AUTOMATED EXTERNAL DEFIBRILLATORS

Background

1. A question has arisen about the use of automated external defibrillators (AEDs) in Stockton Borough and whether their use should be supported, specifically availability in the High Street. This briefing paper looks in outline at some of the available guidance, evidence and issues to consider.

2. AEDs are used to treat sudden cardiac arrest. An AED is a portable device that checks the heart rhythm and can send an electric shock to the heart to try to restore a normal rhythm. They are reported as being easy to use, compact, portable and effective. They are designed to be used by lay persons and the machine guides the operator through the process by verbal instructions and visual prompts. They are safe and will not allow a shock to be given unless the heart's rhythm requires it.

Current availability of AEDs locally

3. It is believed that these devices are currently available across most Tees Active sites in the Borough. These include the Forum, Splash, Thornaby Pavilion and Thornaby Pool. These are static devices for use within the premises and are not available to the general public external to the buildings. A core of staff has been trained in their use. In common with many other parts of the country, there are also facilities available on an ad hoc basis in several schools across the Borough and one in Billingham Town Centre. These are often provided for by charitable organisations or financed through fund raising or donation on an individual basis.

Out of Hospital Cardiac Arrest

4. Approximately 80% of out of hospital cardiac arrests (OHCAs) occur in the home and only 20% in public places. Emergency services in England respond to around 60,000 OHCAs per year with resuscitation attempted in around 28,000. The average overall survival to hospital discharge in those with attempted resuscitation is 8.6% - therefore it is clear to see that OHCA is a very serious event with generally poor outcomes.

5. Improving survival from an OHCA is evidenced to depend on a series of four interventions, often referred to as the Chain of Survival:

   - Early recognition and call for help
   - Early Cardio-Pulmonary Resuscitation (CPR)
   - Early Defibrillation
   - Post Resuscitation Care

6. These are four key, inter-related steps, which if delivered effectively and in sequence, optimise survival from OHCA. The current rate of initial bystander CPR in England is reported as being 43%. There is limited data on the current rate of bystander defibrillation with a public access defibrillator following an OHCA. However, one study reported this to be 1.74% and so it is clear the use of AEDs by the public is not widespread and many are reluctant to use these even where available. Early defibrillation (if a shockable rhythm is present) is crucial. Survival falls by 7-10% per

minute until defibrillation is applied for a witnessed cardiac arrest if no CPR is given and by 3-4% per minute if bystander CPR is administered. It is clear therefore that all the steps in the chain are important.

7. Defibrillation within 3-5 minutes of collapse can produce improved outcomes. A national report on AED use by the Resuscitation Council UK has shown that of 3485 resuscitation attempts, return of spontaneous circulation was achieved in 593 cases (17%). By far the greatest proportion of these came in patients with a shockable rhythm (around 43% achieved return of cardiac output). Note that the outcome here was return of cardiac output at the scene of the event. This is not the same as ultimate survival and although no figures were available for this in the report, it is likely this will be lower as a number of patients will still die later, despite initial return of cardiac output at the scene.

8. Results were noted to be maximised when the AED was immediately available as a part of a clear on-site strategy than when it had to be transported to the patient and so placement of any AED is crucial. Return of cardiac output was best associated with a witnessed arrest, early CPR by bystanders and the presence of a shockable rhythm which was defibrillated quickly i.e. not just by presence of an AED alone.

9. As the Chain of Survival illustrates, a person is therefore most likely to survive an OHCA in the following circumstances:

• Their cardiac arrest is either witnessed by a bystander or the victim is discovered immediately after collapsing.

• The bystander calls 999 immediately.

• The bystander delivers effective CPR without delay.

• The cause of the cardiac arrest is a sudden disturbance of heart rhythm, which may be caused by a heart attack or may be due to another heart condition, sometimes an inherited heart condition.

• The cardiac arrest is due to a 'shockable' rhythm disturbance (ventricular fibrillation or ventricular tachycardia).

• There is an AED close by which another bystander can fetch.

• The bystanders use the AED without delay.

• The emergency services arrive very quickly (within minutes of being called).

