

Scotland's Out-of-Hospital Cardiac Arrest Strategy 2021-2026



March 2021



Scottish Government
Riaghaltas na h-Alba
gov.scot

Scotland's Out of Hospital Cardiac Arrest Strategy

1. Foreword

2. Introduction

- a. Progress to date
- b. Partners to the strategy
- c. Covid-19

3. Summary of the Strategy aims

Pathway for survival:

- 4. **Getting Scotland Ready** - We will ensure people in Scotland can identify the signs of a cardiac arrest.
- 5. **Bystander Action** - We will encourage an increased willingness to call 999, deliver bystander CPR and defibrillation among people who witness an out-of-hospital cardiac arrest.
- 6. **Hospital Care** - We will ensure patients receive high-quality, person-centred care.
- 7. **Aftercare** - We will ensure that people in Scotland affected by out-of-hospital cardiac arrest receive appropriate aftercare.
- 8. **Data and Innovation** – We will ensure access to timely, high quality data to facilitate open review, discussion, learning and action planning.

Conclusion and Annexes

9. Conclusion

10. Annex A: Overlapping strategies

11. Annex B: Glossary

12. Annex C: References

Strategy Foreword



Mairi Gougeon, Minister for Public Health and Sport

Every year, over 3,000 people in Scotland experience an out-of-hospital cardiac arrest (OHCA). A cardiac arrest is when the heart stops pumping blood around the body, commonly because of a problem with the electrical signals in a person's heart. It is a significant healthcare challenge and addressing it is a priority for the Scottish Government.

Throughout the last five years, the Save a Life for Scotland (SALFS) partnership has equipped over 640,000 people, around 11% of the population of Scotland, with CPR skills. At the launch of Scotland's inaugural Out-of-Hospital Cardiac Arrest Strategy in 2015 only around 1 in 20 people in Scotland who experienced an OHCA survived to be discharged from hospital. By the end of that strategy in 2020, this had doubled to 1 in 10 people. This is significant progress, of which we should be proud. It means that we begin this refreshed strategy with a solid foundation on which to continue our work.

Whilst we rightly celebrate those achievements, there remains more to do. We know from international experience that even higher rates of survival are achievable. We can continue to learn from our international colleagues and apply examples of best practice here in Scotland. Likewise, we can share our experiences of improving bystander CPR rates and survival from OHCA to help other countries do the same.

We also know that there is more that we must do to address inequalities within bystander CPR rates and outcomes from out-of-hospital cardiac arrest across Scotland. To do this, our refreshed strategy will continue our efforts to equip as many people as possible with the skills necessary to save the life of someone having a cardiac arrest, but will include a particular focus on reaching communities where we know those inequalities exist.

In order to ensure as many people as possible survive an OHCA, this strategy follows what is known as the 'Chain of Survival'. The Chain of Survival describes the crucial elements required to save a life when someone is in cardiac arrest. These elements are: community readiness and early recognition that a cardiac arrest is happening; early cardiopulmonary resuscitation (CPR); early defibrillation to restart the heart; timely hospital care, and appropriate aftercare. Through the implementation of this strategy, we will work to improve all aspects of the Chain of Survival in Scotland. We will also focus on how the effective use of data can support us in shaping the quality of care delivered to communities across Scotland.

I would like to offer my thanks and appreciation to all who have been involved in delivering the ambitious aims set out in Scotland's original Out-of-Hospital Cardiac Arrest Strategy, to those who have supported this refreshed strategy and, of course, to every member of the public who has learned CPR and those who have stepped forward to help someone experiencing a cardiac arrest.



Mairi Gougeon, Minister for Public Health and Sport

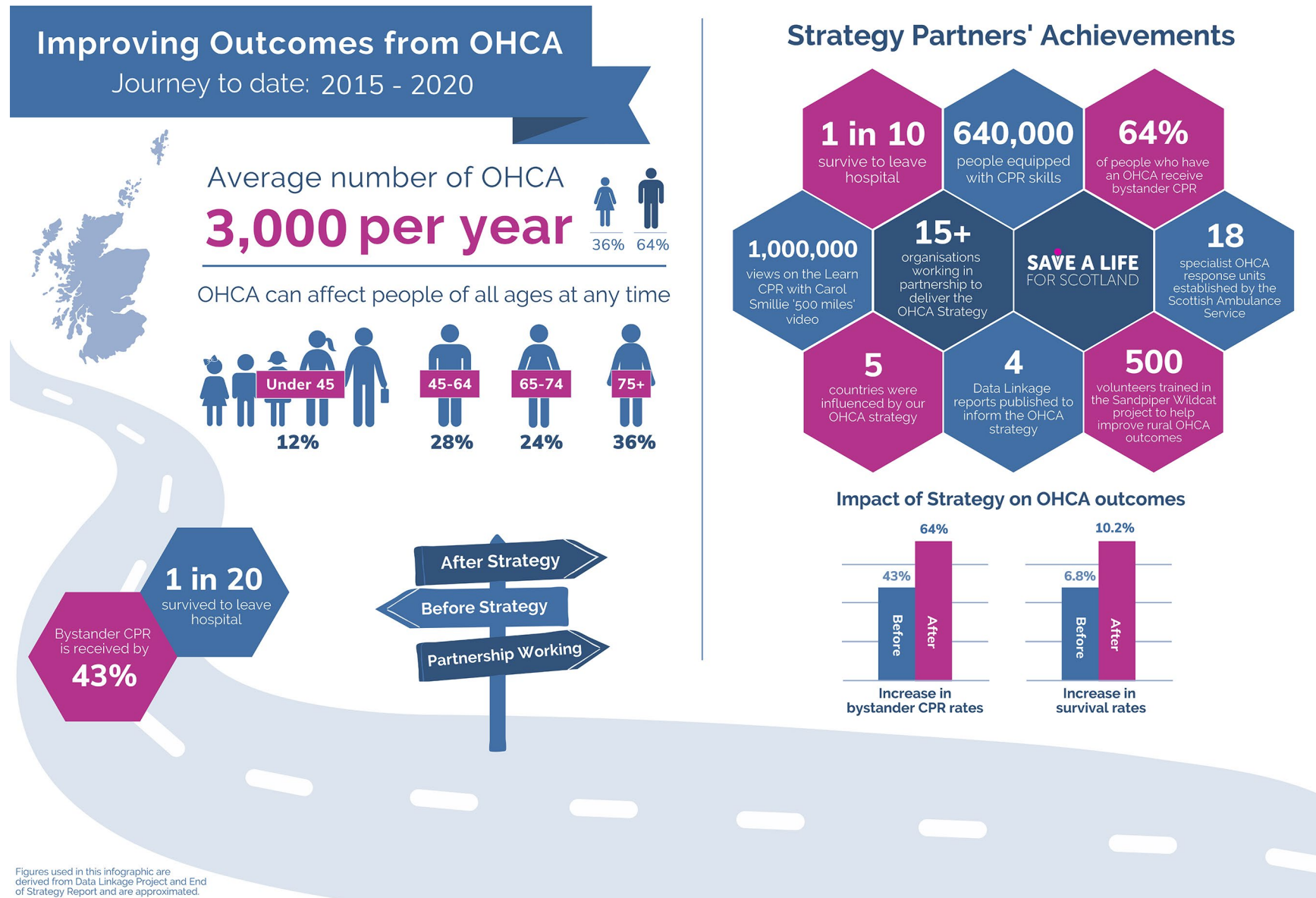


Figure 1: A graphic to display the outcomes from the original strategy – Scotland's Out of Hospital Cardiac Arrest 2015 – 2020.

Introduction



Scotland's Out-of-Hospital Cardiac Arrest Strategy 2021-2026

Each year in Scotland over 3,000 people have resuscitation attempted in the community after they have a cardiac arrest¹. This is known as an Out-of-Hospital Cardiac Arrest (OHCA). Unfortunately only 1 in 10 people survive such an event².

We know from other countries around the world, with similar populations and healthcare systems, that it is possible for more people to survive. In some places 25% of people who have an OHCA will survive to leave hospital³⁴.

With this refreshed strategy, we intend to further increase survival after OHCA in Scotland.

The inaugural Out of Hospital Cardiac Arrest Strategy (2015-2020)

In 2014 Michael Matheson, then Scottish Government Minister of Public Health, brought together a Reference Group including emergency services, third sector organisations, community groups and academics. This group

developed the 'Out-of-Hospital Cardiac Arrest, A Strategy for Scotland 2015 - 2020'⁵. That strategy was launched by Maureen Watt, Minister for Public Health, in 2015.

Since 2015, significant progress has been made.

We achieved our aim of equipping an additional 500,000 people living in Scotland with CPR skills, and survival after OHCA has increased significantly. Before the launch of the first Strategy in 2015, only around 1 in 20 people survived to leave hospital after OHCA. By 2020 this number had doubled to 1 in 10⁶.

Our approach was also recognised as best practice by international bodies including the Global Resuscitation Alliance⁷.

Foundational to the success of the original strategy, was the adoption of the 'Scottish Approach' to cross-sectoral working: "a focus on

outcomes, co-production (at an organisational level), using and sharing assets (primarily organisational assets) and [adopting] a system-wide approach"⁸.

More detail on the achievements of the Out-of-Hospital Cardiac Arrest, A Strategy for Scotland 2015 – 2020 can be found in the end of strategy report at savealife.scot/2015strategyreport.

It takes a system

Saving lives after OHCA requires a whole system of care. The necessary sequence of events starts with community readiness and bystander action, continues with trained community responders and paramedics, and ends with in-hospital care and aftercare on returning to the community. This time-critical sequence is often described as the Chain of Survival⁹ (Figure 1).

