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<tr><td>Out of Hospital Cardiac Arrest (OHCA)</td><td>
‘A cardiac arrest happens when your heart stops pumping blood around your body.
If someone has suddenly collapsed, is not breathing normally and is unresponsive, they are in cardiac arrest.
There is no time to lose. Even if you are untrained your actions can help. (British Heart Foundation).

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

Cardiac arrest predominantly affects middle aged and older people, but some younger people including athletes up to the elite level suffer cardiac arrest/sudden cardiac death. There is often no recognised trigger for individual cases, but it often occurs during exertion.

Patients with pre-existing heart disease are most likely to experience sudden cardiac arrest.
Other causes include lack of oxygen, electrocution, and cocaine use.

Cardiovascular disease is caused by a combination of risk factors:

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<tr><th>Non modifiable risk factors</th><th>Modifiable risk factors</th><th>Conditions</th></tr>
<tr><td>Increasing age</td><td>Smoking</td><td>Diabetes</td></tr>
<tr><td>Gender - male</td><td>Overweight and obesity</td><td>High blood pressure</td></tr>
<tr><td>Family history of CVD</td><td>Diet</td><td>High blood cholesterol</td></tr>
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Using national data, it would be expected that 200 out-of hospital cardiac arrests will occur each year in Stockton Borough, and attempts would be made to provide resuscitation in 92 cases (46%). Of the total number of 200, 40 (20%) occur in a public place. Overall, 17 people (8.6%) would currently be expected to survive.
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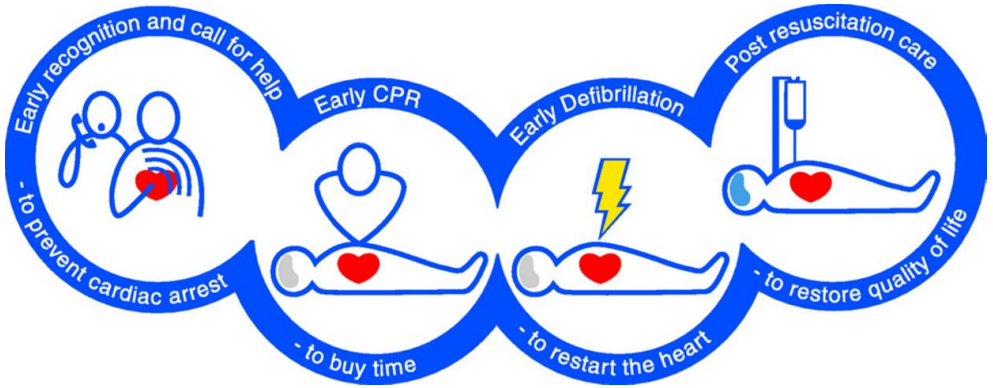
	Research suggests that the survival rate is lower than what has been achieved in other well-developed countries. Studies have identified survival rates of 20% in Seattle, 21% in the North Holland region, and 25% in Norway. An important factor in these studies was the higher level of CPR training in the populations covered.
Treatment and First Response	It is critical to recognise that early use of a defibrillator is part of a recognised 'chain of survival' when responding to cardiac arrest:  Countries with the most improved survival rates for cardiac arrest have made attempts to strengthen all four links in this chain. Every minute without CPR and defibrillation reduces chances of survival by 7 to 10%. NEAS noted that quality CPR and use of an AED doubles the chance of patient survival in cardiac arrest. CPR followed by defibrillation within 3-5 minutes is associated within improved outcomes. It is important to note that an ambulance, unless very close by, is unlikely to attend any incident within this timescale and so first aid prior to emergency service arrival is vital (the target response time to life-threatening incidents is 7 minutes under the new standards). For those who survive cardiac arrest, there will be a variety of outcomes, and the longer a person is in cardiac

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	arrest, the higher the risk of damage to the body, and the greater chance they will have long term care needs. In summary, the criteria for a successful outcome is as follows: - The cardiac arrest is witnessed or discovered immediately - 999 is called immediately - effective CPR is provided without delay - The cause is a sudden disturbance of heart rhythm - The heart is in a 'shockable' rhythm (the chance of this can be improved by immediate and effective CPR) - A defibrillator is close by - Use of defibrillator without delay - Emergency medical services arrive very quickly
- Bystander CPR and AED use	Research from the British Heart Foundation looked at all cardiac arrests attended by NEAS for the period January 2011 to December 2012. At the time this was the only detailed report on cardiac arrests, outside of London. Of the total number of incidents. 26% were witnessed (ie. seen or heard) by a bystander. Of these, CPR was provided by bystanders in 53% of cases (this was lower than the London figure of 65%). *[Updated information has been requested from NEAS]* An overall figure for the rate of bystander CPR in England has separately been given as 43%. The A and E Lead at North Tees Hospital stated that although he was not aware of cPAD use being recorded as a matter of course, he had never been told that a cPAD had been used on a patient attending North Tees. There are limited studies on the rate of OHCA treated with a public access AED. One study in the South of England put the rate at 1.74%. However this rate will of course be affected by the availability of an accessible AED at the time of the cardiac arrest. Other factors affecting the rate of bystander CPR and /or AED use include: - failure to recognise cardiac arrest - lack of knowledge as to what to do - fear of causing harm or being harmed - fear of being sued - lack of knowledge of the location of a public access AED.

