NHS
South East Coast Ambulance Service
NHS Foundation Trust

Out of Hospital Cardiac Arrest: Annual Report

April 2022 – March 2023

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Contents

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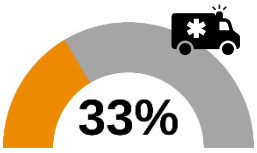
Key figures at a glance

All cardiac arrests

8,824 cardiac arrests attended

2,891 resuscitation attempts made



of arrests received a **resuscitation attempt**

Our patients

66% male
Median age: **69**

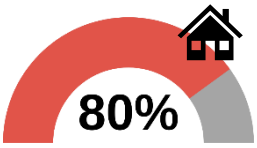
34% female
Median age: **71**

9% under 40 years old
50% over 70 years old

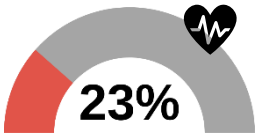
2.2% paediatric

Profile of resuscitation attempts

had a presumed **cardiac or medical aetiology**

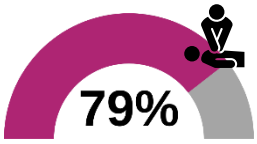


occurred at **home or at a private address**



presented in a **shockable initial rhythm** (VF/VT)

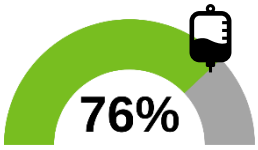
Bystander response



received **CPR from a bystander** before ambulance arrival *

259 defibrillators used before ambulance arrival (10%)*

Ambulance response

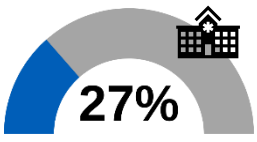


compliance with the **post ROSC care bundle**

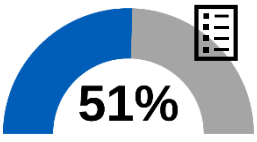
10m 35s mean ambulance response time*

90% attended within 17m 47s

ROSC at hospital



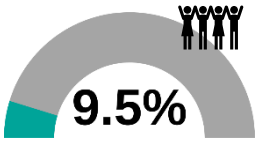
Overall



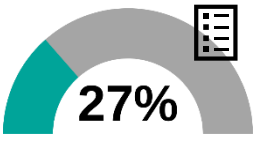
Utstein

912 conveyed to hospital (32%)
10% of these **conveyed to a pPCI**

Survival to 30 days



Overall



Utstein

271 lives saved

**non EMS witnessed resuscitation attempts*

Introduction

Out of hospital cardiac arrest (OHCA) is a life-threatening emergency where the heart stops pumping blood around the body. It is the most time-critical type of incident for ambulance services – without intervention, irreversible death can occur in as little as ten minutes from a patient's initial collapse.

Globally, survival rates from OHCA vary hugely, from less than 5% to more than 60%, and depend on a multitude of factors. Ambulance services have little control over many of these factors, such as patient age or cause of arrest. However, improvements in responding to OHCA, from treatment to timeliness, can, and absolutely do, save lives.

These controllable characteristics are summarised in the four links of the Chain of Survival. These links describe the whole system of care required for patients who experience an OHCA, from community readiness (including advance care planning) through to post discharge care.

This report is structured to examine the strength of each link within South East Coast Ambulance Service Foundation Trust (SECAmb) to both identify aspects with room for improvement and to highlight areas where we can be proud of our performance. It will also explore in further detail the factors which influence survival.

The data for this report comes from our Cardiac Arrest Registry – a database of all cardiac arrests attended by SECAmb. This includes data submitted to NHS England via the Out of Hospital Cardiac Arrest Outcomes (OHCAO) project at the University of Warwick. Information is taken from a wide range of sources, including ambulance patient care records, the Trust's Computer Aided Dispatch (CAD) system, defibrillator downloads, the NHS Summary Care Record, and from other supporting organisations, including Helicopter Emergency Medical Services (HEMS), volunteer and private providers, and hospital survival data.

The registry is based around the Utstein templates, which provides uniformity to the data and allows significant figures to be benchmarked against other services by collecting and categorising data in agreed ways.

Who are SECAmb?

SECAmb responds throughout the south east of England, providing emergency healthcare to a population of around 5 million people in Brighton and Hove, East Sussex, West Sussex, Kent, Surrey, and parts of north east Hampshire. From more than 100 sites we cover a diverse area of 3,600 square miles, including densely populated urban areas, sparsely populated rural areas, 440 miles of coastline, and some of the busiest stretches of motorway in the country.