Introduction

Prioritising early links in the Chain of Survival

The 2015 – 2020 strategy placed particular emphasis on activities at the start of the Chain of Survival, such as bystander CPR. We sought to consolidate and amplify work already being carried out by community groups and third sector organisations across the country to increase rates of bystander CPR in Scotland.

To achieve this, key stakeholders came together to form the Save a Life for Scotland (SALFS) partnership.

Save a Life for Scotland

Save a Life for Scotland (SALFS) is a campaign which brings together the work of a range of partners committed to saving lives by changing the way we think about OHCA in order to get Scotland CPR ready.

It is a collaboration between the emergency services, third sector organisations, Scottish Government and academic researchers. The partnership is directed by the Resuscitation Research Group at the

University of Edinburgh. A full list of the partners can be found in the Strategy Partnership section.

The key strategic aims of SALFS are promoting CPR readiness in young people and across a range of communities and shaping perceptions of OHCA among people living in Scotland. The emphasis we place on the importance of this work is visible as an additional ‘readiness’ link at the start of what the 2015 OHCA Strategy described as the ‘augmented Chain of Survival’¹⁰.

In addition to the public facing work of SALFS, Delivery Group partners worked together on a range of interconnected projects to improve OHCA survival nationally and regionally.

We intend to carry forward the same model of partnership working into the next phase of our plan.

Next steps for SALFS

SALFS wishes to build on the successes of the 2015 – 2020 strategy

and to address inequalities that we know exist in outcomes from OHCA.

We know from our data linkage reports and from other sources of information, such as the Scottish Health Survey¹¹, and original research from the University of Edinburgh^{12,13} that there are certain groups we need to make sure we reach through the implementation of this refreshed strategy.

Scope of Scotland’s Out-of-Hospital Cardiac Arrest Strategy 2021-2026

This strategy addresses the needs of those who experience, or may witness, a cardiac arrest outside of a hospital setting.

We aim to support partners and other organisations to build on what already works well, to identify and address gaps in provision, and to introduce innovative ideas to meet the aims of this strategy.

This strategy document does not address cardiac arrests in children, or those caused by external physical injury (so called ‘traumatic’ cardiac

Introduction

arrests). Both of these types of cardiac arrest are far less common than those caused by medical conditions in adults, and require a different approach to their management.

The issue of preventing heart disease, which can lead to cardiac arrest, is covered by other Scottish Government plans, more detail of which can be found in **Annex A**.

Cardiac arrest can affect anyone, of any age at any time or place. People of all cultural and religious backgrounds and all walks of life. This means that those affected by OHCA have a wide range of experiences. We are committed to listening to and learning from these experiences.

The Chain of Survival

We continue to structure the aims and actions of this strategy on the Chain of Survival, supported by examples of international best practice, for example those summarised in the Global Resuscitation Alliance Call to Action¹⁴.

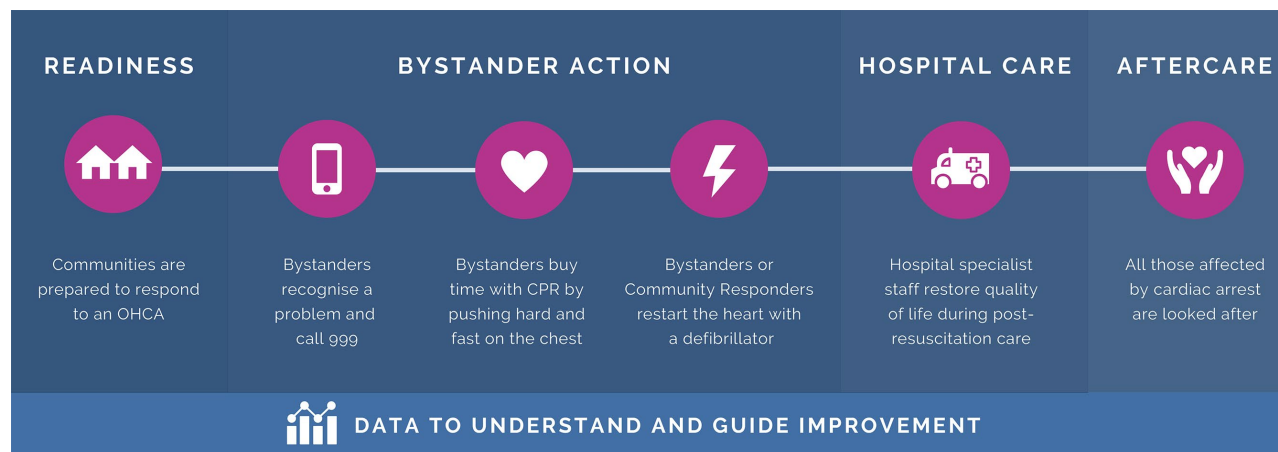
The following chapters address the 6 elements of the augmented Chain of Survival. The elements, which work together to give people the best possible chance of survival after an OHCA are as follows:

- Getting Scotland OHCA Ready
- Bystander Action
 - Call 999
 - CPR
 - Defibrillation
- Hospital care
- Aftercare

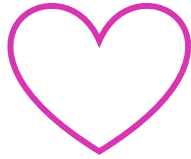
We have also included a Data and Innovation chapter which outlines the data-led approach we will take to improve the Chain of Survival.

A chain is a good metaphor for the series of events required to improve a person's chances of survival from OHCA. It is a reminder that individual elements have a reduced value if the links preceding and following are not also strong. In particular, those actions at the beginning of the Chain are especially important¹⁵. These are described below under the umbrella category of Bystander Action.

Figure 2: The 'augmented Chain of Survival' adapted from the 2015 OHCA Strategy includes community readiness to respond to an OHCA and the aftercare of all involved, which are crucial to improving outcomes after OHCA across all of the communities in Scotland.



Partners to the Strategy



We would like thank the following partners for supporting the development of Scotland's Out-of-Hospital Cardiac Arrest Strategy 2021-2026, and for their commitment to delivery of the strategy:

Scotland's Out-of-Hospital Cardiac Arrest Strategy 2021-2026 was conceived by a collaboration of organisations committed to improving outcomes for those affected by OHCA. These partners form the [Save a Life for Scotland](#) campaign.

- British Heart Foundation
- British Red Cross
- Chest Heart and Stroke Scotland
- Defence Medical Services (Scotland)
- East Neuk First Responders
- Lucky2BHere
- Police Scotland
- Resuscitation Council UK
- Resuscitation Research Group, University of Edinburgh
- Royal Life Saving Society UK
- Scottish Ambulance Service
- Scottish Fire and Rescue Service
- Scottish Government
- St Andrew's First Aid
- St John Scotland

The role of the Save a Life for Scotland partnership is to engage as the public face of the strategy. It is led by Lisa MacInnes, Resuscitation Research Group at the University of Edinburgh.

[Delivery Group](#)

The strategy Delivery Group is responsible for implementing the strategy and monitoring the outcomes. This group is chaired by Dr Gareth Clegg, University of Edinburgh and Scottish Ambulance Service. Delivery Group Partners include:

- British Heart Foundation
- British Red Cross
- Chest Heart and Stroke Scotland
- Convention of Scottish Local Authorities (COSLA)
- Defence Medical Services (Scotland)
- Police Scotland
- Resuscitation Research Group, University of Edinburgh
- Scottish Ambulance Service

- Scottish Fire and Rescue Service
- Scottish Government
- St John Scotland

[Reference Group](#)

The strategy and its delivery is overseen by the out-of-hospital cardiac arrest Reference Group, which is chaired by Prof Jason Leitch, the National Clinical Director of the Scottish Government. It includes representatives from the Delivery Group partners.

Partners to the Strategy

Writing Group

The writing group which led on the development of the strategy on behalf of SALFS partnership are as follows:

- Gareth Clegg, University of Edinburgh, NHS Lothian and Scottish Ambulance Service
- Lisa MacInnes, University of Edinburgh and NHS Lothian
- Liz Hasseld, University of Edinburgh
- Diane Lac, University of Edinburgh
- Jean Skelton, University of Edinburgh
- Becki MacPherson, Scottish Government
- John Wilson, Scottish Government
- Allan Cowie, Chest Heart and Stroke Scotland
- Jim Ward, Scottish Ambulance Service
- Steven Short, Scottish Ambulance Service
- Naz Lone, Scottish Intensive Care Society Audit Group
- Mark Dunn, NHS Lothian
- Dave Bywater, Scottish Ambulance Service
- Richie Hall, Scottish Fire and Rescue Service

- Sarah Smith, Chest Heart and Stroke Scotland
- Angus Loudon, St John Scotland
- Liz Crawford, St John Scotland

External expert feedback

We would like to thank the following subject matter experts for their comments on drafts of the strategy document:

