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Bridging the Survival Divide:

Strategically Improving OHCA Outcomes

Contents

OHCA in Scotland:
the current landscape

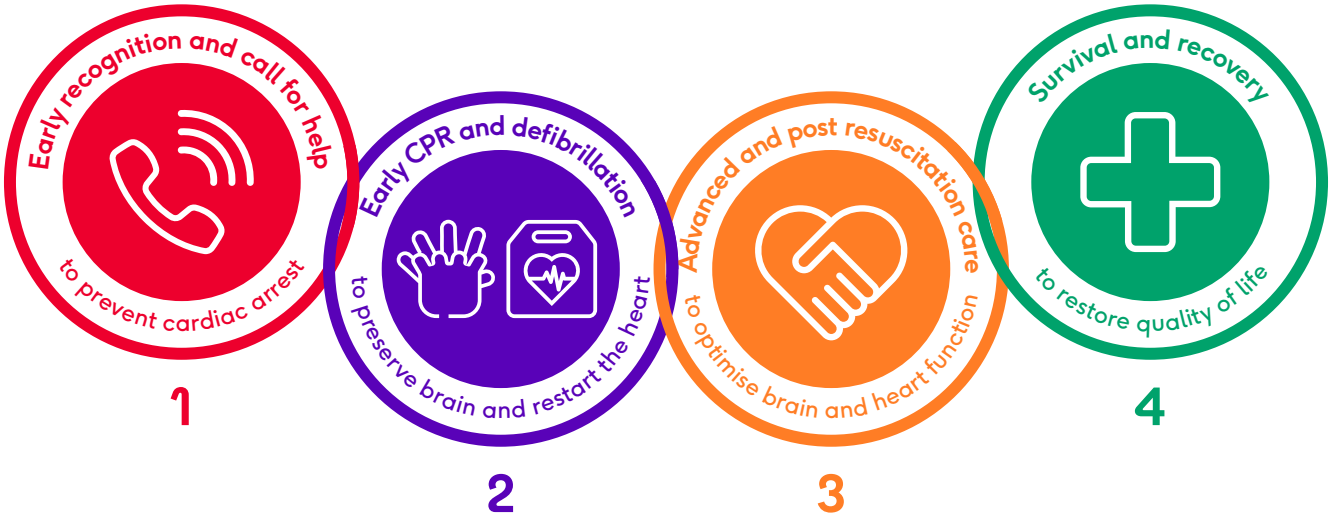
Currently in Scotland there are around 3,800 worked[1] out-of-hospital cardiac arrests (OHCA) each year, and just one in ten people survive an OHCA.[2] Survival of OHCA has increased steadily, with strong progress shown before the Covid-19 pandemic. However, progress post-pandemic has recovered slowly and there is more to be done to ensure as many people as possible have the best chances of surviving a cardiac arrest. Scotland's OHCA Strategy sets out a target survival rate of 15%, but the latest published rate is only 9.6%.[3] OHCA survival remains a significant public health challenge in Scotland and is a source of marked health inequalities.

This report recommends investment from the Scottish Government to increase the number of public-access defibrillators (PADs) across Scotland, improving access in areas that need them most and providing support to those communities to place and upkeep the devices.

Defibrillators play a key part in increasing OHCA survival. Every minute without receiving CPR and defibrillation reduces the chance of surviving an OHCA by up to 10%.[4] Early defibrillation is widely recognised as critical to improving OHCA survival rates. Evidence from controlled environments, where defibrillation occurs within 3–5 minutes, shows survival rates can increase to as much as 50–70%.[5] While this represents an ideal scenario where such high rates are unlikely to be achievable in the community, it highlights the importance of improving timely access to defibrillators. Early defibrillation is a key part of the Chain of Survival, but a PAD is only used in one in ten OHCAs in Scotland.[6]

Currently **in Scotland** there are around **3,800** worked out-of-hospital cardiac arrests (OHCA) each year, and just **one in ten** people survive an OHCA

Chain of Survival



Currently in Scotland there are 10,025 defibrillators registered on The Circuit, the UK's national defibrillator network.[7] Many of these defibrillators have been fundraised by local communities or funded by charity programmes and initiatives. BHF's own community defibrillator programmes have helped fund 415 defibrillators in Scotland, across every local authority, over the last 10 years. However, it has become clear that the current approach to defibrillator provision, which often relies on fundraising and charitable efforts, has led to significant inequities in the provision of PADs, with the most deprived communities now most in need of PADs. This demonstrates that fundraising and funded programmes are not enough on their own to close the access gap we have seen grow, and this approach to defibrillator provision may even have contributed to this gap.