We employ more than 4,500 people, around 90% of whom are operational. This includes both those working in the pre-dispatch phase, caring for patients remotely at our operations centres, where we receive 999 and 111 calls, and staff providing face-to-face care, including around 2,500 accident and emergency clinicians. Our patients present with highly varied conditions, from the critically ill and injured who need specialist treatment, to those with minor healthcare needs who can be treated at home or in the community.

We work alongside other emergency and blue light services, including police, fire, and other ambulance services, as well as specialist emergency organisations such as Helicopter Emergency Medical Services (HEMS), private and volunteer ambulance providers, and individual volunteers, including GoodSAM responders and our Community First Responders (CFRs).

*The helicopter emergency services organisation for the SECAmb area is **Air Ambulance Charity Kent Surrey Sussex (KSS)**. They respond to an average of nine emergency calls a day across the area, with specialised doctors and paramedics delivering treatment at scene. HEMS attended 11% of resuscitation attempts in SECAmb in 2022-23 (332), including 71% of those with a traumatic cause.*

Cardiac arrests in SECAmb

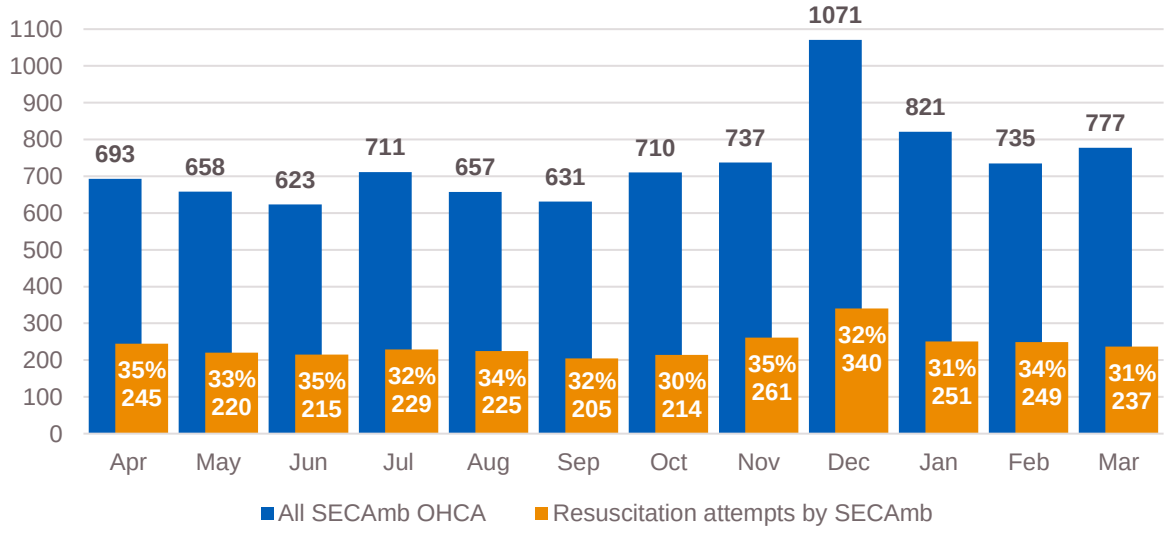
Between April 2022 and March 2023, SECAmb crews attended a total of **8,824 out of hospital cardiac arrests** (OHCA). Of these, **2,891 patients (33%) received a resuscitation attempt** from SECAmb crews.

On average, SECAmb attended 735 cardiac arrests and made 241 resuscitation attempts per month – this was more than one cardiac arrest every hour, and one resuscitation attempt approximately every three hours.

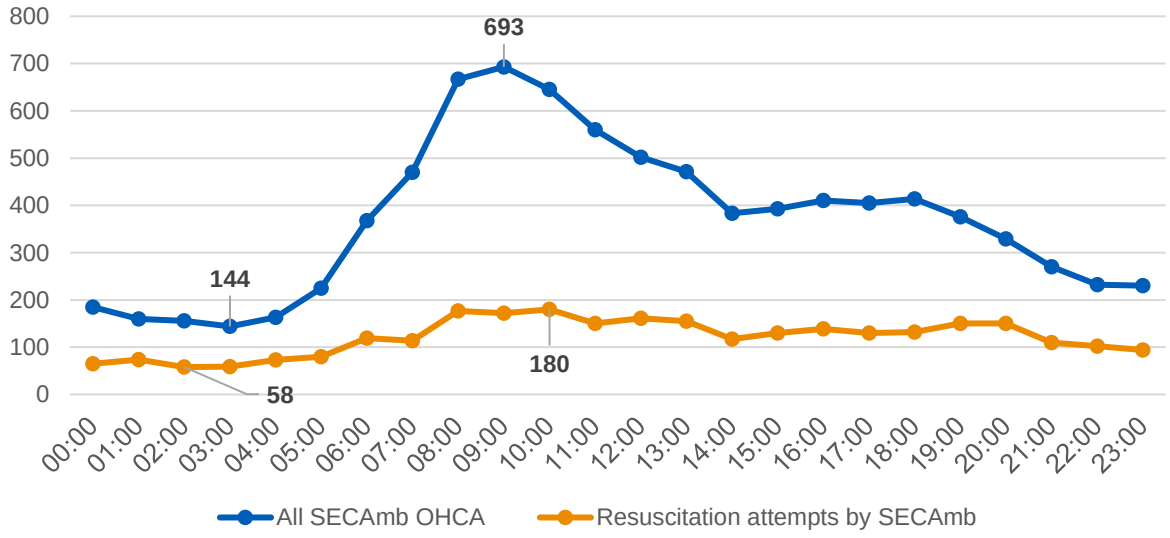
Compared to last year:

- The **number of cardiac arrests attended increased by 10%**, or 819 patients.
- The **number of resuscitation attempts increased by 4%**, or 103 patients.
- The **proportion of resuscitations attempted decreased by 2%**.

December remains our busiest month, with the highest number of both cardiac arrests and resuscitation attempts (1071 and 340 respectively). However, December 2022 was significantly busier than usual – **December was our first month with more than 1,000 cardiac arrests attended, an increase of 34% on December 2021**.



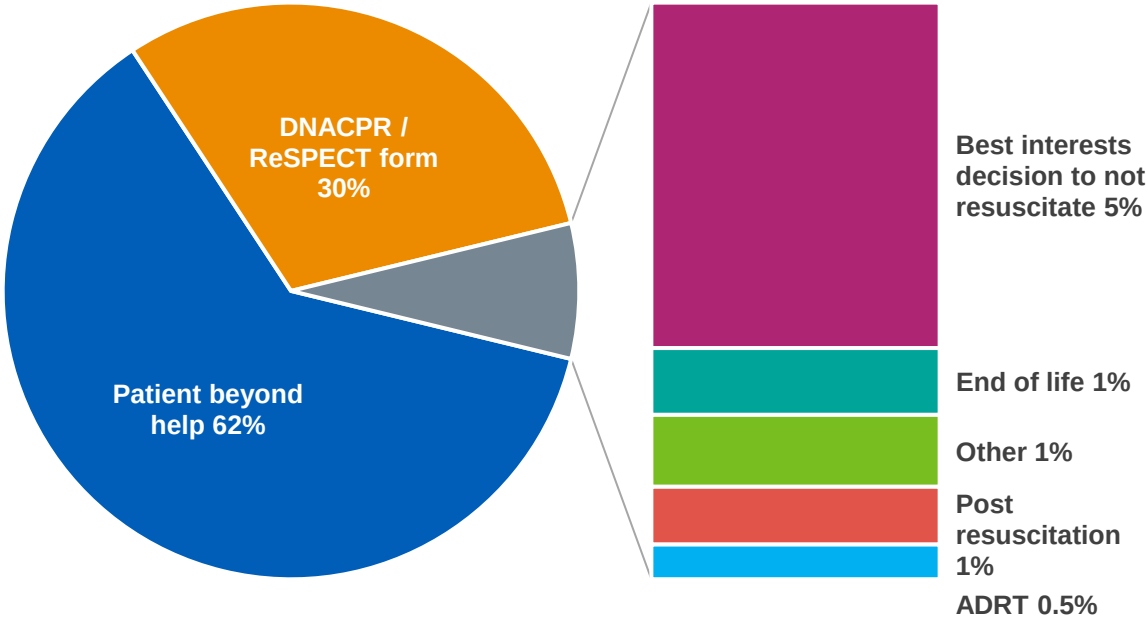
Our busiest time of day remained between 8am-11am, with 23% (2,005) of daily cardiac arrests and 18% (529) of daily resuscitation attempts.



Incidents where SECAmb was not primarily responsible for the patient are not included in the total of cardiac arrests – these include incidents where another ambulance Trust led the care, or where SECAmb provided assistance to arrests which occurred in a hospital.

Resuscitations not attempted

The most common reason for SECAmb not attempting a resuscitation was that the patient was beyond medical help (3,668). This is followed by patients who had formal CPR recommendations, such as ReSPECT (Recommended Summary Plan for Emergency Care and Treatment) or DNACPR (Do Not Attempt Cardiopulmonary Resuscitation) forms (1,805). Patients with other types of Advance Decisions to Refuse Treatment (ADRTs) or Treatment Escalation Plans (TEPs) made up 0.5% of incidents where a resuscitation was not attempted (27).