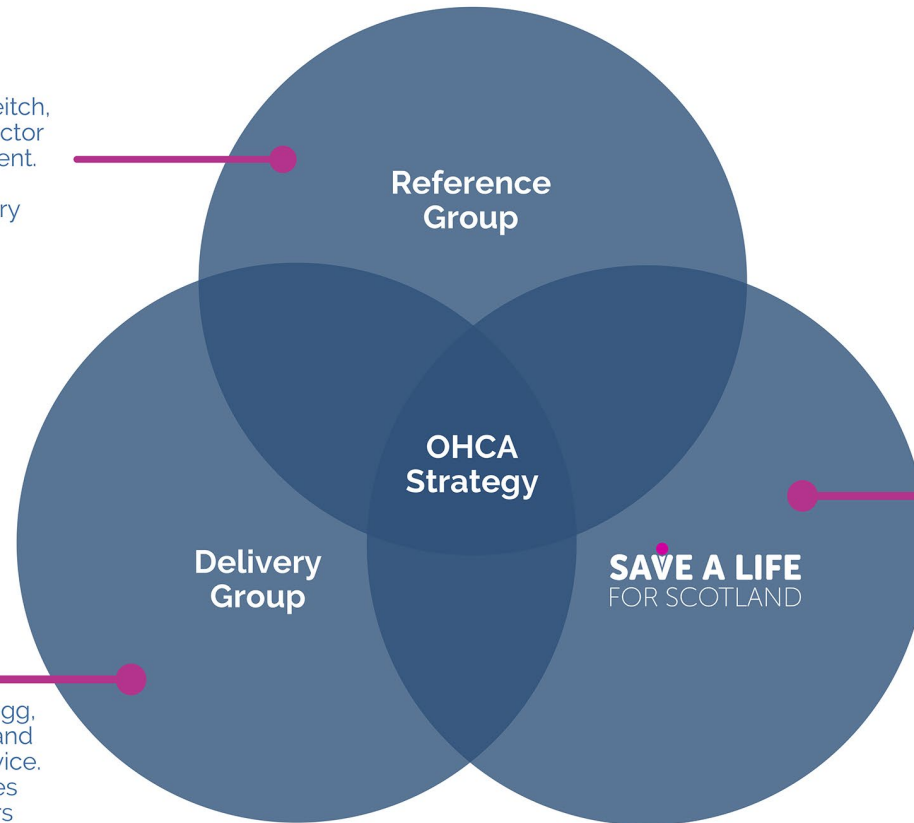
- Deafblind Scotland
- Marcus Ong, Duke-NUS Medical School and Health Services Research Institute Singapore
- Katie Dainty, University of Toronto
- Gillian Moreton, Lifelines Scotland
- Sudden Cardiac Arrest UK

In addition, strategy partners would like to offer their sincere thanks to the individuals and organisations who attended consultation events and offered their feedback. We also extend our thanks to the ALLIANCE, who facilitated a lived experience engagement event.

We would also like to thank Claire Fleck Photography for supplying the photograph for the front cover.

Reference Group

Chaired by Prof Jason Leitch, the National Clinical Director of the Scottish Government. This group oversees development and delivery of the Strategy



Delivery Group

Chaired by Dr Gareth Clegg, University of Edinburgh and Scottish Ambulance Service. This group operationalises the Strategy and monitors outcomes

Save a Life for Scotland

A partnership led by Lisa MacInnes, University of Edinburgh and NHS Lothian. This is the public facing campaign of the Strategy

Figure 3: A diagram to explain the differences between the Strategy groups – the Reference group, the Delivery group and the Save a Life for Scotland group.

Covid-19



Consideration of the short and long-term impact of the Covid-19 pandemic.

It is impossible to publish this strategy without considering the impact of Covid-19.

We know that people who witness an OHCA may have concerns around Covid-19 transmission. The ask of bystanders to perform CPR or defibrillation is a big one, especially in the midst of a pandemic, and it is not one that we make lightly.

Since the launch of the inaugural Out-of-Hospital Cardiac Arrest Strategy in 2015, the position of Save a Life for Scotland has been that hands-only CPR is the most appropriate course of action during a cardiac arrest in adults. This continues to be our recommendation during the Covid-19 pandemic.

SALFS have updated our CPR guidance to reflect Covid-19 appropriate actions. This now includes covering the mouth and nose for the person in cardiac distress with a loose

cloth.

Health inequalities, already significant in Scotland, have increased during the pandemic as Covid-19 has had a disproportionate impact on people living in areas of socioeconomic deprivation, and on people from Black, Asian or minority ethnic backgrounds. This reinforces the importance of our efforts to address inequality in outcomes from OHCA.

Throughout the pandemic the Scottish Ambulance Service has continued robust data collection at the scene of OHCA. This will enable analysis of the impact of the pandemic on OHCA and help us to robustly assess future planning implications.

During the development of this refreshed strategy, we considered the potential impact of Covid-19 on the aims of the strategy. In particular, we considered whether it would be appropriate to reduce the targets in anticipation of the challenges of recovering from the pandemic.

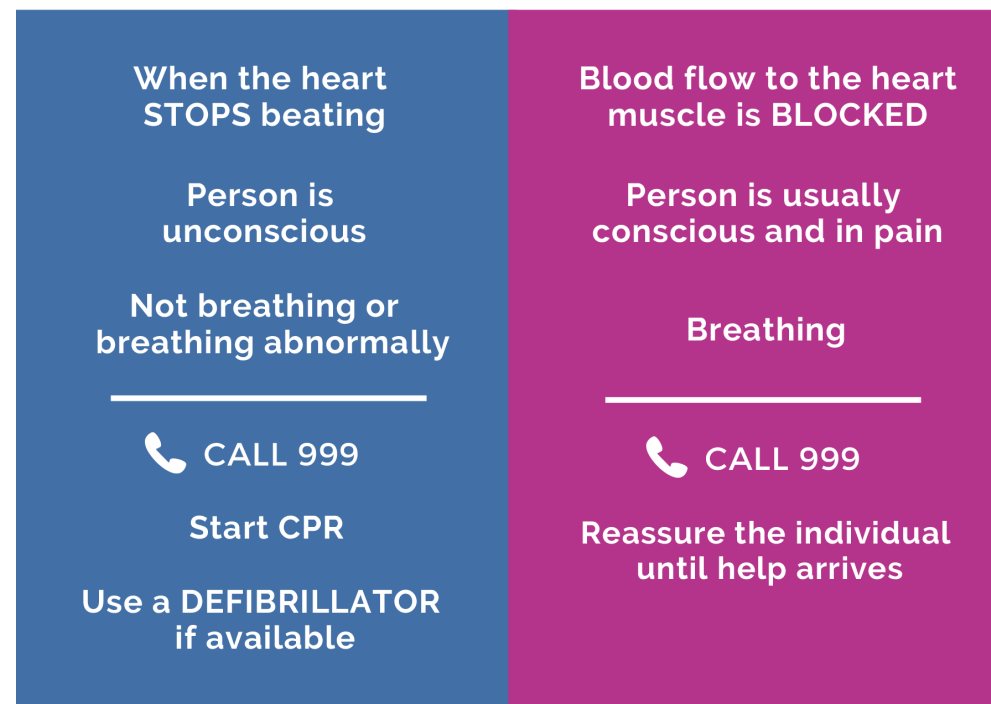
However, we have not done so as we view the implementation of this strategy as important in the recovery from the Covid-19 pandemic and it is important to us that we do not minimise our aims. This is reflected in the ambitious aims and actions of this strategy.

CARDIAC ARREST

VERSUS

HEART ATTACK

KNOW THE DIFFERENCE & HOW YOU CAN HELP



SAVE A LIFE
FOR SCOTLAND

Figure 4: A diagram to explain the difference between a cardiac arrest and a heart attack.

Summary of the strategy aims



The top 10 aims of this strategy are that by 2026:

- The SALFS partnership will have equipped 1 million people in Scotland with CPR skills.
- All school aged children in Scotland will have the opportunity to be equipped with CPR skills.
- We will target our work to address key inequalities in OHCA outcomes.
- Bystander CPR rates will be increased to 85%.
- Public Access Defibrillators will be placed optimally and be as accessible as possible.
- 20% of all OHCA's will have a defibrillator applied before the arrival of ambulance service.
- Survival from OHCA will increase to 15%.
- All individuals who are affected by OHCA will be offered support afterwards.
- We will address the challenge of timely communication of anticipatory care plans and decision support for front line ambulance service crews.
- We will use data to understand and address variation and seek innovative ways to improve outcomes after OHCA.

Getting Scotland OHCA Ready



We will ensure people in Scotland can identify the signs of a cardiac arrest.

Aims:

1. The idea that OHCA can be a survivable event is embedded in the public perception.

2. There is an increased awareness of signs and symptoms of cardiac arrest enabling prompt bystander action.

3. Common misperceptions about CPR and defibrillation are addressed.

A cardiac arrest occurs when the heart stops pumping blood around the body. Someone who is having a cardiac arrest will suddenly lose consciousness and will either stop breathing or stop breathing normally.

It is estimated that every minute of delay in bystander action reduces the likelihood of survival after OHCA by 10%¹⁶. Therefore, early recognition of cardiac arrest by those nearby and

prompt call for help followed by bystander CPR are key to survival. Yet in a poll of adults living in Scotland more than 20% of respondents felt they would not know when to use CPR and half would not be confident to administer it¹⁷. This uncertainty and reluctance to act is exacerbated in communities and age groups most affected by OHCA¹⁸.

To address this, we will work to ensure that people understand that OHCA can be a survivable event and are aware of the symptoms of an OHCA. This will enable them to act quickly and potentially save a life.

Inequalities

We are already aware of inequalities in health¹⁹, particularly affecting outcomes after OHCA. Over the last five years, we have started to understand more clearly the association between measures of socioeconomic position and decreased survival after OHCA²⁰.

People from more deprived areas in Scotland are almost twice as likely²¹ to have an OHCA and are 60% less likely to survive to leave hospital than those from less deprived areas²². Around 11% of the population of Scotland live in a rural area²³ and are 32% less likely to survive to leave hospital after OHCA than those living in urban areas²⁴.