We have made great strides over the last few years to increase PAD coverage, but it is clear targeted investment of public funds, coupled with the new data and tools we now have available to optimise placement and community support, could have a significant impact on addressing the current inequities and further improving PAD coverage.

Defibrillator use and health inequalities: data and insight

Inequalities exist across the Chain of Survival and, although work in recent years has sought to address them, it is clear that a national approach and strong leadership by the Scottish Government is required to move the needle. Investment and strategic delivery are vital to address the inequity in defibrillator access that has grown through the responsibility being placed on communities themselves to increase PAD access in their areas.

People in areas of greatest deprivation are up to twice as likely to experience an OHCA and less likely to survive one.[8] **There are multiple contributing factors to this. Data shows a link between areas of greatest deprivation and lower availability of PADs and research suggests that people are less likely to have been trained in CPR if they are from a lower socio-economic background.**[9]

Thanks to resources like The Circuit, we have the strongest picture ever of where PADs are, and more notably, where they are needed.

There are multiple areas that lack defibrillators and where long retrieval times are impacting survival. In 2025, using The Circuit data, BHF identified 12 areas across Scotland with some of the longest estimated retrieval times and significant levels of deprivation.

With retrieval times in some of these areas as high as 17 minutes 46 seconds (Saltcoats, North Ayrshire),[10] it is clear that PAD retrieval and use within the ideal window of under 3–5 minutes is not possible.

Variation in rates of PAD use across different areas in Scotland has been attributed to lack of access to PADs, with health board areas like Greater Glasgow and Clyde and Lanarkshire showing lower PAD use.[11] The latest Scottish Ambulance Service OHCA report states clearly that 'the disparity in the likelihood of PAD use is widening with those in more deprived communities missing out'.[12] Any action to increase access to PADs needs to consider these areas of greatest need, where retrieval rates remain high and survival remains low, to reduce these health inequalities.

People in areas of **greatest deprivation** are up to **twice as likely** to experience an OHCA and **less likely** to survive one

Over the last 10 years the number of PADs in Scotland has estimated to have doubled,[13] but further action is needed to ensure that the use of PADs increases. Figures from 2023–24 show a PAD was used in 10.3% of worked OHCAs in Scotland, a figure that has steadily increased in recent years but remains low.[14] Part of the challenge around increasing PAD access and availability is ensuring that PADs are placed where they are most likely to be utilised.

New data from the Scottish Ambulance Service has modelled PAD availability in relation to the location of OHCAs. This data shows that although we have increased PAD coverage, only around 20% of OHCAs are occurring within a 200m radius of a PAD (PAD use beyond 200m drops off so 200m is used as the model distance for PAD 'coverage').[15] To improve OHCA outcomes we need increased PAD coverage, with more OHCAs occurring within this 200m range of a PAD.

PADmap

PADmap is a free, publicly available resource that was launched in 2025 by the University of Edinburgh and was funded by the Scottish Government and St John Scotland. The tool uses data from the Scottish Ambulance Service and The Circuit to create a map showing mathematically optimised locations for PAD placement. It combines 'historic cardiac arrest locations with the locations of all the existing defibrillators to compute locations that are most likely to see future cardiac arrests'.[16]