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- Mythbusting	Mythbusting and awareness raising in relation to cardiac arrest and its treatment is therefore important. This includes CPR training and overcoming an unwillingness to assist. In relation to AEDs: - There are very few legal barriers to providing intervention in cardiac arrest, including using AEDs - Although deployment by trained first aiders would be the optimal scenario, AEDs are designed to be used by an untrained person (audible and visual instructions are used by AEDs to guide the user through the process), and have been used successfully in this way - AEDs are safe to use and will not cause further harm. Defibrillators are therefore an important contribution towards increasing survival rates if they can be deployed in a timely manner, in conjunction with CPR, but a number of factors need to be considered in their provision.
Other forms of response to OHCA	Another response to improving outcomes is the roll out of volunteer Community First Responders (CFRs) across the region. This is managed by the ambulance service. CFRs are equipped with a range of basic life-saving equipment including AEDs and oxygen, and are tasked with responding to emergency calls within their vicinity, in addition to an ambulance response. There are currently three CFRs in Stockton, and a recent recruitment drive in Tees has seen initial interest generated. A benefit of the programme is clearly the increase in the availability of AEDs within a given community, and CFRs are in some cases also able to provide source of training for local community groups. Additional coverage is provided by Cleveland Fire Brigade (CFB). All fire appliances carry AEDs and the crews are trained in their use. Since 2016 CFB have been providing a co-response with NEAS. This is not intended to replace ambulance attendance at potential/actual cardiac arrests as these will continue to attend incidents, but the scheme enables a faster attendance on the scene by an equipped, emergency response service than may otherwise have been the case. Since co-responding was introduced in the Stockton area, crews have been called out on 641 occasions. Defibrillators have been used twice by crews in Stockton District during 2017 (as of end of July). The Cleveland Fire Support Network charity delivers British Heart Foundation Heart Start training programmes. 17 sessions were delivered in Stockton in 2016-17 reaching 238 people, and 7 sessions for 69 people have been provided in 2017-18 to date.

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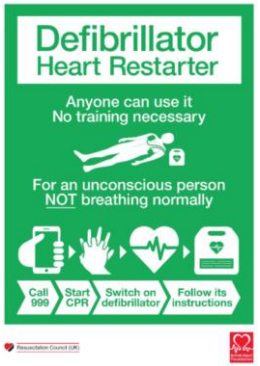
Role of defibrillators - Static AEDS	Example:   AEDs come in two main types: <u>Static AEDs</u> Some companies, clubs and public/community buildings such as schools and colleges have 'static' AEDs on site. These provide coverage for their staff, visitors and students. These are mainly available during operational opening hours only, with some staff trained to use them and be aware of their location. For example, all dentists are required to hold an AED on site. NEAS are not necessarily aware of all static AEDs located in the region. NEAS would find it beneficial for all static AEDs to be logged on their system. Although the Resuscitation Council outlined that schools are not recommended to provide AED unless there is a child or staff at higher risk, statutory guidance on supporting pupils at school with medical conditions recommends that schools consider purchasing an AED as part of their first aid equipment. The Department of Education has produced further guidance on AEDs for educational establishments. Incidence of OHCA in schools is tragic but thankfully very rare. However a recognised benefit of AEDs being located in schools is that it raises awareness amongst pupils and can improve the quality of first aid training that may be given for pupils and staff.