We also know that ethnicity can be a factor in how likely a person is to experience an OHCA. For example, people from South Asian backgrounds have up to 50% higher risk of developing coronary heart disease than white Europeans²⁵. Coronary heart disease can lead to a heart attack or cardiac arrest.

In addition, we know from international studies that women are less likely to have CPR performed on them²⁶, a pattern we also see in Scottish data²⁷. The misconception that breasts make CPR more challenging, fear of doing harm, fear of inappropriate touching and fear of being accused of sexual

Getting Scotland OHCA Ready

assault have been given by the public as reasons for this gender discrepancy²⁸. It is important that over the next 5 years, the partnership works to combat these fears and embed the knowledge that CPR is a gender neutral life-saving technique.

We will also work to ensure that we do not exclude disabled people and/or those living with a long-term health condition from the work that we do. Whilst we know that the physical aspects of CPR may present a challenge for those with limited mobility, everyone can play a role in the chain of survival either by calling 999 or by guiding other bystanders to perform CPR and retrieve a PAD.

As part of this targeted work, the Scottish Ambulance Service have piloted a “CPR skills for disabled people” course. It is hoped that, if successful, this course can be made available across Scotland in addition to the development of digital training materials.

Language concerns may also affect the ability of the partners to meet with certain groups - for example, British Sign Language (BSL) users, non-native English speakers or Gaelic speakers across Scotland. Partners will consider how to address this barrier.

By acknowledging these inequalities and working with communities we can ensure that everyone has the best chance of survival.

GoodSAM

The GoodSAM smartphone app is a mechanism that can be used to increase readiness to respond to OHCA, and allow the ambulance service to alert responders in the community to a nearby OHCA²⁹. In 2020 the Scottish Ambulance Service began using GoodSAM to alert trained responders and off duty ambulance service staff. We will develop our use of GoodSAM to enable communities to respond more effectively to OHCA.

Actions:

1. We will continue our public awareness campaign, with a focus on increasing awareness of:

- the signs and symptoms of cardiac arrest.
- the importance of prompt bystander action (calling 999, CPR and defibrillation).
- that CPR is a gender neutral intervention.
- that aftercare resources are available for those who intervene in an OHCA.

2. We will focus our public awareness campaign on reaching those who we know experience inequalities in bystander CPR rates and survival from OHCA.

3. We will raise awareness of the potential of the GoodSAM app to be used to alert responders in the community.



The Newton Family

“We never thought anything like this would ever happen to us, which is silly, of course it can happen to anybody.”

Judy Newton’s husband Gregor walked up the stairs in their home around 9pm after lighting the log burner. A few moments later their 11 year old son Harry yelled for help from upstairs. Gregor had collapsed and his face was blue. Judy rushed up the stairs to help and Harry’s older sister Eilidh called for an ambulance. Gregor was fit and well when he experienced his OHCA.

Judy began CPR, “I knew that I needed to try something and doing the first compressions, hearing his ribs breaking, I didn’t realize I had that much strength in my body. I couldn’t remember the ratio, that we get taught, so I made it up as I went along I just did compressions and was praying to everybody”

Sandy, a first responder arrived quickly after the 999 call and brought the defibrillator to deliver a shock to Gregor, about 45 seconds later Gregor gave a cough and regained consciousness.

“And then I kind of knew he was ok when he started to swear profusely” said Judy.

From Harry recognising something was wrong and calling for help, Eilidh calling 999, Judy delivering CPR, Sandy arriving with a defibrillator, and the ambulance arriving to take Gregor to hospital, everybody played their part and did it 100%.

“It shows the Chain of Survival is not just some theory, it really does work if everything takes place.”

Bystander Action (Call 999, CPR and Defibrillation)



We will encourage an increased willingness to deliver CPR and defibrillation among people who witness an out-of-hospital cardiac arrest.

Aims:

- 1. To equip a total of 1 million people in Scotland with CPR skills**
- 2. All school aged children will have the opportunity to be equipped with CPR skills.**
- 3. Bystander CPR rates will be increased to 85%.**
- 4. Public Access Defibrillators will be as accessible as possible.**
- 5. 20% of all cardiac arrests will have a defibrillator applied before the ambulance service arrive.**
- 6. Survival from OHCA will increase to 15%.**

Prompt bystander action – calling 999, delivering CPR and defibrillation - are vital to improving a person's chance of survival from OHCA.

The first action taken by any bystander must be to call 999 and request an ambulance for an OHCA.

Cardiopulmonary resuscitation (CPR) is a series of actions which artificially circulates blood around the body, buying time before the emergency services arrive or until defibrillation can be attempted³⁰.

Public Access Defibrillators (PADs) deliver an electric shock to the heart of someone in cardiac arrest, allowing the normal, organised, electrical rhythm of the heart to restart³¹.

Although these are two distinct actions, CPR and defibrillation work hand in hand to give people the best chance of survival after cardiac arrest.

Evidence shows that the use of CPR in the immediate aftermath of an out-of-hospital cardiac arrest can increase the likelihood of survival by 2-3 times³². Where only one bystander is present at the scene, the most important thing

they can do is call for help and do CPR as instructed by the Ambulance Service call handler.

In some circumstances defibrillation within 3 minutes of a cardiac arrest can increase the chance of survival to above 70%³³.

If there is a publicly accessible defibrillator nearby, and it is possible to fetch it without interrupting CPR, the Ambulance Service will instruct a bystander to collect it. In Scotland, defibrillators are not often used before the arrival of the Ambulance Service³⁴.

Working with communities to familiarise people with both CPR skills and the use of PADs, and ensuring that people who witness an OHCA feel confident in using both of these, is the foundation of ensuring that those who experience an OHCA have the best chance of survival.

Bystander Action (Call 999, CPR and Defibrillation)

Cardiopulmonary resuscitation (CPR)

The most obvious barrier to performing CPR is the knowledge of how to do it. Even though Ambulance Service call handlers will instruct bystanders at an OHCA in how to do chest compressions, it is those who have previously been equipped with CPR skills who are most willing to deliver this intervention³⁵.

We want bystanders who witness an OHCA to feel able to take action, and to achieve this we aim to familiarise a total of 1 million people in Scotland with CPR skills.

We will make a concerted effort to target our approach to equipping people with CPR skills. This is to ensure that we reach communities who typically face barriers to accessing opportunities to learn CPR skills, or who experience inequities in outcomes from OHCA³⁶.

Alongside equipping people with these lifesaving skills, we must also make sure that we continue to work to

address common misconceptions about CPR. Fear of inadvertently doing harm or making the situation worse and fear of being sued are some of the reasons cited for inaction³⁷.

Much good practice already exists. Public services and third sector organisations have played a vital role in engaging with communities and equipping 640,000 people across Scotland with CPR skills through the implementation of the 2015 OHCA Strategy.

Now we can build on that success. We will use this opportunity to increase the reach of our work to embed CPR skills in communities across Scotland, and ensure that the change is sustained over time.

Schools

The SALFS partnership is committed to supporting schools and youth organisations to equip young people with CPR skills. We will work with local authorities, education colleagues and partners, to make sure that all school age children have the opportunity to learn CPR skills.

We will work with youth organisations to support young people to become CPR ambassadors in their communities and schools.

Equipping young people with these lifesaving skills not only creates the basis of a strong long-lasting bystander culture but enables even primary school aged children to support their friends and family to learn these skills too^{38,39,40}.

Community-led engagement

As 80% of cardiac arrests occur at home⁴¹, it is vital that we continue to consider ways to increase engagement at community-level. Our partners are committed to working closely with communities and we will work together to continue this approach.

It is important that we continue to ensure that our initiatives are as accessible as possible. To do this, we will increase engagement with existing community organisations (e.g. sports hubs, local businesses and other community groups) to raise awareness of and offer opportunities to learn CPR.

Bystander Action (Call 999, CPR and Defibrillation)

We are not the only partners in Scotland who are working towards increasing survival rates after OHCA. We will seek out and work in collaboration with local community groups across Scotland who focus on CPR and defibrillation (both provision of equipment and training) to gather our collective experiences and support and amplify each other's work.

First Responders

The strategy partners know that while recognising the signs of a cardiac arrest may seem straightforward, bystanders are not always confident in their ability to do so. It is vital then, that Scottish Ambulance Service call handlers are able to quickly recognise bystander's description of an OHCA and encourage the caller to begin CPR.

Supporting bystander action will give those in need a fighting chance until the appropriate emergency resources arrive on scene.

Prompt arrival of community responders is also vital to improving

the Chain of Survival. By utilising trained volunteer emergency responders we can increase the resources available to help at an OHCA, relieve the pressure on bystanders and increase the chances of survival for those in need.

People from a number of agencies can be or already are trained to respond to OHCA. This means there is more opportunity for a quick initial response, particularly in some rural and remote areas. The ability to do this is already enshrined in community planning policy⁴², giving partners the scope to support local first response solutions.

In recent years, smartphone applications such as GoodSAM have facilitated rapid community responder action in response to OHCA, alerting nearby off duty doctors, nurses and paramedics to an emergency. Scottish Ambulance Service has adopted GoodSAM for use and the SALFS partnership will work to support its effective usage.

End of Life decision making and anticipatory care planning

CPR is a treatment that could be attempted on any individual whose heart function stops. Such events are inevitable as part of dying and thus, theoretically, CPR could be given to every person when they die.

It is therefore essential that emergency responders can more easily identify people for whom cardiac arrest represents the terminal event in their illness and for whom CPR would be inappropriate because it will not be of benefit or they have recorded that they do not want to receive CPR. This helps them to ensure that action taken reflects the wishes of that person.