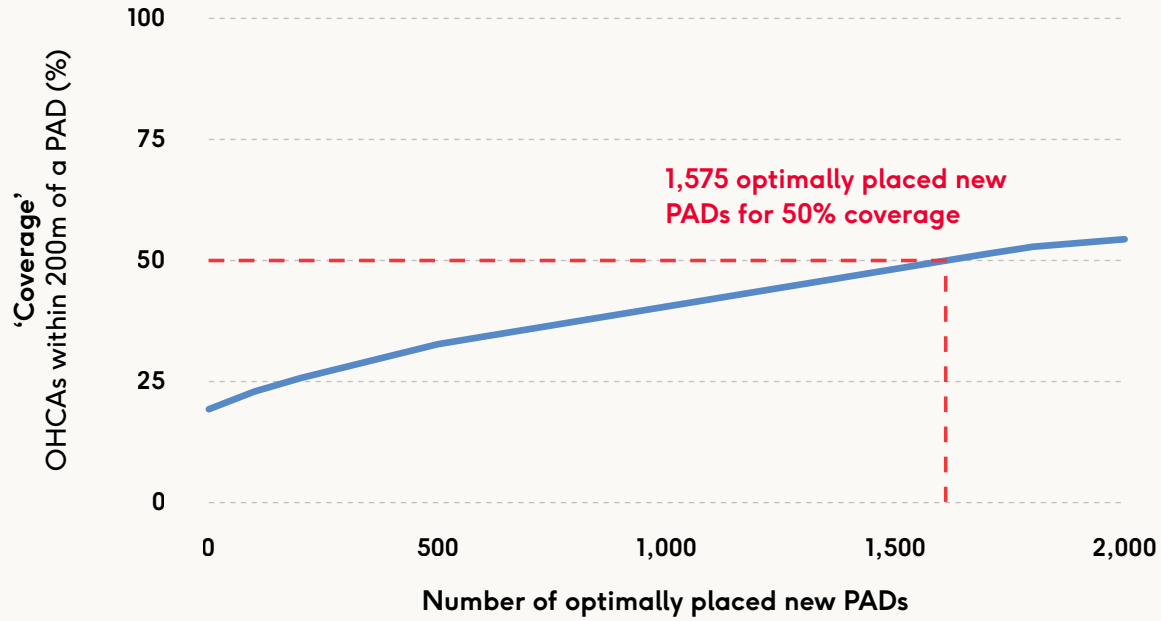
A pilot study in Falkirk showed that PADs placed using PADmap were twice as likely to be deployed and 66% more likely to deliver a shock.[17] We strongly support the use of PADmap as part of any initiative to improve PAD availability across Scotland, ensuring that PADs are placed optimally. The increase in coverage demonstrated by the modelling below is only possible by optimising the placement of PADs and ensuring that they are in unlocked cabinets that are accessible 24/7.

Optimal placement:
investment for impact

If we want to increase OHCA survival rates across Scotland, we must address the inequity that exists in access to defibrillators. Investment to tackle this issue on a national level is required to achieve this, with a clear focus on targeting the communities that need it most.

Scottish Ambulance Service data modelling has mapped the impact of increasing the number of optimally placed new PADs on PAD 'coverage' (OHCAs within 200m of a PAD). This modelling indicates that increasing the number of optimally placed new PADs by 1575 would increase the coverage of OHCA occurring within 200m of a PAD to 50%, more than double the figure that currently occur within 200m.[18]