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- Community-public Accessible Defibrillators (cPADs)	A Private Member's Bill was introduced in the last Parliament to require the 'provision of defibrillators in education establishments, and in leisure, sports and certain other public facilities' as well as requiring training and funding. However that particular Bill will not be taken forward as it did not progress through the legislative stages before the June 2017 General Election was called. Organisations hosting static AEDs may wish to convert them into public accessible defibrillators where appropriate. The review to date has not identified any static AEDs in the main SBC office locations. Currently, individual workplace assessments govern whether or not an AED should be included within first aid equipment. Use of defibrillators was added to the curriculum of the Emergency First Aid, and First Aid at Work, courses and fresher from January 2017, in addition to the existing modules on CPR. Therefore over time all First Aid trained personnel should have an understanding of and an ability to safely deploy an AED in support of CPR where necessary. As provision of first aiders is managed locally within services, there is no central list of first aid/CPR trained members of staff for SBC. <u>Community-public Accessible Defibrillators (cPADs)</u> In the North East, AEDs that are available at any time to the public are generally referred to as cPADs. These are often provided through initiatives such as fund-raising by local parish councils. They are not normally provided by the NHS but close liaison with the ambulance service is essential. These are usually located in easily identifiable public locations, available 24/7, and are hosted in clearly visible cabinets. These are code-locked and only accessible after calling the Ambulance Service (which will have the CPAD registered on its system). At least one 'guardian' is needed and they are responsible for making periodic checks to ensure the CPAD is in working order. The Guide advises that defibrillators should not normally be in a locked container. However, North East Ambulance Service does not support this approach for public accessible AEDs and works to ensure that cPADs can only be unlocked once a 4 digit code has been provided by the Ambulance Control Room. This governance process is in place so that NEAS can be confident that when they direct a person to a CPAD, it will be stocked and ready to use. If a CPAD was used in an emergency, NEAS would then take it 'offline' until it had been confirmed as being restocked by the guardians. The system also prompts a 999 call to be made before any other action is taken, which is the first and crucial step in the chain of survival. Protection from vandalism is also a consideration, although recorded incidence of vandalism is relatively low.

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	If a call of cardiac arrest is received and it is identified as occurring within a 500m radius of a cPAD, the location of the cPAD will be flagged up to the operator in the control room. If only one person is in attendance at the scene they will be given instruction by telephone to carry out CPR until ambulance arrival. If two or more people are in attendance, they will be directed to the cPAD and provided with the code, and then directed to assist the first person. Once a cPAD is installed, there is usually some form of launch event, with NEAS able to provide an awareness session for local people and organisations in the immediate area. Training would be beneficial for staff and/or volunteers working and living in the vicinity.
Location of cPADs	To improve outcomes, the Resuscitation Council recommends that defibrillators are made available where there are large numbers of people (eg. busy railway stations and shopping centres), and where there is an increased risk of cardiac arrest (eg. gyms). Workplaces with staff at risk should also consider AEDs, and train staff to undertake CPR and use AEDs. Widespread roll-out across the community would be unlikely to have a major impact on outcomes given that cardiac arrest would be a rare event for most public locations. A number of factors would need to be considered before the location of a cPAD was determined. They have in many cases been installed in village locations, recognising the challenges that face emergency services when responding to more rural locations. In more urban areas, a key factor is the volume of people within a given area. One study has estimated any location that has over 1000 adults over the age of 35 present during normal business hours can expect one incident of sudden cardiac arrest every five years. This can be considered to be a useful guide to assist any decisions to locate a public access AED. Consideration of areas of potential risk including disease prevalence may also be a factor. To assist any future placement of AEDs, NEAS would be able to provide data on previous incidents and their severity.

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Cost and installation	A variety of AEDs are on the market. The one-off costs with purchasing individual AEDs are relatively low, although provision must also be made for ongoing maintenance which are generally minimal. As a general guide, an individual AED costs between £850-£1000 plus VAT. The pads used to attach the AED to the patient would need to be replaced after use at a cost of c.£30, otherwise their shelf life is up to 5 years. Batteries are also available with a shelf life of up to 5 years and a battery would cover many deployments before needing to be replaced in the interim (the eventual replacement cost is c. £200). In addition, a cPAD would require an externally mounted, secure cabinet (guide price £600), connected to an electricity supply in order to maintain temperature in the cabinet. Annual electricity costs are c£30. Actual costs would differ depending on the method of delivery. Community-led provision would for example have greater access to charitable funds (eg. British Heart Foundation), Local authorities are also able to purchase AEDs through NEPO, and educational establishments have access to the NHS Supply Chain.
Mapping of existing coverage in Stockton Borough	As of June, NEAS reported that there were 13 AEDs designated as cPADs in the CCG area (which includes Hartlepool). The majority of these were in Hartlepool Borough, but several cPADs have been identified in Stockton Borough as follows. Further developments were coming on stream and an up to date confirmed map of cPAD locations will be produced as part of the review. Information gathering to date has identified the following (nb. this is not intended to be exhaustive in relation to static AEDs) : <u>Town Centres and Communities</u> - Stockton Town Centre area is not covered by a cPAD. Castlegate and Wellington Square Shopping Centres do not host cPADs and did not report any static AEDs located in units in their Centres. Splash hosts a static AED. - Billingham Town Centre has good coverage, with two cPADs in the Town Centre. Funding was provided by a local charity which was match-funded by the Town Centre. There are at least two other known static AED sites, including in Billingham Forum, and Queensway Dental.