Guidance is already in place to support recording of such decisions but the visibility of this can often be difficult in the emergency situation. We will work with NHS and emergency response partners to ensure the systems are in place to make information recorded about such decisions more accessible to all responders, and so help to

Bystander Action (Call 999, CPR and Defibrillation)

reduce unwanted or inappropriate resuscitation attempts.

Defibrillators

Public Access Defibrillators (PADs) are designed for use by members of the public without training. They come with written instructions and can give audible guidance to users.

PADs are automatic defibrillators, which means that they will only deliver a shock where it is required. Despite this, the public are often still reluctant to use them^{43,44,45}.

To address this, we will work to embed the use of PADs within our public awareness campaign outlined in the Getting Scotland OHCA Ready chapter. We will draw on examples of best practice from the partnership and other local community groups to develop our messaging in this regard. Another barrier to prompt bystander defibrillation is a lack of accessibility of PADs. This can be a result of a combination of factors including; lack of registration limiting the ability for SAS call handlers to direct a bystander

to a nearby PAD, or the lack of a PAD placed within an accessible distance to the location of the OHCA.

At the time of writing, PADs are only used by the public in around 8% of arrests in Scotland⁴⁶.

There are many PADs installed in a variety of locations across Scotland, though not all are registered with the Scottish Ambulance Service. We will continue to encourage the accessible mounting, clear signposting and registration of PADs.

The Scottish Ambulance Service uses 'The Circuit', a UK-wide registry of defibrillators developed by the British Heart Foundation which allows 999 call handlers to quickly direct bystanders to a registered PAD when it is nearby. We recommend that all PADs are registered to increase the opportunities for the ambulance service to be aware of their location and support bystanders to access and use them in instances of OHCA.

To support effective use of PADs, we published [Out-of-Hospital Cardiac Arrest: guide to public access defibrillators in 2018](#). This provides practical advice to those considering a PAD for their local community.

We will update the guide during the lifetime of this strategy to provide the most up to date advice and encourage communication between potential PAD guardians and SALFS partners.

PAD location work

Mathematical modelling can be used to help ensure that PADs are placed in locations that maximise their usefulness. Using our knowledge of where OHCA's are most likely to happen we are able to build a tool to show where PADs are most likely to be required.

We are working to make this type of tool readily available to communities and organisations who wish to deploy PADs for greatest benefit.

Bystander Action (Call 999, CPR and Defibrillation)

Actions:

1. We will work with Local Authorities to give school aged children to opportunity to be equipped with CPR skills.
2. We will work with the Scottish Ambulance Service to optimise the interaction with call handlers as they assist bystanders in performing CPR and using PAD.
3. We will support the development and deployment of first responder networks. This will include
 - ensuring first responders are trained in the delivery of high performance CPR.
 - working with communities, statutory organisations and third sector organisations to support a coordinated first response to OHCA.
4. We will work with NHS and emergency response partners to make sure that systems are in place to make information recorded about end of life decisions is available and accessible to responders in instances of OHCA.
5. We will familiarise adults and children across Scotland with PAD usage.
6. We will analyse and publish data to provide members of the public with information as to the most effective location to place their defibrillator.
7. We will develop and implement evidence based national PAD guidelines, focusing on optimal placement and public engagement.
8. We will continue to encourage the accessible mounting, clear signposting and registration of PADs with the Scottish Ambulance Service.



Brian Clarke

“Brian keeps wanting to say thank you all the time, but seeing him here speaking to us today is the best thank you”

On February 15th 2015 Brian Clarke was leaving the gym in Anstruther when he had a cardiac arrest. He was found in his car by a passerby who alerted the staff inside the gym. Stuart Barton, who had spoken to Brian only moments ago was shocked as he ran outside to see him collapsed. With another member of the public, he checked for breathing, called 999 and sent for a defibrillator. He also began CPR.

“So there’s me, never used a defibrillator before, panicking, but it was so simple and you have that horrible thing going in your mind, am I doing this right? But it was honestly so simple and speaks so clearly, “analysing patient, shock advised, shock given”, and then away you go with your CPR again. And right as we had a pulse, a knight in shining armour, the first responder showed up.”

Gillian Duncan from East Neuk First Responders was now on the scene and took over from Stuart. Shortly after that, a Scottish Ambulance paramedic arrived and took Brian to hospital. Brian was on a life support machine for 50 hours and his family really didn't know what was going to happen, but then, he woke up. He was still Brian. He survived his OHCA because of the early actions of these individuals including early defibrillation.

Hospital Care



We will ensure specialist in-hospital care to support recovery

Aims:

1. We will support continuous improvement of specialist in-hospital care to improve survival from OHCA.

People who experience a cardiac arrest and have responded to initial treatment often need advanced hospital care for a period of time after the heart has been restarted.

If they are unconscious or vital organs need support, frontline doctors, nurses and other health care professionals working in Intensive Care Units (ICUs) and Coronary Care Units (CCUs) provide specialist life support therapies to provide the best chance of recovery.

Despite receiving life support therapies, high numbers of people continue to die each year in ICU after suffering a cardiac arrest but survival rates with good neurological recovery of up to 60% are possible^{47 48}.

ICU care is a crucial step in recovery from OHCA for people who experience a cardiac arrest and their families. Scotland has a cohesive, joined-up network of highly trained and motivated ICU healthcare professionals, supported by access to high quality data and information systems. We will build upon these unique strengths to support continuous improvement of specialist in-hospital care to support the recovery of people who experience a cardiac arrest. Sharing innovation and excellence through the network of ICU healthcare professionals will help us to achieve this.

Recent research has driven forward treatments for people admitted to ICUs after experiencing a cardiac arrest. In partnership with the Scottish Intensive Care Society and Scottish Intensive Care Society Audit Group, we will develop guidelines, which reflect the most up to date evidence on ICU care for people after cardiac arrest.

Making better use of the high quality information stored in Scotland's unique healthcare databases could enhance our audit systems. We will consider what is important to measure in order to drive effective improvements in care.

Actions:

1. We will develop a national ICU OHCA guideline to include:

- Advice on which patients are likely to benefit from treatment in an Intensive Care Unit.
- How best to coordinate with clinical staff across relevant hospital specialties.
- What is the best way to deliver specialist treatment - such as temperature management (initiation, maintenance, rewarming and normothermia, shivering management, physiologic targets during temperature management).
- Best practice to determine whether ICU treatment is benefitting

Hospital Care

someone after OHCA (Multi-modal prognostication).

- Improving pathways for rehabilitation after discharge from ICU.
 - Advice about organ donation.
- 2. We will explore the feasibility of embedding components of OHCA care in ICU in the Scottish Intensive Care Society Minimum Standards and Quality Indicators.**
 - 3. We will share innovation and best practice about OHCA across Scotland's ICUs to promote rapid translation of new evidence into practice. We will take a holistic approach to this work, encompassing ICU care, bereavement care and post ICU rehabilitation and support.**



Cherill Parry

“I wouldn’t be here if it wasn’t for the defibrillator at the community centre and someone being able to use it on me. If I could tell you one thing it would be that you can’t hurt someone, you can only do good.”

On Saturday 9th June 2018, Cherill Parry was walking her dog in Gairloch when she started to feel unwell. After visiting her doctor, she arrived home only to collapse on the pavement outside.

“I got out of the car and I don’t remember anything for about three weeks after that! I was told that I dropped like a stone on the pavement outside my house, and my neighbour ran across to the community centre to get the defibrillator and used it on me. After that, the doctor and the air ambulance arrived. Apparently I ‘died’ a couple of times, according to reports.”

After three weeks in Raigmore Hospital in Inverness, Cherill was transferred to Edinburgh where she underwent heart surgery to fit a pacemaker. After leaving the hospital she returned to Raigmore for a further two weeks, but is now recovered.

Sadly, Cherill was informed in hospital that her husband Russell had died at home in Gairloch exactly two weeks after her cardiac arrest. At her husband’s funeral, a collection was taken for another defibrillator. Little did she know then that this defibrillator would go on to save the life of another person in 2020. Despite enduring such serious illness and personal tragedy, Cherill remains positive about the future and was quick to pay tribute to the role of CPR and defibrillator community groups like Lucky2Bhere. I wouldn’t be here if it wasn’t for the defibrillator at the community centre and someone being able to use it on me”

Aftercare



We will ensure support for people in Scotland after their experience with out-of-hospital cardiac arrest.

Aims:

1. All individuals who experience an OHCA are well supported afterwards.

2. There is support available for bystanders who witness an OHCA.

3. The wellbeing of emergency service and volunteer community responders is supported.

It is important to ensure that care and support is available for all people who have been affected by OHCA. This includes survivors, their families, bystanders and other responders.

In order to support the aftercare needs of people who have been affected by OHCA, it is vital that we listen to the lived experience to shape our actions and develop our support resources.

Survivors and their families

For many survivors, the cause of their cardiac arrest will have been a blockage in one of the blood vessels supplying the heart muscle. This causes a heart attack which can sometimes lead to cardiac arrest.

People who have this underlying cause for their cardiac arrest will be eligible to access cardiac rehabilitation. Cardiac rehabilitation services provide vital support to help people get back to everyday life as much as possible after developing heart disease.

However, for people who experience cardiac arrest with a different cause – for example Spontaneous Coronary Artery Dissection (SCAD), or an inherited heart condition, may not be eligible for referral into these services.

