of its community.

We have included the following papers, which provide information in addition to this section:


**Costings and recommended suppliers**

The different organisations that have contributed to this brief have a wide number of partners, including but not limited to:

- Cardiac Science
- Philips
- Physio Control
- WEL Medical
- Zoll.
The market would be able to withstand an increase in demand from schools. We recommend that schools group together to place joint orders to reduce the unit price. Schools should also liaise with their local ambulance service, as different ambulance services favour different suppliers, and there is an advantage in using the same machines.

The list price for an AED starts at around £995 but bulk buying can reduce this by up to 20%. Most suppliers will also offer introductory or further training.

The cost and range of accessories varies by model. For example, a set of pads can cost around £20. A metal cabinet for wall mounting is available for some models, costing between £200 and £400.

**Reaction from Schools**

SADS UK has had a positive response from schools that have put defibrillators and training in place. One of the main comments received is that they are amazed at how easy the defibrillator is to use and staff are pleased that they can also apply their training to help save a life in the community if it’s ever needed.

Below is an email from Helena Romanes School in Essex, providing feedback on the AED training they received. The feedback highlights how pleased the school were to have the defibrillator donated and to undertake the training.

“**We had our training today with a lovely, friendly paramedic lady - Lyndsay - she was fantastic and if possible I would like you very much to pass on to her superior how fabulous she was. The training was fun but informative and she made us feel very at ease with the equipment. We all feel very confident in using our AED now.”**

SADS UK has also worked with Cheshire West and Cheshire Council to put 21 defibrillators in place in Ellesmere Port.

This photo (right) shows a number of representatives from different schools across Cheshire West coming to receive the defibrillator for their school.

**Lives of teachers saved**

SADS UK donated a defibrillator to Methwold High School in Norfolk. The week after its installation, 36 year old teacher John Scarisbrick went into cardiac arrest. The ambulance didn’t reach him for quite some time as although two ambulances were despatched, there was an accident on the main road preventing them from getting to the scene. The paramedics remarked what a lucky man John was, as without the teachers using CPR and applying the defibrillator they didn’t believe he would be with us today.

Similarly, at Francis Combe Academy in Watford in 2010, a teacher survived a cardiac arrest after staff acted quickly. The defibrillator had been installed following the death of a former
pupil, and staff at the school were able to use it to restart the heart and save the life of 60 year old teacher Anthony Taylor.

**Schools contacting the charity**

Apart from the above, SADS UK has had a very positive response to their Big Shock Campaign publicity to put defibrillators into schools. Their database shows that in the last three years the charity has been contacted by over 100 schools asking SADS UK to help them put a defibrillator on their premises to safeguard pupils and personnel.

Over the past year SADS UK has placed more defibrillators in schools than in any other year and has been contacted by an increased number of schools requesting more information about putting a defibrillator in place.

“We are delighted to have been able to work with SADS UK to raise funds to have a defibrillator placed within the school.

“As a village school this will not only provide peace of mind for our staff and pupils but for the community as a whole.

“You never know who or when someone will benefit from its placement here. I hope we never have to use it – but we will be glad to know it’s here – just in case!”

**Matt O’Grady, Headteacher, West Horndon Primary School**

Further information can be found at [www.sadsuk.org](http://www.sadsuk.org)

**Who provides the training, how long is it and how much does it cost?**

You do not need training to use a defibrillator because they are fully automated and when you open the case they talk you through the process.

The Defibrillator will not deliver a shock unless it reads that the heart rhythm requires one. While you do not need training it is beneficial for people to have training that familiarises them with the equipment and the steps in the Chain of Survival that lead to a successful resuscitation. This includes calling 999 and performing CPR.

There are many ways to learn how to use defibrillators ranging from free courses in the community to in-depth training.

Options for training include:

1) face-to-face courses
2) online e-learning & DVD based courses
3) blended learning including both of the above
The British Heart Foundation, St John Ambulance and British Red Cross all provide training on how to use defibrillators both as part of broader first aid and emergency life support skills training and as stand-alone training. Our organisations would all contribute to a shared aim of ensuring that schools with defibrillators were confident in how and when to use them, clear about who is able to use them, and provide ongoing support to schools in building their resilience to medical emergencies. There are, of course, also many other providers offering a range of flexible and varied training.

**Defibrillators in locked or coded cabinets**

The most important consideration is that those who might need to use an AED know where it is kept and how to access it quickly. No barrier should be put in the way of anyone collecting it when it is needed; it should not be locked away and inaccessible.

There is understandable concern that an AED in a public place may be at risk of theft or vandalism. Where there is a definite high risk that an AED may be stolen or damaged, any arrangements to protect it will almost certainly create delays in getting it to the person who is in immediate need of it. On the other hand an AED that has been stolen or damaged will be of no use to anyone. Our general advice is that AEDs should not be kept locked, but if the risk of theft or vandalism is considered significant, any protective measures must be accompanied by a reliable arrangement to minimize the delay in obtaining access when it is needed.

Most AEDs located in public places are kept in protective cabinets; the standard sign for an AED should be used to show where it is stored. Various types of cabinet are available offering different levels of security and weather-proofing. With many, the door is alarmed so that when the AED is removed an alarm is activated, but local circumstances will determine the need for this feature.

In the workplace, it is vital that all employees know that there is an AED present, where it is, and what it is for. Installing the standard sign for an AED nearby will help. Equally important is that everyone knows exactly what they should do to raise the alarm in the event of accident or sudden illness. Organisations with AEDs should consider having a formal policy to facilitate this.

AEDs should be located as close as possible to their most likely place of use. This will usually be determined by the layout of the building or venue and by the number of people at potential risk in each place. Security considerations may play an additional role. During the early implementation of the National Defibrillator Programme it was decided to place AEDs no further than two-minutes brisk walk from the places that they were likely to be used, and this precedent could act as a practical guide.

It is recommended that the local ambulance service is made aware that an AED is available at a particular location and whether it can be accessed at all times or only (for example) during office hours; this information can help ambulance call-takers guide those initiating a resuscitation attempt.

**Contact list with areas of expertise**

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1 This is taken from chapter 12 of ‘A guide to AEDs’ produced in December 2013 by Resuscitation Council UK and the British Heart Foundation
- Dr Andy Lockey, Honorary Secretary RC(UK) and Consultant in Emergency Medicine andrew.lockey@cht.nhs.uk
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