Figure 1: OHCAs within 200m of a PAD vs new PADs placed

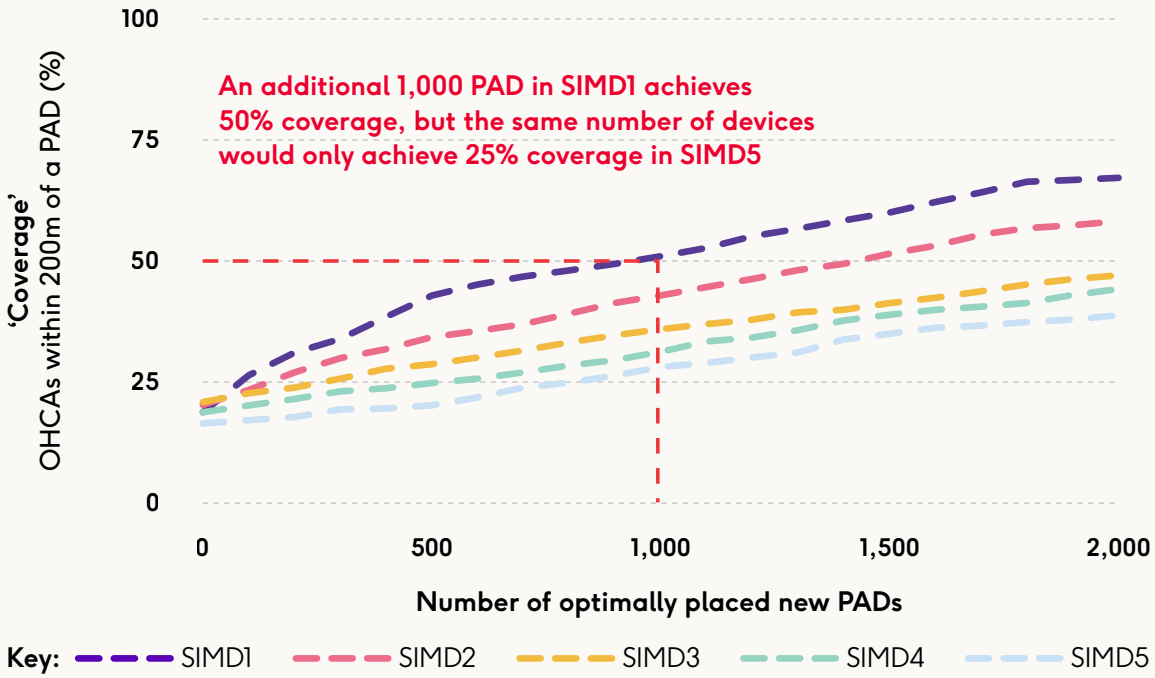


Source: Dr Ben Leung, Scottish Ambulance Service. OHCA location data January 2011 to March 2022, The Circuit data November 2025.

If we want to **increase OHCA survival rates** across Scotland, **we must address** the inequity that exists in access to defibrillators

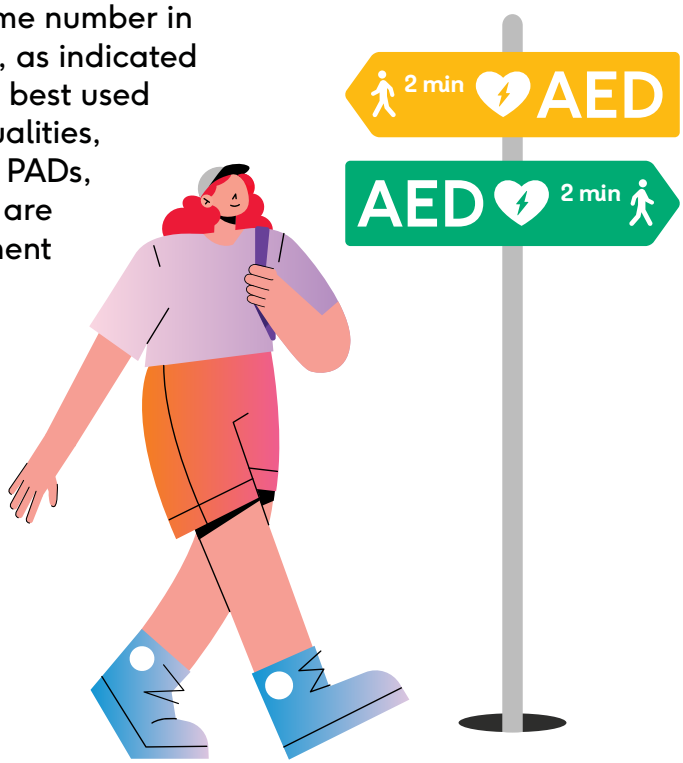
Of particular significance is the impact of increasing the number of optimally placed PADs in areas of greatest deprivation, as we know that these are the communities that have the poorest OHCA outcomes. The modelling shows that increasing the numbers of PADs in SIMD1 (the most deprived areas and communities) by 1,000 would increase PAD coverage to 50%, also showing the higher incidence of OHCA in SIMD1.[19]

Figure 2: OHCAs within 200m of a PAD vs new PADs placed, by SIMD quintile



Source: Dr Ben Leung, Scottish Ambulance Service. OHCA location data January 2011 to March 2022, The Circuit data November 2025.

Increasing the number of PADs by the same number in SMID5 would only achieve 25% coverage, as indicated by the graph above. For investment to be best used to close the gap between widening inequalities, we need to ensure that there are enough PADs, but also that they are placed where they are most needed. The delivery of any investment should prioritise placement in areas of deprivation, which not only shows the most efficient increase in coverage, but it will potentially contribute to improving OHCA outcomes and survival rates in those areas that see lower PAD use.