Wider work on improving timely and equitable access to rehabilitation for people with heart disease is covered within the Scottish Government's Heart Disease Action Plan. We will work collaboratively to improve this kind of

support for people who experience cardiac arrest.

We must also recognise that OHCA can have a significant impact on people's emotional and psychological wellbeing, and explore how best to support people in coping with these impacts.

Many OHCA survivors can benefit from accessing information and support. This can take the form of peer support such as online forums from Sudden Cardiac Arrest UK (<https://www.suddencardiacarrestuk.org/get-support>), or in some cases, specialist help, such as the "Life After Cardiac Arrest" (www.lifeaftercardiacarrest.org) resource for survivors and families experiencing loss after OHCA.

Many of the SALFS partner organisations have information available about cardiac arrest. This includes support groups for survivors and specialist psychological services in some cases.

We will continue to signpost to these as part of our public awareness campaign. We will also seek to identify and amplify examples of best practice in order to increase the availability of help to those who need it.

Bystanders

The increasing bystander CPR rate in Scotland means that more people are intervening in an OHCA than ever before.

Several studies have explored the effect of witnessing a cardiac arrest on the well-being of bystanders, who are often family members of the person in cardiac arrest. Fear, anxiety, anger, confusion, and even signs of post-traumatic stress have been reported⁴⁹
50 51 52 53 54 55.

Research looking at the experience of bystanders has also shown wide variation in individual preference for the support they require from clinical staff. Clinicians involved in those cases had a huge impact on individuals' experience after the cardiac arrest and are therefore in a key position to make a difference to individuals after OHCA⁵⁶.

Responding to this need for support, SALFS partners have created online educational resources aimed at emergency services clinicians and First Responders to provide a space of further learning to understand OHCA post-event. We will signpost to these resources as part of our ongoing public awareness work.

We will continue to explore and learn from national and international initiatives to increase the availability of support to OHCA bystanders.

Innovations such as the Bystander Support Network in Canada have been created to provide an opportunity for bystanders to find further information and support.

Support for Community Responders and Emergency Services

In addition to the needs of members of the public who are bystanders to OHCA, we also need to consider the mental wellbeing of responders (including community First Responders and those working in emergency services).

The Rivers Centre (www.lifelines.scot) is a specialist service for First

Responders affected by psychological trauma. We will work closely with community responder groups, the Scottish Ambulance Service, Police Scotland, and Scottish Fire and Rescue Service to raise awareness of this resource and support responders to access the support they require.

Case Study: Bystander Support in Canada

In Canada, an online Bystander Support Network has been created to provide resources alongside an online forum for bystanders affected by Cardiac Arrest⁵⁷. Members are able to research, ask questions, share stories, and network with others from around the world who have been affected by OHCA. It is a resource for members of the public seeking support after an OHCA but also an evolving piece of research to help clinicians and researchers learn more about the bystander experience and what types of support is needed.

<http://www.bystandernetwork.org/>

Actions:

- 1. We will provide a range of aftercare support, including online, telephone and face-to-face resources.**
- 2. We will improve signposting to existing aftercare support.**
- 3. We will develop a referral pathway for First Responders to access aftercare support.**
- 4. We will include aftercare in our public awareness campaign to ensure that people are aware of the routes through which they can access support.**
- 5. We will listen to those with lived experience of OHCA to better understand their aftercare needs.**

Data and Innovation



We will ensure access to timely, high quality data to facilitate open review, discussion, learning and action planning.

Aims:

1. **Our use of data will help us to understand and address variation and improve outcomes after OHCA.**
2. **Innovative solutions are used to tackle the key challenges relating to OHCA.**

To support all the ambitions of this strategy it is important that we have access to, and effectively utilise, data to understand the system of care required to preserve life and provide support for those affected by OHCA⁵⁸
⁵⁹.

Access to this information enables us to understand where inequities exist, and where improvements can be made. Ultimately, this supports our ability to direct our actions and resources in the most effective way to improve outcomes from OHCA across Scotland.

The OHCA Data Linkage Project

As part of the 2015 OHCA Strategy we established the OHCA data linkage project⁶⁰. This gave us an effective base upon which to begin to measure progress towards our aims. For example, we were able to show an increasing rate of bystander CPR, and identify trends in public access defibrillator deployment both of which were key components of the first strategy.

The key clinical outcome after OHCA is long term patient survival. Our data linkage reporting helped us show that across the lifetime of the strategy the number of people who survived to leave hospital after an OHCA increased from 1 in 20 to 1 in 10⁶¹.

Next steps in data analysis

Survival is an important measure, but cannot be considered in isolation. Preparing communities and responders to intervene appropriately

in the community, returning people to their families where possible after OHCA, and supporting them through their survivorship^{62 63} requires a multi-faceted approach. In this context survival is not always the most important outcome, and is certainly underpinned by a range of crucially important process measures over which we have more direct influence.

We will continue to identify key metrics in the augmented chain of survival and find ways to measure what is important to delivering our aims.

By taking this approach our data linkage work has already enabled vital insights about where we should focus our attention as we move forward with this refreshed strategy. We now have the opportunity to develop this further by modelling changes to the chain of survival in Scotland to see where improvement will have the most impact.

We will work collaboratively with the Scottish Cardiac Audit to link SAS data about OHCA with detailed data held about cardiac care, to understand the cardiology care that people who experience an out of hospital cardiac arrest receive and how this impacts on their outcomes.

Similarly we wish to work with Intensive Care colleagues to take advantage of the high quality audit information stored in Scotland's unique healthcare databases to facilitate innovation and excellence in care across Scotland's ICUs that will promote best practice.

Analysis of Scottish OHCA outcomes has shown that people living in more deprived areas remain more likely to experience an OHCA and that people from deprived areas are still less likely to survive following OHCA. Deprivation also has a significant effect on the likelihood of receiving bystander CPR⁶⁴.

A weight of international literature also makes us aware that the intersection between OHCA and gender, ethnicity, mental illness, and other comorbidities

creates particular challenges for successful prevention and resuscitation. We will endeavour to combine OHCA data with insight from other sources in order to develop more effective systems of care.

Scotland's communities are characterised by variation, including geography, deprivation and age demographic. Often these characteristics will have an impact on OHCA outcomes, some of which are better understood than others, and can point us towards bespoke local considerations to be addressed in terms of the application of the key links in the chain of survival.

In addition where communities are more similarly configured but outcomes vary, this raises the potential for learning between systems in an attempt to improve outcomes. The key is intelligent use of data to understand variation and the factors that underlie this variation.

Our analysis of the whole patient journey after OHCA has also illuminated the crucial importance of respect for the wishes of individuals in respect to end of life care⁶⁵.

It reinforces the importance of enabling meaningful conversations between people, their families and those who support their care and wellbeing, about what they would wish to happen if they become unwell and face the scenario where resuscitative interventions may be applied.

Not only are these conversations to be encouraged but their output needs to be captured, and crucially to be available to emergency services in the minutes between a 999 call being received and a resuscitation commenced. This would help families cope with bereavement knowing that the wishes of their loved one were respected, help guide the efforts of clinicians, and most importantly seek to preserve dignity in death. We wish to explore innovative digital and communications solutions to the challenges this entails.

Technological innovation

Finally, addressing OHCA lends itself to the application of established and emerging technologies. These include using video for real time support, effective audit of care delivery,

technology to support recognition of OHCA including application of Artificial Intelligence, and the use of geospatial technology to enable resource location and utilisation (for example locating PADs or community responder resources).

It is our intention to work closely and collaborate widely with industry, clinical and academic partners in order to make the augmented Chain of Survival in Scotland an international example of best practice with regards to its use of technological innovation.

Actions:

- 1. We will develop a monitoring and evaluation framework for this strategy which will be focussed on key process measures of care for patients after OHCA.**
- 2. We will link data about OHCA with data about gender, ethnicity, mental illness, and other comorbidities to identify and address unwarranted variation.**
- 3. We will harness the potential of data held in Scotland's national ICU audit and cardiac audit**

through linkage with the Scottish Ambulance Service data.

- 4. We will develop a plan to use innovative digital technologies to interact with the public and facilitate bystander action in response to OHCA.**
- 5. We will facilitate collaboration between strategy delivery and academic partners to answer key questions about OHCA.**
- 6. We will work with colleagues in primary care to implement solutions to the challenges of timely communication of anticipatory care plans and decision support for front line ambulance service crews in dealing with complex end of life care decisions.**

Conclusion

This refreshed strategy marks a refocusing of the aims outlined within the inaugural OHCA Strategy 2015 – 2020. It is an effort to build on our successes, and to further target our work as we continue to address OHCA in Scotland.

We have made excellent progress throughout the lifetime of the 2015 strategy. Despite this, current survival rates from OHCA in Scotland are still lower than we want them to be.

At this stage, we must tackle some significant challenges in order to further improve. We must continue with our important work to get Scotland CPR ready, through raising awareness of OHCA and the importance of bystander action - but as part of this we must also address some of the misconceptions around CPR. We will also continue, through the excellent work of our partners, to support communities to prepare themselves to respond effectively to OHCA. We know that there are parts of the country, and groups of people that we need to make a particular effort to reach because they experience inequalities in outcomes from OHCA. This targeted approach to tackling inequalities is a continued area of focus for us in this refreshed strategy.

We have also sought within this strategy to support bystander action, improve accessibility of Public Access Defibrillators and ensure that we do all that we can to encourage seamless and prompt intervention for people who have an OHCA. We have identified key actions to support continuous improvements within hospital care to support recovery of people after cardiac arrest, and vitally, we have identified key actions which recognise the importance of providing aftercare support to everyone affected by OHCA.

