The Occupational Health Advisory Group for the Electricity Industry (OHAG) is an independent body of senior occupational physicians. They all have a professional role to provide advice to individual companies in the electricity industry and they meet together three times a year to discuss matters of common interest and to promote good practice in occupational health across the industry. The main route for doing this is by the preparation of guidance notes on topics of interest to the industry. The remit of OHAG and its guidance covers all aspect of the industry from generation, through transmission and distribution to retail and supply.

Until now the promulgation of this OHAG guidance has largely been by means of paper copies of the documents circulating within individual companies in the electricity industry. OHAG recognises that there is a need to make these papers more widely available and is grateful for the support provided by the Energy Networks Association (ENA) in hosting these documents on their website, and the links to them from the websites of the Association of Electricity Producers (AEP) and the Energy Retail Association (ERA).

The guidance notes will be of interest to managers, employees and occupational health professionals within the industry. They give general advice which has to be interpreted in the light of local circumstances. Health professionals using the guidance, retain an individual responsibility to act in accordance with appropriate professional standards and ethics. This guidance is offered in good faith and neither the individual members of OHAG, the companies they support, the ENA, AEP or the ERA can accept any liability for actions taken as a result of using the guidance.
Automated External Defibrillators (AEDs)

1. Introduction

Ischaemic heart disease continues to be a significant public health concern and Sudden Cardiac Death (SCD) is responsible for some 12,000 deaths per year in the UK: a prevalence of about 2 per 1000 population\(^1\).

Most cases of sudden cardiac arrest (SCA) are due to a ventricular tachyarrythmia (rapid, abnormal heart contractions), usually ventricular fibrillation (VF), on a background of ischaemic heart disease\(^2\). Thus it is uncommon in males below the age of 55 years and females below the age of 65 years. There is a brief window during which VF can be treated definitively and effectively by defibrillation; otherwise VF typically degenerates into asystole (no heart activity), which is generally fatal. The duration of VF can be prolonged by basic cardiopulmonary resuscitation (CPR), which functions as a bridge until defibrillation is available\(^3\).

Fundamentally survival following SCA depends upon three interventions;

i. Initiation of basic life support cardio-pulmonary resuscitation (CPR)
ii. Defibrillation
iii. Advanced cardiac life support (ACLS) drug intervention

If all three are immediately available – a best case scenario – survival can be 67%. Delay reduces this percentage very rapidly. Each minute delay reduces survival by 5% to 10\(^4\).\(^5\). Whilst there may some variation in the time/survival equation, the sooner VF is treated, the more likely a positive outcome. With increasing awareness and workforce expectations and reducing costs of AEDs, companies may wish to consider whether they should be provided in the workplace.

2. Aims of this Document

The aims of this document are:

- To summarise the evidence of effectiveness of AEDS.
- To give guidance on the provision of AEDS in electricity company workplaces.

3. Relevant Legislation

- The Health & Safety (First Aid) Regulations 1981
4. Relevant Guidance


5. The provision of AEDs

a. Guidelines

A consensus view has developed that AEDs should be considered in sites with large concentrations of persons >50 years of age, or where >10 000 people gather. Analysis of likely benefits supports provision when:

- The site specific incidence of SCA is such that there is a reasonable probability of the use of a defibrillator within 2 years (based on an estimated event rate of one SCA per 1000 person-years; i.e. sites of 500 people or more)
- The time from call out of the conventional ambulance service to delivery of defibrillation cannot reliably be achieved within 5 minutes, and
- When the defibrillator can be delivered to the patient within 5 minutes (in >90% of cases) by training and equipping lay persons to function as first responders, recognise cardiac arrest, telephone 999, initiate cardio-pulmonary resuscitation and attach and operate an AED

To be effective, systems must be in place to ensure defibrillation can be provided as soon as possible. The programme includes:

- recognition of SCA
- communications to call for help
- availability of trained first aiders and
- coordination with local emergency services and a rapidly available ambulance service to provide subsequent advanced life support during transfer to a coronary care unit

b. Public Access AEDs

The Department of Health instituted the UK National Defibrillator Programme in Feb 2000. The most recent update (8 Feb 2007) states that nearly 700 defibrillators have been placed in 110 sites across England and Wales. An analysis of the first 250 uses in the period 2000-2005 showed that 146 of these instances were confirmed as SCA. Overall survival was 25% - better than conventional systems – and over half the cases occurred in airports. A Scottish Ambulance Service study found only a marginal improvement on survival (5% to 6.5%), others suggest ‘dramatic’ changes. Both the Chicago HeartSave programme and the North America Public Access Defibrillation trial reported positive but modest results. A further study
from the Scottish Ambulance Service concluded that the marginal improvement in survival did probably not justify wider public access\textsuperscript{12}. Interestingly, during the time in which AED programmes have been initiated and evaluated, the incidence of out of hospital SCA seems to be decreasing, perhaps reflecting an improvement in population risk factors for ischaemic heart disease\textsuperscript{13}.