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	- Thornaby - the Town Centre reports that a local business has made a donation to acquire a cPAD but it is not yet operational. The Pavilion Leisure Centre has a static AED, as does Thornaby Pool. - Ingleby Barwick – the Town Council has recently installed a cPAD at the Community Hall, using money from the Wind Farm Community Fund. Cllr Mitchell is a nominated guardian. Another cPAD is being considered for inclusion at the new Community Centre at The Rings. A static AED will be located at the new Leisure Centre. - Long Newton, and Grindon both have cPADs in place, funded via public subscription and the parish council respectively. - Stillington and Whitton. Stillington has four static AEDs located at Darchem and the GP Practice. Darchem are undertaking further work to install an additional AED as a cPAD. At Whitton, the parish council has adopted a disused phone box to host a cPAD in the near future, and is attempting to raise £3300 to complete the necessary work. Other parish councils would be interested in discussing the options for their areas.
- Tees Active	As noted above Tees Active Ltd has several static AEDs in place, installed over the last 9-10 years. In addition, the Tees Barrage Park Run has funded an AED at the Barrage and Tees Active will maintain it. Due to concerns about maintaining staffing levels on site, Tees Active has not previously advertised their AED locations externally, as staff would in some way need to react as first responders to any incident, ie. as a minimum they would need to locate and provide the AED. Following discussion with the review, Tees Active will discuss with NEAS the potential to make their AEDs more publically available. The Forum's AEDs have been used three times, all with positive outcomes. All lifeguards and staff with First Aid at Work qualifications are trained in their use, which undoubtedly improves their response capability. The effect on staff at having to use an AED 'for real' should not however be underestimated.
- Schools	Twenty-one Primary Schools including eight academies responded to the Committee. Eleven of these have static AEDs on site, and another school has active plans to install an AED, and seven others would consider it, including one stating a cPAD would be considered. Eighteen respondents outlined their staff training, with seven describing a variety of first aid training for pupils. Nine secondary schools responded (including five mainstream academies, one free school, and two special schools). Of these, eight have AEDs on site, with one of these willing to consider hosting a cPAD subject to

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	satisfactory resolution of safeguarding issues. Three schools outlined first aid training for pupils (eg. for all at the Year 8 stage, or Sixth Form). One post-16 provider has an AED in place. Funding for school based AEDs has been from a variety of sources including school budgets, parent donations, charity and company donations. One secondary school deployed its AED to an incident as a precaution but it did not have to be used.
Examples of Local Authority Involvement in AED provision	Case studies of direct local authority involvement were examined as part of the review. **Hartlepool Council** has undertaken a rolling programme of work on defibrillators. Overall, so far, HBC has directly assisted the delivery of eight cPADs. Initial delivery saw the introduction of cPADs in busy public places and rural areas, and to increase coverage of static AEDs within leisure provision. A second phase of work saw further delivery from the Council and responses to requests from community groups. HBC has now worked with the Community Heart Beat Trust (https://www.communityheartbeat.org.uk/) and these also provide an online governance system which helps manage the maintenance and checking regime. Funding for the programme has been provided by HBC. The Council has worked with community groups to continue its programme; including Defibs4Hartlepool which has focussed on installing AEDs in schools. **Middlesbrough Council** has undertaken to develop a ten-year Defibrillator Plan to increase defibrillator coverage, in conjunction with increasing awareness of resuscitation techniques, and its wider prevention strategy. The plan initially aims to install eleven cPADs in key locations, with launch events planned for each, including leaflet drops in the immediate areas, and a plan for sustainability and governance. A budget of £15k was identified to purchase the defibrillators, spare pads etc, and the external wall fitted cabinets. A clinical lead for the project was identified.
Summary of findings / Role of AEDs	The review recognises that wider health improvement initiatives are required to improve the rates of cardiovascular disease and to prevent cardiac arrest from occurring wherever possible in the first place. Out of Hospital Cardiac Arrest is clearly a serious incident and even with the best treatment outcomes can be poor. However effective and more consistent application of the steps in the ‘chain of survival’ have been

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	demonstrated to improve survival rates. Defibrillators are a key link in this chain, and steps have been taken to improve coverage across the region in recent years. A number of AEDs/cPADs are now in place across the Borough, with the potential for this number to grow. There are however some gaps, for example Stockton Town Centre. Although widespread placement of public access AEDs may not be suitable or cost effective, there may be a case for a targeted approach to build on the assets already in place, in order to benefit a small number of individuals over time. Should any further steps be taken to increase the number of AEDs/cPADs in the Borough, consideration would need to be given to factors 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. It is important to remember that the 2014 Consensus Paper on Cardiac Arrest (British Heart Foundation, NHS England, Resuscitation Council) stresses that access to AEDs is one part of the solution. It is also crucial to increase public awareness of: - cardiac arrest - how to recognise it - the need to call 999 immediately - the need to start CPR immediately - the fact that cPADs can be safely used by anyone.