All PADs should be placed in unlocked cabinets, be accessible 24/7, and be registered on The Circuit to maximise the chances of them saving lives.

Case study:
schools and defibrillators

A measure that has been implemented in England, to some extent in Wales, and is being implemented in Northern Ireland, is to provide schools with defibrillators to increase defibrillator access.

There are potential benefits to providing schools with PADs. A study of the West Midlands in England showed that 33% of OHCAs occur within 300m of a school, although this study was limited in its geography it does suggest that schools may be potentially beneficial sites to place PADs in some cases.[20] Schools are also often well located within residential areas and with most worked arrests happening in the home, supplying a PAD to every school could potentially provide better defibrillator coverage to local communities. It also offers opportunity to educate students about defibrillators, socialising information like the Chain of Survival and presenting an opportunity to further highlight the importance of CPR training, training which is not currently mandatory on the curriculum or monitored in Scotland.

Using data from The Circuit, BHF Scotland has analysed the potential impact of placing PADs on all schools on average retrieval times across each local authority in Scotland. In some local authorities we see a marked reduction in retrieval time. For example, in Glasgow City the average retrieval time drops from an average of 5 minutes 12 seconds to 3 minutes 48 seconds and in the most deprived areas in Glasgow City there would be a 25% decrease in the average retrieval time.[21]

However, evidence is limited, and a reduction in average retrieval time is not seen across all local authority areas. In some areas there is only a small decrease in retrieval time by a few seconds, such as North Ayrshire and Renfrewshire.[22] The impact in areas of greatest deprivation is also not seen consistently across all local authorities. This data is top level and presents only an average retrieval time, meaning that it will potentially include schools that are not best placed to site a defibrillator because of their location or proximity to existing PADs. However, the data does indicate that a more strategic approach, using mathematically optimised PAD placement, would be a more impactful and efficient use of investment.

Community readiness, support, and development

When increasing PAD access across Scotland, it is not just data and coverage that needs to be considered, but also community readiness, support, and development.

For PAD use to increase, we need to ensure that every defibrillator is emergency ready through robust maintenance and guardianship, as well as community readiness. The Chain of Survival rests heavily on community readiness for bystander CPR and PAD deployment before an ambulance arrives.

Guardianship

Defibrillator guardians are individuals who ensure a defibrillator is correctly registered on The Circuit. They check a defibrillator regularly, making sure it is where it should be and checking the condition of its pads and batteries. Guardians are a vital part of The Circuit and they ensure that as many defibrillators as possible are ready to use in an emergency and that the ambulance service know where they are, if they can be used, and when they can be used (some defibrillators have restricted hours, if they are placed in a workplace or in schools for example).

However, securing guardians for PADs can be challenging. The barriers to guardianship require further work to understand but is an issue that needs to be considered when expanding PAD access. We know that support, resources, and engagement to secure guardians is a necessary part of PAD placement. Becoming a defibrillator guardian is an ongoing commitment, and not a one-time registration, and this can also present a challenge when sourcing guardians. Any investment to increase the number of PADs needs to recognise the need for resource and support to address challenges around guardianship. More development is needed to identify the best way to do this, but it may take the form of dedicated personnel to support community engagement on a local level to build resilience and capacity.