Included in the total cardiac arrests for the year were the 45 patients who were successfully resuscitated before SECAmb arrival, and did not rearrest (referred to as 'post resuscitation' patients).

For patients without formal care plans, clinicians may still deem a resuscitation attempt to not be in the patient's best interests. These patients include those who have informally expressed wishes regarding their care, and those nearing the natural end of their life due to comorbidities or life-limiting conditions that would make a successful resuscitation highly unlikely. These 'best interests' patients made up 4.5% of incidents where a resuscitation attempt was not made (269).

These figures are in line with last year, with a very slight increase in the proportion of patients who were beyond help, and a corresponding slight decrease in those for whom resuscitation was not started because of formal care plans. However, the **number of post resuscitation patients has increased by 44%** from last year.

Records are classified according to the reason that a resuscitation attempt was not made. For example, patients who were beyond help at the time of call would be classified as beyond help, regardless of whether they held a DNACPR or other care plan. Therefore, the number of cardiac arrest patients who held a formal CPR recommendation at the time of their cardiac arrest is higher than indicated in the above figures.

For 2022-23, a valid CPR recommendation or appropriate anticipatory care plan was held by approximately 35% of patients who did not receive a resuscitation attempt.

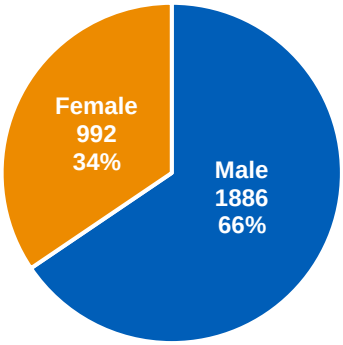
Advance treatment plans help ensure that patients receive appropriate care according to both what matters to them and what is realistic. However, for such plans to be effective, communication between all parts of the healthcare system is vital.

SECAmb uses IBIS (Intelligence Based Information System) to make patient care plans available to ambulance clinicians attending a patient – patient details are matched against the IBIS database when the 999 call is made so that plans can be accessed from scene.

IBIS currently holds over 40,000 patient care plans, including ReSPECT and DNACPR forms, patient's wishes for treatment and preferred place of care. It is used by Health Care Professionals (including respiratory/heart failure nurses, community matrons/district nurses, and mental health teams), GP surgeries, social services, housing services, hospices, and some acute trusts.

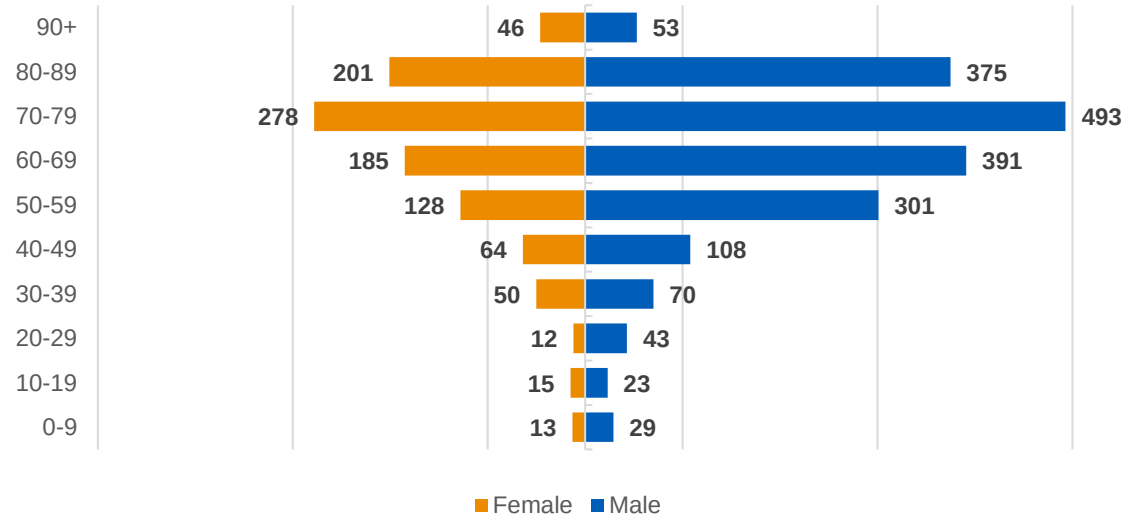
Our patients

The **characteristics of patients who received a resuscitation attempt from SECAmb remained highly consistent** with those seen in previous years, while the average ages of patients have increased slightly.



Men continued to outnumber women two to one, and still had a slightly lower average age, with a median of 69, whilst women had a median of 71. **The overall median age was 70**.

The distribution of ages also remained similar: **less than one in ten patients were under 40**, and **more than half were 70 or over**.