A substantial recent analysis of a large number of SCD revealed that 72\% occurred at home\textsuperscript{14}. A majority (66\%) had documented or suspected cardiac disease. The term ‘sudden’ was misleading; most patients had symptoms, often up to one hour prior to collapse. It may actually be that the principle behind public access defibrillation, whereby SCD occurs unexpectedly and randomly, is open to question.

c. AEDs at the workplace

The Resuscitation Council (UK) have summarised their views on the responsibility of organisations to provide a defibrillator\textsuperscript{15}. There is no statutory legal requirement to do so. Liability might potentially arise under common law for failure to take adequate safeguards to protect the workforce or public at a facility, but normal first aid provision under the relevant regulations does not include AEDs\textsuperscript{16}. The likelihood of an employee suffering from SCA at any given facility and therefore being in a position to benefit from AED provision can reasonably be balanced against the cost of purchase, installation, and maintenance of the device and of initial and ongoing training of staff to use the devices.

An objective analysis of cost against benefit indicates that provision is only worthwhile where the likelihood of SCA is relatively high and advanced support may be only available after considerable delay. Given that workers are in general fit and well (by dint of the fact that they are at work) and many will be below the crucial risk threshold for males (55 yrs; above which age 96\% of cardiac events and strokes occur\textsuperscript{17}), the likelihood of an SCA occurring at the workplace will be low.

However AEDs are now cheap and safe, and the cost probably low enough to be insignificant to a large business. First aiders’ expectations are raised during their training/refresher training, and they may feel unsupported in that role if AEDs are not provided. Should an SCA occur at work, first aiders and the workforce more broadly may consider that the business has fallen short in it’s duty, if death results and there is a perception that more could have been done. Indeed US experience is that numerous lawsuits are pending against many bodies, including employers, for failure to provide AEDs\textsuperscript{18}.

A recent specific review emphasized the importance of a complete programme to support defibrillators, if the decision is that they be provided at the workplace. The same review concluded that cost effectiveness depends upon a number of factors.
and given the relative rarity of the occurrence of SCA the decision to provide must be weighed against other occupational health provision. Further, the issue of who should fund such provision – state or employer – ‘remains unresolved’.

**d. Training**

Although several of the public access programmes mentioned use untrained bystanders to administer defibrillation, in the workplace we would expect trained first aiders to respond. Such training would normally be included in routine first aid training, but as a stand alone constitutes 4 hours of basic life support including AED use, followed by a 2 hour refresher every 6 months. Some recent evidence suggests that brief (30 minute) training courses are just as effective.

**e. Costs**

Technology continues to evolve and competition is also driving reduction in cost. An AED is now available for approximately £1000. Cost must be added for consumables, maintenance, supervision and training. However provision is increasingly supported by local or national interest groups.

**6. Recommendations**

AED provision does not in any way reduce the need to pursue primary disease prevention programmes in the form of lifestyle based physical well-being activities focussing on heart disease prevention including diet, exercise, cholesterol and smoking.

The evidence supporting the effectiveness of AEDs is becoming more persuasive, although it must be emphasized that they form only one part of a resuscitation programme. However other, very relevant, considerations may encourage employers to provide AEDs.

**7. Summary**

The issue of whether AEDS should be provided at the workplace is not as straightforward as it might appear. The problem of sudden cardiac arrest is undoubtedly substantial, but the risk in a working population is less than the population generally. AEDS form only part of a resuscitation programme and should not be provided in isolation.

The evidence of effectiveness continues to develop, as indeed does the design of the machines themselves. Employers will need to balance all these factors in making their decision whether to introduce AEDs.
8. References & Sources of Further Information

1. Lang E S, Rais, M A. Ventricular tachyarythmias (out of hospital cardiac arrests) BMJ Clinical Evidence 1 Jul 2006