Partnership remains at the core of this refreshed strategy. Working together to discover bright spots of best practice and applying it across our country. Improving by sharing our data and our stories. Creating better systems by understanding each other's challenges. Flourishing by celebrating each other's successes.

We want to learn from the experiences of the last five years in order to do better, equip more communities, help more individuals and save more lives. Scotland's Out-of-Hospital Cardiac Arrest Strategy 2021-2026 sets out how we will do that.

Appendices: Overlapping policy and strategies



The partners recognise that a healthy lifestyle can have a marked effect on the likelihood of experiencing a cardiac arrest, heart attack or poor heart health. These National Strategies sit alongside the OHCA strategy:

Diet and Healthy Weight

[A healthier future: Scotland's diet and healthy weight delivery plan](#)

Alcohol and Drugs

[Rights, respect and recovery: alcohol and drug treatment strategy](#)

Physical Activity Action Plan

[A More Active Scotland: Scotland's Physical Activity Delivery Plan](#)

Tobacco Action Plan

[Raising Scotland's tobacco-free generation: our tobacco control action plan 2018](#)

In addition, the following areas are relevant to the strategy:

Anticipatory care planning

[Anticipatory care planning | NHS inform](#)

Palliative care

[Palliative and End of Life Care: Strategic Framework for Action](#)

Health Literacy and person centred care

[Making it easier: a health literacy action plan 2017 - 2025](#)

[The Health Literacy Place](#)

Scotland's Digital Strategy

[Scotland's Digital Future: A Strategy for Scotland - gov.scot \(www.gov.scot\)](#)

Realistic Medicine

[Realistic Medicine – Shared decision making, reducing harm,](#)

[waste and tackling unwarranted variation](#)

National Performance Framework (NFP)

Jointly developed by the Scottish Government, COSLA and the people of Scotland, the [National Performance Framework](#) is a vision for Scotland which reflects our values as a nation and the aspirations we hold for our future.

External documents

[Resuscitation to Recovery](#) by Resuscitation Council UK and British Heart Foundation

[In Hospital Care of Out of Hospital Cardiac Arrests: Time matters](#) by the National Confidential Enquiry into Patient Outcome and Death

Appendices: Glossary

ALLIANCE	The Health and Social Care Alliance Scotland is the national third sector intermediary for a range of health and social care organisations: https://www.alliance-scotland.org.uk/
Scottish Ambulance Service Call Handlers	Those who answer 999 calls, speak to and direct the caller until further help arrives.
BSL	British Sign Language.
The Circuit	A national defibrillator network funded by the British Heart Foundation and adopted by the Scottish Ambulance Service.
CCUs	Coronary Care Units.
Coronary Heart Disease	A major cause of morbidity and mortality in Scotland caused by a blockage in the arteries.
CPR	Cardio-pulmonary Resuscitation. This abbreviation is commonly used for delivery of Chest Compressions, with or without the addition of rescue breaths.
Data Linkage	Scottish Ambulance Service data linked to patient outcomes.
ECMO	Extracorporeal membrane oxygenation. A machine that replaces the function of the heart and lungs.
GoodSAM	A first responder application for smartphones.
GRA	Global Resuscitation Alliance: www.globalresuscitationalliance.org
ICU	Intensive Care Unit.
Local Authorities	Local government comprising 32 local authorities across Scotland providing public services, including education, social care, waste management, libraries and planning.
Normothermia	Normal body temperature.
NPF	National Performance Framework: https://nationalperformance.gov.scot/

Appendices: Glossary

OHCA	Out-of-Hospital Cardiac Arrest. A cardiac arrest occurring outside of a hospital environment.
PADs	Public Access Defibrillators. Automated External Defibrillators designed for use by the public before the arrival of emergency services.
ROSC	Return of spontaneous circulation. Resumption of a sustained heart rhythm that sends blood around the body after cardiac arrest.
SAS	Scottish Ambulance Service.
SALFS	The Save a Life for Scotland partnership is composed of public, government, academic and third sector organisations: www.savealife.scot
SCAD	Spontaneous Coronary Artery Dissection a rare condition where a tear appears in an artery which is an oxygen rich blood vessel that takes blood away from the heart.

Appendices: References

¹ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020) pp.5

² Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020) pp. 4

³ Wissenberg, M., Lippert, F., Folke, F., Weeke, P., Hansen, C., Christensen, E., Jans, H., Hansen, P., Lang-Jensen, T., Olesen, J., Lindhardsen, J., Fosbol, E., Nielsen, S., Gislason, G., Kober, L., Torp-Pedersen, C., 'Association of national initiatives to improve cardiac arrest management with rates of bystander intervention and patient survival after out-of-hospital cardiac arrest' *Journal of American Medical Association* (2013) 310, pp. 1377–1384.

⁴ Lindner, T., Søreide, E., Nilsen, O., Torunn, M., Lossius, H., 'Good outcome in every fourth resuscitation attempt is achievable — An Utstein template report from the Stavanger region' *Resuscitation* (2011) 82, pp.1508–13

⁵ Save A Life For Scotland, *Out of Hospital Cardiac Arrest: A Strategy for Scotland* (Edinburgh, 2015)

⁶ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020) pp. 4

⁷ Global Resuscitation Alliance, *Improving Survival from Out of Hospital Cardiac Arrest: Acting on the call* (Seattle, 2018)

⁸ Scottish Government (Social Research), *The Scottish Approach: A case study of the Out-of-Hospital Cardiac Arrest Strategy* (Edinburgh, 2017)

⁹ American Heart Association, 'Improving survival from sudden cardiac arrest: the “chain of survival” concept. A statement for health professionals from the Advanced Cardiac Life Support Subcommittee and the Emergency Cardiac Care Committee' *Circulation* (1991) 83 (5) pp. 1832 – 1847

¹⁰ Save a Life For Scotland, *Out of Hospital Cardiac Arrest: A Strategy for Scotland* (Edinburgh, 2015) pp. 13

Appendices: References

- ¹¹ Scottish Government 'Scottish Health Survey webpage' [Scottish Health Survey - gov.scot \(www.gov.scot\)](https://www.gov.scot/scottish-health-survey) [accessed 02/03/21]
- ¹² Dobbie, F., Uny, I., Eadie, D., Duncan, E., Stead, M., Bauld, L., Angus, K., Hassled, L., MacInnes, L. & Clegg, G. 'Barriers to bystander CPR in deprived communities: Findings from a qualitative study' *PLOS ONE* (2020)15(6)
- ¹³ Chamberlain, R. C., Barnettson, C., Clegg, G. R. & Halbesma, N. 'Association of measures of socioeconomic position with survival following out-of-hospital cardiac arrest: A systematic review' *Resuscitation* (2020) 157, pp. 49–59 .
- ¹⁴ Global Resuscitation Alliance, Improving Survival from Out of Hospital Cardiac Arrest: *Acting on the call* (Seattle, 2018)
- ¹⁵ Deakin, C., 'The Chain of Survival: Not All Links Are Equal' *Resuscitation* (2018) 126 pp. 80–82,
- ¹⁶ Larsen, M.P., Eisenberg, M.S., Cummins, R.O., Hallstrom, A.P. 'Predicting survival from out-of-hospital cardiac arrest: A graphic model' *Annals of Emergency Medicine* (1993) 22(11),pp.1652-8.
- ¹⁷ The Scottish Government (Social Research), *Exploring the knowledge, attitudes, and behaviour of the general public to responding to out-of-hospital cardiac arrest* (Edinburgh 2016)
- ¹⁸ Dobbie, F., Uny, I., Eadie, D., Duncan, E., Stead, M., Bauld, L., Angus, K., Hassled, L., MacInnes, L. & Clegg, G. 'Barriers to bystander CPR in deprived communities: Findings from a qualitative study' *PLOS ONE*, (2020) 15(6)
- ¹⁹ Public Health Scotland 'The right to health: tackling inequalities' [Overview of the right to health - The right to health - Health inequalities - Public Health Scotland](#) [accessed 05/03/2021]
- ²⁰ Chamberlain, R. C., Barnettson, C., Clegg, G. R. & Halbesma, N., 'Association of measures of socioeconomic position with survival following out-of-hospital cardiac arrest: A systematic review' *Resuscitation* (2020)157, pp. 49–59
- ²¹ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020) pp. 7
- ²² Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020) pp. 21

Appendices: References

- ²³ Scottish Government, *Rural Scotland: key facts* (Edinburgh, 2018)
- ²⁴ Save a Life For Scotland, *Out-of-Hospital Cardiac Arrest: A strategy For Scotland Data Linkage Report 2015/2016* (Edinburgh, 2016) pp. 5
- ²⁵ British Heart Foundation, 'South Asian Background and heart health' [South Asian background and heart health \(bhf.org.uk\)](https://www.bhf.org.uk) [accessed 18 February 2021]
- ²⁶ Blewer, A. L., McGovern, S. K., Schmicker, R. H., May, S., Morrison, L. J., Aufderheide, T. P., Daya, M., Idris, A., Callaway, C., Kudenchuk, P., Vilke, G., and Abella, B. 'Gender Disparities Among Adult Recipients of Bystander Cardiopulmonary Resuscitation in the Public' *Circulation: Cardiovascular Quality and Outcomes*, 11 (2018) pp. 2
- ²⁷ Save a Life For Scotland, *Out-of-Hospital Cardiac Arrest: A strategy For Scotland Data Linkage Report 2015/2016* (Edinburgh, 2016)
- ²⁸ Perman, S., Shelton, S., Knoepke, C., Rappaport, K., Matlock, D., Adelgais, K., Havranek, E., and Daugherty, S., 'Public Perceptions on Why Women Receive Less Bystander Cardiopulmonary Resuscitation Than Men in Out-of-Hospital Cardiac Arrest' *Circulation*, (2019) 139, pp. 1060 - 1068
- ²⁹ GoodSAM <https://www.goodsamapp.org/medical> [accessed 8 March 2021]
- ³⁰ Resuscitation Council UK, 'CPR in Schools' [CPR in Schools | Resuscitation Council UK](https://www.resus.org.uk/cpr-in-schools) [accessed 5 March 2021]
- ³¹ British Heart Foundation and Resuscitation Council UK, *A guide to automated external defibrillators (AEDS), Resuscitation Council UK and BHF* (London, 2019)
- ³² Comilla, S., A.M., R. M., Jason, D. & L., K. A., 'Predictors of Survival From Out-of-Hospital Cardiac Arrest' *Circulation* (2010) 3 (1), pp.63–81
- ³³ Valenzuela, T., Roe, D., Nichol, G., Clark, L., Spaite D., Hardman, R., 'Outcomes of rapid defibrillation by security officers after cardiac arrest in casinos' *New England Journal of Medicine* (2000) 343, pp. 1206-9.