Approximately 2% of resuscitation attempts attended by SECAmb were paediatric patients (63), including 12 neonatal resuscitation attempts.

Michael's story

Michael Woolley, 80, from Reigate, suffered a cardiac arrest at his home in December 2022. His wife, Lynn, immediately began CPR, called 999 and followed the instructions of Emergency Medical Advisor, Barbara Trevena.

First to arrive at the scene in around five minutes was Paramedic, Lucy Thomson. Lucy commenced advanced life support and began delivering shocks with a defibrillator to restart Michael's heart, before being joined by Paramedics, Tracey Little and Millie Lowe, and Critical Care Paramedic, Lee Davis.

Together the team delivered eight shocks to establish a more normal rhythm for Michael's heart as the Trust's Hazardous Area Response Team arrived to lead a challenging exit from the couple's top floor apartment.

Michael was rushed to St George's Hospital where he underwent a procedure to open his arteries. While initially given a life expectancy of just one to two years, he has since had an internal defibrillator fitted, increasing his life expectancy by five to ten years.

"The day of my collapse was just miracle after miracle," explained Michael. "First that I wasn't on my own in the lift when I collapsed but instead in front of Lynn, then that Lynn began CPR so expertly directed by Barbara, and then that Lucy and her colleagues were so quickly with us ensuring I received the treatment I needed. Everything just fitted together so perfectly. I'm so lucky to be here and so grateful to the whole team for everything they did for me."

Barbara praised Lynn's calmness as she gave CPR to Michael ahead of Lucy's arrival. "Lynn did everything right. It's so vital that CPR is commenced straight away to give any patient the best chance of survival. Lynn was brilliant."

The initial CPR and subsequent treatment was so beneficial that hospital teams performed a second scan to check Michael's brain as the first showed so little damage.

Lynn expressed her thanks to the clear instruction delivered by Barbara and added, "I will forever be grateful for how she talked me through everything I needed to do that day. She was a calming voice."

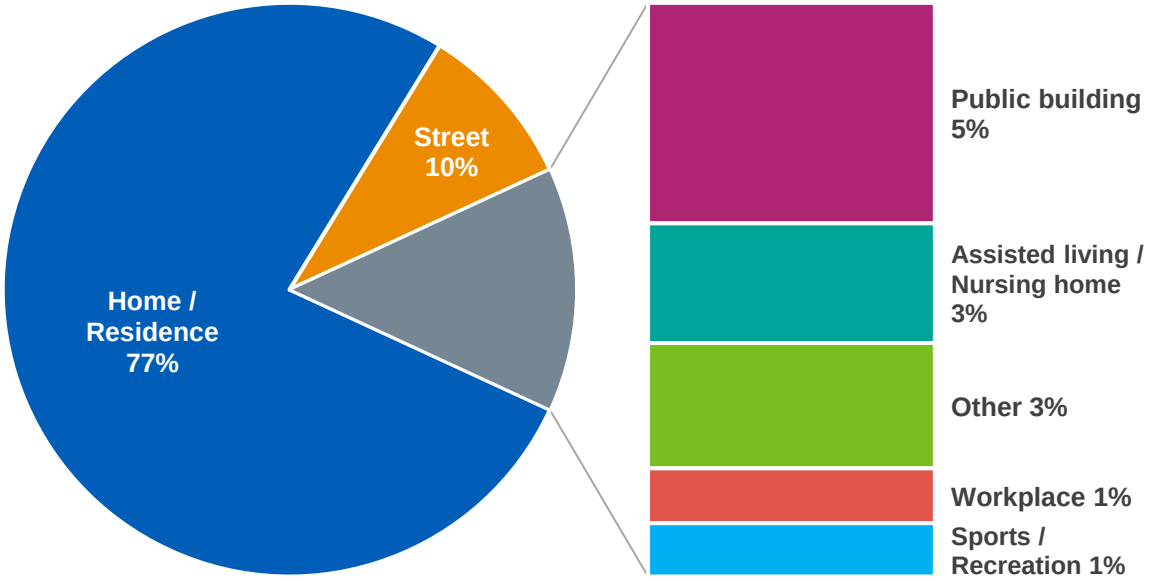
Lucy said, "It was a real team effort from start to finish. From the moment Lynn dialled 999 and began CPR so quickly, it was the perfect example of the chain of survival. We were so pleased to play our part in ensuring Michael can look ahead to the future and enjoy life."

Michael and Lynn have been together for more than 40 years, and have two children, Lucia and Emma.

Michael and Lynn with Paramedics Tracey Little, Lucy Thomson, and Millie Lowe, and Emergency Medical Advisor Barbara at Banstead Make Ready Centre.