<u>AED programmes and placement</u>

10. The Resuscitation Council (UK) recommends that defibrillators are available in places where there are large numbers of people (e.g. railway stations, airports, sports stadiums, some shopping centres) and where there is an increased risk of cardiac arrest (e.g. sports and gym facilities). They therefore recommend that public access AED programmes should be considered in public places with high density

and movement of people, where cardiac arrests are frequently witnessed and trained CPR providers can quickly be on scene.

11. Review evidence suggests that when AEDs are placed in public areas with large numbers of both victims and resuscitators, they are able to increase the yield of survival of OHCA. This can be limited however by the fact that bystanders used AEDs in only a small percentage of OHCAs. AEDs are cost effective only when used in situations where a reasonable number of cardiac arrests are expected to occur, the arrests are likely to be witnessed and an AED is closely available to permit defibrillation within minutes.

12. AEDs are likely to have minimal impact when placed widely in the community as many of the crucial factors above cannot be met and most public places are very unlikely to witness many cardiac arrest events.

13. In general, the more likely it is that an AED will be used, the more worthwhile it is to provide it. To put this in context, one study has estimated that any location that has over 1000 adults over the age of 35 present per day during normal business hours (7.5 hours/day, 5 days per week, 250 days per year) can expect one incident of sudden cardiac arrest every five years. Therefore it is clear that unless the area is frequented by large numbers of people, any incidents are likely to be very rare indeed.

14. Unfortunately there are no generally agreed criteria on which to base definitive advice on whether or not to provide an AED in any specific place but consideration of the following points should help a decision to be made:

• Cardiac arrest affects predominantly middle-aged and older people (more men than women). Although some younger people (including athletes and elite sportspeople) suffer cardiac arrest or sudden cardiac death, this is much less common but may attract understandable public attention.

• People with underlying heart disease (particularly ischaemic heart disease, in which the coronary arteries are narrowed) are particularly vulnerable.

• The greater the number of people present in, or passing through, any one place the greater the risk of cardiac arrest occurring there.

• Cardiac arrest often occurs during exertion. The stress of travel is also a recognised precipitant but in many other cases there is no recognised trigger.

• The purpose of installing an AED is to deliver a shock as soon as possible after cardiac arrest - if possible within five minutes at the most. Delays in fetching the AED or obtaining a code to unlock a cabinet may reduce the chance of success.

• Although untrained members of the public have used AEDs successfully to save life, the great majority of successful AED use has been by trained people (albeit people with modest training) who were nearby. It is essential to have people on site who are willing to be trained to use the AED.

• The ability to perform CPR is a vital skill.

15. An on-site strategy is most effective at sites where there is an appreciable risk of cardiac arrest occurring. However, this is heavy on resources, often with a need for multiple AEDs in a large site with a commitment to train staff on an ongoing basis. Therefore AED placement is only of use if it is nearby and can be used quickly. This is not cost effective if it is a low risk site. Any decision on potential use, placement and training should be discussed in conjunction with the local ambulance service at an early stage.

16. When implementing any AED programme, community and programme leaders should consider factors such as the development of a team with responsibility for monitoring and maintain the devices, training and retraining individuals who are likely to use the AED and identify a group of volunteers who are committed to using the AED in victims of cardiac arrest.

Summary

17 Any consideration of placement of an AED in the community should be based on a number of factors as outlined above including how busy any given location is and the nature of the activities there (i.e. likelihood of an actual cardiac event occurring), the need for training and maintenance of devices, the accessibility of any AED advice and the associated level of training of CPR skills.

18. Should an AED placement be considered feasible and desirable once all of these are taken into account, discussion of the proposal should take place with the local ambulance service to scope the idea and get input into advice and training. It would also be important for them to record the location of any device.

19. It should be noted that OHCA is a serious occurrence and outcomes are often poor, even with maximal treatment. However, optimal use of an AED with all other factors within the Chain of Survival accounted for can help to improve this to some degree. This optimal use can be difficult to achieve for the reasons outlined. Nevertheless, relevant targeted use in a well-run and maintained programme with appropriate awareness and training may benefit a small number of individuals over time.

20. However, given the factors outlined in this paper, it is unlikely that widespread AED use is suitable or cost effective for Stockton Borough and compared to other public health initiatives is unlikely to have a major impact on overall health outcomes.

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Sources of information

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