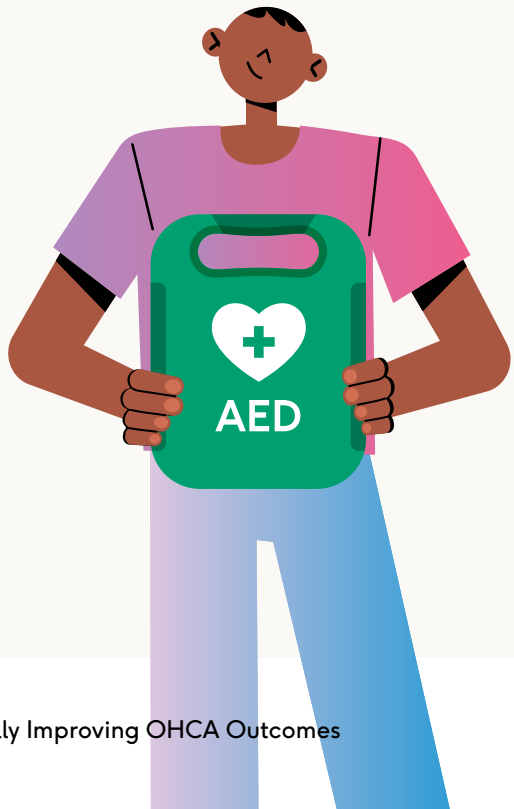
Part of guardianship is ensuring that PADs are maintained, and there are costs associated with replacing pads and batteries, either when they expire or when the defibrillator is used. These costs can be prohibitive in cases where the financial responsibility falls on guardians or community groups. Because of this, we would recommend that any investment in increasing the number of PADs in Scotland to cover maintenance costs for a period of 10 years to ensure that PADs remain emergency-ready beyond the period of initial investment, and that the burden of maintenance costs does not fall to local communities, particularly those we know already face inequalities in PAD access.

Place-based approaches to defibrillator access

When expanding PAD coverage across Scotland, it is important to consider not only guardianship but also the challenges posed by rurality when addressing defibrillator access. Static PADs in unlocked cabinets work well in densely populated areas, but in remote locations this approach is less effective. Longer travel times and sparse coverage mean that an ambulance may arrive before a PAD can be retrieved, so different solutions are needed.

Geography creates real barriers to timely intervention. In Dumfries and Galloway, for example, 44% of the population live in rural areas and average ambulance response times exceed 10 minutes, sometimes reaching 20.[23] Survival after OHCA is lower in these settings, and every minute without action reduces the chance of survival by up to 10%. Strengthening community readiness is therefore essential.

Local responder schemes, such as the Sandpiper Wildcats in Grampian and the CARe (Cardiac Arrest Rescue) Zone initiative in Dumfries and Galloway, show what tailored approaches can achieve. Research shows that Wildcats responders with defibrillators reached patients 7 minutes, on average, before an ambulance, improving response times.[24] Exploring similar models to make defibrillators more accessible in rural communities alongside strategic PAD placement could help ensure that where people live does not determine their chances of surviving a cardiac arrest.



Community readiness: the Chain of Survival

A final consideration is that access and availability of PADs cannot be considered in isolation to improve OHCA survival rates across Scotland. It is an integral part, but there are other components to community readiness that need to be considered. Administering CPR is vital alongside early defibrillation, to increase the chances of surviving an OHCA. CPR training is a key skill, and an opportunity to familiarise people with defibrillators and break down some of the 'myths' surrounding their use. For example, many people believe specialist training is required to use a defibrillator, which is not the case.

We strongly encourage that CPR training becomes mandatory for school students in Scotland and that training is monitored. All local authorities committed to teaching secondary school students across Scotland in 2019, however we do not have the data to properly understand which students are being trained, when they are being trained, and how that training is delivered. To ensure that communities are emergency-ready, CPR training should be made mandatory and monitored in schools so we equip as many people as possible, normalise understanding of CPR and defibrillators, and gather data to further understand challenges and barriers around CPR.

Key recommendations

Scotland has made significant progress in improving OHCA survival rates and expanding access to public-access defibrillators, but the current approach, which relies too heavily on community fundraising and charity programmes, has contributed to marked inequalities. People in the most deprived areas remain twice as likely to experience an OHCA and less likely to survive, with PAD coverage and retrieval times far outside what is needed to save lives. We must act now to address these challenges and strengthen community readiness across the Chain of Survival to improve OHCA outcomes. To do this we recommend:

Strategic investment in PADs

Commit national funding to increase the number of public-access defibrillators (PADs), prioritising placement in areas of greatest deprivation where OHCA incidence and survival gaps are most pronounced.

Optimised placement using data tools

Adopt evidence-led approaches such as PADmap and The Circuit to ensure PADs are placed in locations that maximise coverage and impact, with all devices accessible 24/7 and registered on The Circuit.

Support for guardianship and maintenance

Provide resources to secure PAD guardians and cover maintenance costs (pads, batteries) for at least 10 years, removing financial burdens from communities and ensuring devices remain emergency ready.