Arrest locations

The distribution of resuscitation attempts in SECAmb across different types of location remained almost identical to last year. **Cardiac arrests at private residences, such as home addresses and assisted living and care homes, made up 80% of all resuscitation attempts.**



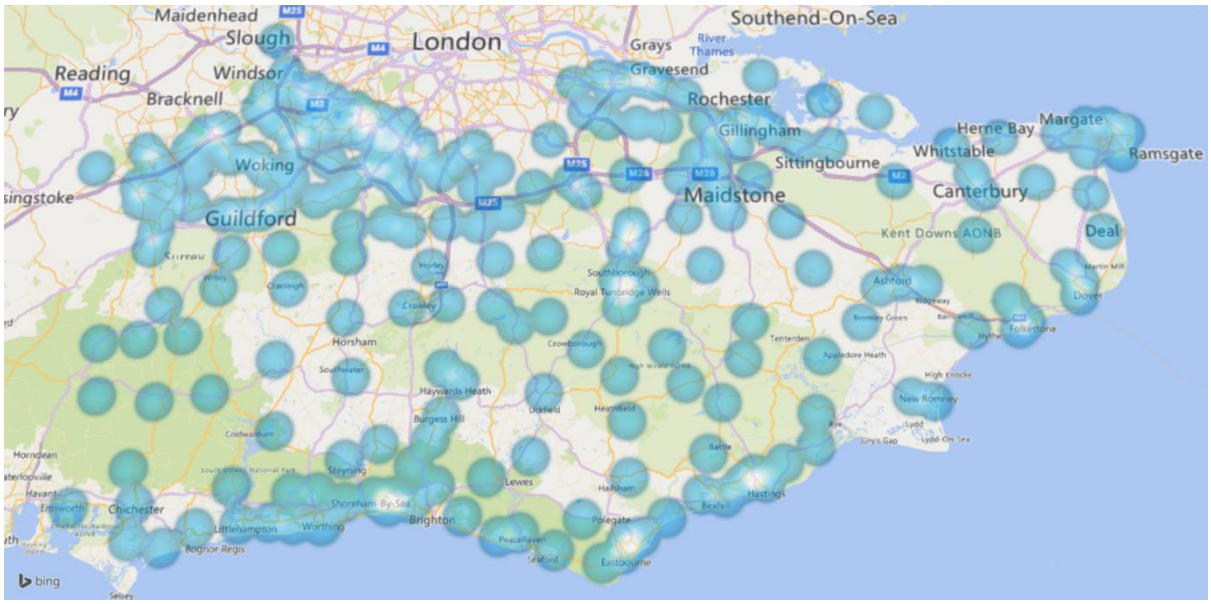
While our cardiac arrest patients are spread across all of the SECAmb area, the geographic distribution of incidents is also affected by socio-economic and demographic factors. Unsurprisingly, areas with denser populations are likely to have a greater number of cardiac arrests, as are areas with higher proportions of older patients.

It is recognised by the Resuscitation Council UK that **deprivation can affect the incidence of sudden OHCA within communities**. Higher deprivation is also correlated with lower rates of bystander CPR and poorer access to Public Access Defibrillators (PADs).

The English Indices of Deprivation report measures deprivation through a combination of seven distinct domains:

- *Income*
- *Employment*
- *Health Deprivation and Disability*
- *Education, Skills Training*
- *Crime*
- *Barriers to Housing and Services*
- *Living Environment*

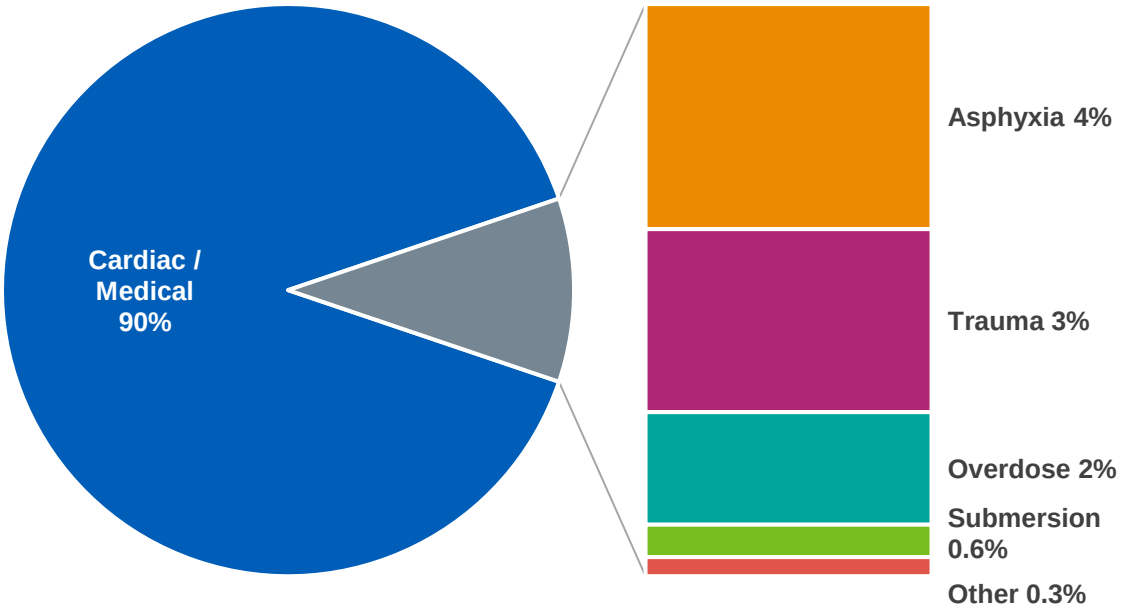
When examining the home postcodes of our OHCA patients, there were some areas of particular note, including several which are in line with areas of high deprivation as reported by the most recently available English Indices of Deprivation report (2019). The map below shows the home postcodes of our patients (excluding those who live outside the SECAmb area):