Appendices: References

- ³⁴ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020)
- ³⁵ The Scottish Government (Social Research), *Exploring the knowledge, attitudes, and behaviour of the general public to responding to out-of-hospital cardiac arrest* (Edinburgh 2016)
- ³⁶ Dobbie, F., Uny, I., Eadie, D., Duncan, E., Stead, M., Bauld, L., Angus, K., Hasseld, L., MacInnes, L., Clegg, G., 'Barriers to bystander CPR in deprived communities: Findings from a qualitative study' *PLOS ONE* (2020) 15 (12)
- ³⁷ The Scottish Government (Social Research), *Exploring the knowledge, attitudes, and behaviour of the general public to responding to out-of-hospital cardiac arrest* (Edinburgh 2016)
- ³⁸ Rios, M. D., Han, J., Cano, A., Ramirez, V., Morales, G., Campbell, T. L. & Hoek, T. V. 'Pay it forward: High school video-based instruction can disseminate CPR knowledge in priority neighborhoods' *Scopus* (2018)19(2) 423–429
- ³⁹ Isbye, D. L., Rasmussen, L. S., Ringsted, C. & Lippert, F. K., 'Disseminating Cardiopulmonary Resuscitation Training by Distributing 35 000 Personal Manikins Among School Children' *Circulation* (2007)116, pp.1380–1385 .
- ⁴⁰ Fleischhackl, R., Nuernberger, A., Sterz, F., Schoenberg, C., Urso, T., Habart, T., Mittlboeck, M. & Chandra-Strobos, N., 'School children sufficiently apply life supporting first aid: a prospective investigation' *Critical Care* (2009)13(4)
- ⁴¹ Resuscitation Council UK, NHS England and British Heart Foundation, 'Consensus Paper on Out-of-Hospital Cardiac Arrest In England' [OHCA consensus paper.pdf \(resus.org.uk\)](https://www.resus.org.uk/ohca-consensus-paper.pdf) [accessed 5 March 2021]
- ⁴² Community Empowerment (Scotland) Act 2015
- ⁴³ Smith, C. M., Keung, S. N. L. C., Khan, M. O., Arvanitis, T. N., Fothergill, R., Hartley-Sharpe, C., Wilson, M. H. & Perkins, G. D. 'Barriers and facilitators to public access defibrillation in out-of-hospital cardiac arrest: a systematic review' *European Heart Journal - Quality of Care and Clinical Outcomes* (2017) 3(4) pp. 264–273

Appendices: References

- ⁴⁴ Hawkes, C. A., Brown, T. P., Booth, S., Fothergill, R. T., Siriwardena, N., Zakaria, S., Askew, S., Williams, J., Rees, N., Ji, C. & Perkins, G. D. 'Attitudes to Cardiopulmonary Resuscitation and Defibrillator Use: A Survey of UK Adults in 2017' *Journal of the American Heart Association* (2019) 8(7)
- ⁴⁵ Krammel, M., Schnaubelt, S., Weidenauer, D., Winnisch, M., Steininger, M., Eichelster, J., Hamp, T., Tulder, R. van & Sulzgruber, P. 'Gender and age-specific aspects of awareness and knowledge in basic life support' *PLOS ONE* (2018)13(6)
- ⁴⁶ Pg 12, Scottish Out of Hospital Cardiac Arrest Data Linkage Project 2018-2019.
- ⁴⁷ Hindle, E., Dunn, M., Gillies, M. & Clegg, G. 'Neuroprognostication following out of hospital cardiac arrest - a retrospective study of departmental practice' *Intensive Care Medicine Experimental* (2015) 3 (Suppl 1)
- ⁴⁸ Nolan, J., Laver, S., Welch, C., Harrison, D., Gupta, V., and Rowan, K., 'Outcome Following Admission to UK Intensive Care Units after Cardiac Arrest: A Secondary Analysis of the ICNARC Case Mix Programme Database', *Anaesthesia* (2007) 62 (12) pp. 1207–16
- ⁴⁹ Weslien M., Nilstun, T., Lundqvist A., and Fridlund B., 'When the unreal becomes real: family members' experiences of cardiac arrest' *Nursing in Critical Care* (2005) 10, pp. 15-22
- ⁵⁰ Pusswald, G., Fertl, E., Faltl, M., and Auff, E. 'Neurological rehabilitation of severely disabled cardiac arrest survivors. Part II. Life situation of patients and families after treatment' *Resuscitation* (2000) 47, pp. 24-241
- ⁵¹ an Wijnen, H., Rasquin, S., van Heugten, C., Verbunt, J., and Moolaert, V., 'The impact of cardiac arrest on the long-term wellbeing and caregiver burden of family caregivers: a prospective cohort study' *Clinical Rehabilitation* (2017) 31, pp. 1267-1275
- ⁵² Wallin, E., Larsson, I., Rubertsson, S., and Kristoferzon, M., 'Relatives' experiences of everyday life six months after hypothermia treatment of a significant other's cardiac arrest' *Journal of Clinical Nursing* (2013) 22, pp. 1639-1646
- ⁵³ Ingles, J., Spinks, C., Yeates, L., McGeechan, K., Kasparian, N., Semsarian, C., 'Post-traumatic Stress and Prolonged Grief After the Sudden Cardiac Death of a Young Relative' *Journal of the American Medical Association - Internal Medicine*. (2016) 176(3), pp. 402–405

Appendices: References

- ⁵⁴ van't Wout Hofland, J., Moolaert, V., van Heugten, C., Verbunt, J., 'Long-term quality of life of caregivers of cardiac arrest survivors and the impact of witnessing a cardiac event of a close relative' *Resuscitation* (2018) 128, pp. 198-203
- ⁵⁵ Wilder Schaaf, K., Artman, L., Peberdy, M., Walker, W., Ornato, J., Gossip, M., and Kreutzer, J., 'Anxiety, depression, and PTSD following cardiac arrest: A systematic review of the literature' *Resuscitation* (2013) 84 (7) pp. 873-877
- ⁵⁶ Weslien M., Nilstun T., Lundqvist A., and Fridlund B. 'When the unreal becomes real: family members' experiences of cardiac arrest. *Nursing in Critical Care* (2005) 10, pp. 15-22
- ⁵⁷ Haywood, K., and Dainty, K., 'Life after cardiac arrest: The importance of engaging with the 'forgotten patient'' *Resuscitation*, (2018) 128
- ⁵⁸ McNally, B., 'The Importance of Cardiac Arrest Registries' *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* (2014) 22 (1)
- ⁵⁹ Perkins, G. and Brace-McDonnell, S., 'The UK Out of Hospital Cardiac Arrest Outcome (OHCAO) Project', *BMJ Open* (2015) 5 (10)
- ⁶⁰ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2015/2016 results* (Edinburgh, 2017)
- ⁶¹ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020)
- ⁶² Hope, A., and Munro, C., 'Understanding and Improving Critical Care Survivorship', *American Journal of Critical Care* (2019) 28 (6) pp.410–12
- ⁶³ Iwashyna, T., 'Survivorship Will Be the Defining Challenge of Critical Care in the 21st Century' *Annals of Internal Medicine* (2010) 153 (3)
- ⁶⁴ Clegg, G., McGivern, G., Bywater, D., Short, S., and Kent, A., *Scottish Out-of-Hospital Cardiac Arrest Data Linkage Project: 2018/2019 results* (Edinburgh, 2020)

Appendices: References

⁶⁵ Cokljat, M., Lloyd, A., Clarke, S., Crawford, A., Clegg, G., 'Identifying patients at risk of futile resuscitation: palliative care indicators in out-of-hospital cardiac arrest' *BMJ Supportive & Palliative Care* (2019)



Scottish Government
Riaghaltas na h-Alba
gov.scot

© Crown copyright 2021



This publication is licensed under the terms of the Open Government Licence v3.0 except where otherwise stated. To view this licence, visit nationalarchives.gov.uk/doc/open-government-licence/version/3 or write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: psi@nationalarchives.gsi.gov.uk.

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This publication is available at www.gov.scot

Any enquiries regarding this publication should be sent to us at

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

ISBN: 978-1-80004-762-4 (web only)

Published by The Scottish Government, March 2021

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS841246 (03/21)

W W W . g o v . s c o t