Mandatory CPR training in schools

Make CPR training compulsory and monitored across all Scottish schools to build community readiness and strengthen the Chain of Survival.

Tailored approaches for rural areas

Consider place-based approaches to defibrillator provision in rural Scotland to complement PAD placement, ensuring geography does not dictate survival chances.

We would like to express our sincere thanks to the Scottish Ambulance Service for providing data and modelling that were instrumental in informing this report.

References

1. 'Worked arrests' refers to cases of OHCA that do not involve major physical trauma and where resuscitation was attempted by the Scottish Ambulance Service

2. Scottish Ambulance Service. (2025). Scotland's out-of-hospital cardiac arrest report 2023–24. Retrieved from https://www.scottishambulance.com/media/pelfnspc/ohca-report-2023-24.pdf

3. Scottish Government. (2021). Scotland's out-of-hospital cardiac arrest strategy 2021–2026. Edinburgh: Scottish Government. ISBN 9781800047624. Retrieved from https://www.gov.scot/publications/scotlands-out-hospital-cardiac-arrest-strategy-2021-2026/

4. Resuscitation Council UK. Defibrillation. Retrieved from https://www.resus.org.uk/public-resources/defibrillation

5. Valenzuela, T. D., Roe, D. J., Nichol, G., Clark, L. L., Spaite, D. W., & Hardman, R. G. (2000). Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos. The New England Journal of Medicine, 343(17), 1206–1209. Retrieved from https://doi.org/10.1056/NEJM200010263431701

6. Scottish Ambulance Service. (2025). Scotland's out-of-hospital cardiac arrest report 2023–24. Retrieved from https://www.scottishambulance.com/media/pelfnspc/ohca-report-2023-24.pdf

7. British Heart Foundation. Defibrillator data. Retrieved from https://www.bhf.org.uk/defibdata

8. Scottish Ambulance Service. (2025). Scotland's out-of-hospital cardiac arrest report 2023–24. Retrieved from https://www.scottishambulance.com/media/pelfnspc/ohca-report-2023-24.pdf

9. Resuscitation Council UK. (2024). Every second counts: Tackling health inequalities in resuscitation. Retrieved from https://www.resus.org.uk/every-second-counts

10. British Heart Foundation. (2025). The Circuit data

11. Scottish Ambulance Service. (2025). Scotland's out-of-hospital cardiac arrest report 2023–24. Retrieved from https://www.scottishambulance.com/media/pelfnspc/ohca-report-2023-24.pdf

12. Scottish Ambulance Service. (2025). Scotland's out-of-hospital cardiac arrest report 2023–24. Retrieved from https://www.scottishambulance.com/media/pelfnspc/ohca-report-2023-24.pdf

13. Resuscitation Research Group. (2023). Public access defibrillators in Scotland: Reviewing the current state and keys to improving the future (White Paper). The University of Edinburgh

14. Scottish Ambulance Service. (2025). Scotland's out-of-hospital cardiac arrest report 2023–24. Retrieved from https://www.scottishambulance.com/media/pelfnspc/ohca-report-2023-24.pdf

15. Leung, B. (2025). OHCA location data January 2011 to March 2022, The Circuit data November 2025. Scottish Ambulance Service

16. PADmap. (2025). How it works. Retrieved from https://padmap.org/how-it-works

17. PADmap. (2025). How it works. Retrieved from https://padmap.org/how-it-works

18. Leung, B. (2025). OHCA location data January 2011 to March 2022, The Circuit data November 2025. Scottish Ambulance Service

19. Leung, B. (2025). OHCA location data January 2011 to March 2022, The Circuit data November 2025. Scottish Ambulance Service

20. Benson, M., et al. (2022). Location of out-of-hospital cardiac arrests and automated external defibrillators in relation to schools in an English ambulance service region

21. British Heart Foundation. (2025). The Circuit data

22. British Heart Foundation. (2025). The Circuit data

23. Scottish Ambulance Service. (2025)

24. Fickling, K., Clegg, G., Jensen, K., Donaldson, L., Laird, C., & Bywater, D. (2019). Sandpiper Wildcat project – saving lives after out of hospital cardiac arrest in rural Grampian [Poster]. Emergency Medicine Journal, 36(1), e9.1. Retrieved from https://emj.bmj.com/content/36/1/e9.1

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