Causes of arrest

The aetiology, or cause, of cardiac arrest as given in this report is based on the information documented on ambulance patient care records. It is therefore a presumed cause, dependent on details available to clinicians at the time of the incident.

The proportions of aetiologies for resuscitation attempts in SECAmb remained almost identical to last year, and were broadly in line with those seen nationally. **Nine out of 10 resuscitation attempts in SECAmb were presumed medical or cardiac in origin.**



The definitions for aetiology used are from the OHCAO Project at the University of Warwick and NHS England submissions, and may differ slightly from general definitions:

- *Cardiac / medical includes clearly cardiac-related cases and other medical causes (e.g., anaphylaxis, asthma, gastro-intestinal bleeds, and metabolic and respiratory causes) and where there is no other obvious cause of the arrest.*
- *Asphyxia includes all external causes of asphyxia, such as foreign-body airway obstruction, hanging, and strangulation, but excludes drowning.*
- *Trauma is specified as cardiac arrests directly caused by blunt, penetrating, or burn injuries.*

Stewart's story

Stewart Bensted, from Sittingbourne, was helping his neighbour with a DIY project in April 2022, and had popped home to get some materials when he started to feel unwell. Luckily for Stewart, his neighbours' son Joseph Tribe, witnessed the collapse and alerted his parents, Jennifer Johnstone and Richard Tribe, who began vital CPR with another neighbour, Gavin Brown, before Paramedic Practitioner, Mark Wright arrived.

Mark said, "As I arrived, I could see two men carrying out CPR and I shouted out the window 'don't stop!' because often people will stop CPR when they see us arrive. They were doing a great job and that's what is so important when you have a situation like this. Getting those good chest compressions in before we arrive makes a real difference."

While Stewart's neighbours continued with the CPR, Mark quickly got his defibrillator ready and within three shocks they were able to restore Stewart's heart rhythm. At this point, back-up arrived, including a team of Kent Fire and Rescue co-responders from Sittingbourne station and multiple ambulance crews. The team continued to work to stabilise Stewart before Air Ambulance Charity Kent Surrey Sussex provided additional expert treatment to prepare him ahead of his journey to hospital.

Mark added, "I can count on one hand the number of times we get a successful outcome, so it is incredible to see Stewart is doing so well, without any significant issues."

Stewart was quickly taken to the specialist cardiac unit at the William Harvey Hospital where he was in the intensive care unit for six days and had two stents fitted. He remained in hospital for two weeks before returning home. While he has no memory of what took place, he had nothing but praise for his care.

"I'm just grateful for the care I was given from my neighbours, the ambulance staff, and the hospital. It was fantastic!" Stewart said.

Helen praised efforts of everyone involved and added, "We have been able to thank our neighbours – without their swift actions the outcome would have been so different. But we really wanted to thank all the responders too. Everyone worked so amazingly together. Mark and the paramedics stayed afterwards to talk us all through everything and check we were ok. In all the uncertainty their words and care were so needed and appreciated."

Stewart has returned to work, and recently held a joint celebration for his 60th birthday and marriage to his long-term partner Helen.

Chain of Survival

The Chain of Survival is an internationally recognised description of the key elements of addressing OHCA. It covers action from community readiness (including anticipatory care planning for patients known to be at higher risk of cardiac arrest), through bystander involvement such as the use of Public Access Defibrillators (PADs), to interventions from trained responders and paramedics, and ending with post-arrest care from ambulance services, hospitals, and after discharge in the community.

The strength of the chain relies on all of its links, involving bystanders, emergency medical advisers (EMAs), and clinical staff all working together to administer high quality treatment as fast as possible, to give patients the best possible chance of survival.

Early recognition and call for help

Early CPR

Early defibrilliation

Post-resuscitation care

Frankie's story

Frankie Turner, now 27, from Maidstone, was at home with her husband Nathan when she suffered a cardiac arrest in the early hours in December 2022.

Nathan was quick to begin CPR in the minutes before ambulance crews arrived, following the clear instructions of Emergency Medical Advisor, Maddie Jarvis-White, as well as calling on the CPR training he had received serving in the Army.

As Nathan continued CPR, help was arranged by SECAmb dispatcher, Alex Scott. First to arrive at scene were ambulance crew Matthew Chambers and Gina Barker, shortly before Emily Caudron-Lisle and Cydney Brown.

The two crews began advanced life support before being joined at the scene by Critical Care Paramedic, Ed Hyson and Operational Team Leader, Angela Weir. The team worked together, delivering a total of three shocks with a defibrillator to bring Frankie's heart back into a normal rhythm. Frankie was sedated before being taken to Maidstone Hospital where she spent 10 days being treated and recovering.

"I'm just so grateful," Frankie said. "The whole team was just incredible. Obviously, I don't remember anything from the night but I will never forget what they did."

Maddie praised Nathan's efforts: "Nathan was amazing. He just did everything I asked of him, which was vital and should be really proud."

Nathan said, "I was so relieved when Matthew and Gina and then everyone turned up. They were angels in disguise. They were all so calm, caring, and professional from the moment they arrived. We and our family and friends will be forever thankful for everything they did."

Ed said, "The whole incident was a perfect example of the chain of survival in action, starting with Nathan calling 999 and beginning vital CPR. The whole team worked really well together. On behalf of everyone I would like to wish them, their family and friends all the very best for the future."

Frankie recently celebrated her 're-birthday' with family and friends. She also held a 'CPR party' earlier this year where people could practice resuscitation on a manikin.

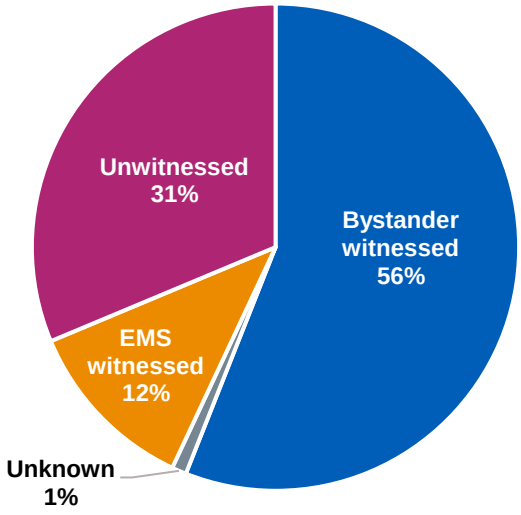
Mum to now two-year-old daughter Phoebe, Frankie is now awaiting the results of genetic testing which could establish the cause of her cardiac arrest. In the meantime she has been fitted with implantable cardioverter-defibrillator (ICD) – which she has named 'Dot.'

Early recognition and call for help

88% (2552) of SECAmb resuscitation attempt patients were in cardiac arrest before the arrival of emergency medical services (EMS). When considering response times, intervention times, and bystander involvement, it is these 'non-EMS witnessed' resuscitation attempts which are examined. This figure includes patients who arrested between the time of the initial 999 call and the arrival of EMS.

Early recognition depends not only on bystanders, but also on EMS and telephone triage. Highly trained emergency medical advisers (EMAs) using an effective clinical decision support system (such as NHS Pathways) play a vital role in ensuring that cardiac arrests, or symptoms of imminent cardiac arrest, are recognised as quickly as possible.

The first question asked at the start of each 999 call is whether the patient is breathing, so that help can be immediately dispatched to patients who are clearly in cardiac arrest.



SECAmb measures the sensitivity of detection of cardiac arrest during 999 calls, i.e., how well our system does at identifying every patient in cardiac arrest. The final diagnosis code assigned to the call by the EMA is used to account for patients who may have deteriorated into cardiac arrest during the call. **94% of resuscitation attempts were identified as cardiac arrests by SECAmb EMAs** in 2022-23 (n=2,485).

The time-critical nature of cardiac arrests means that these calls should be assigned the highest priority available to ambulance services; a ‘Category 1’.

95% of resuscitation attempts were categorised as a Category 1. For these patients, our mean response time was 9 minutes 37 seconds, with 90% attended within 16 minutes 35 seconds.

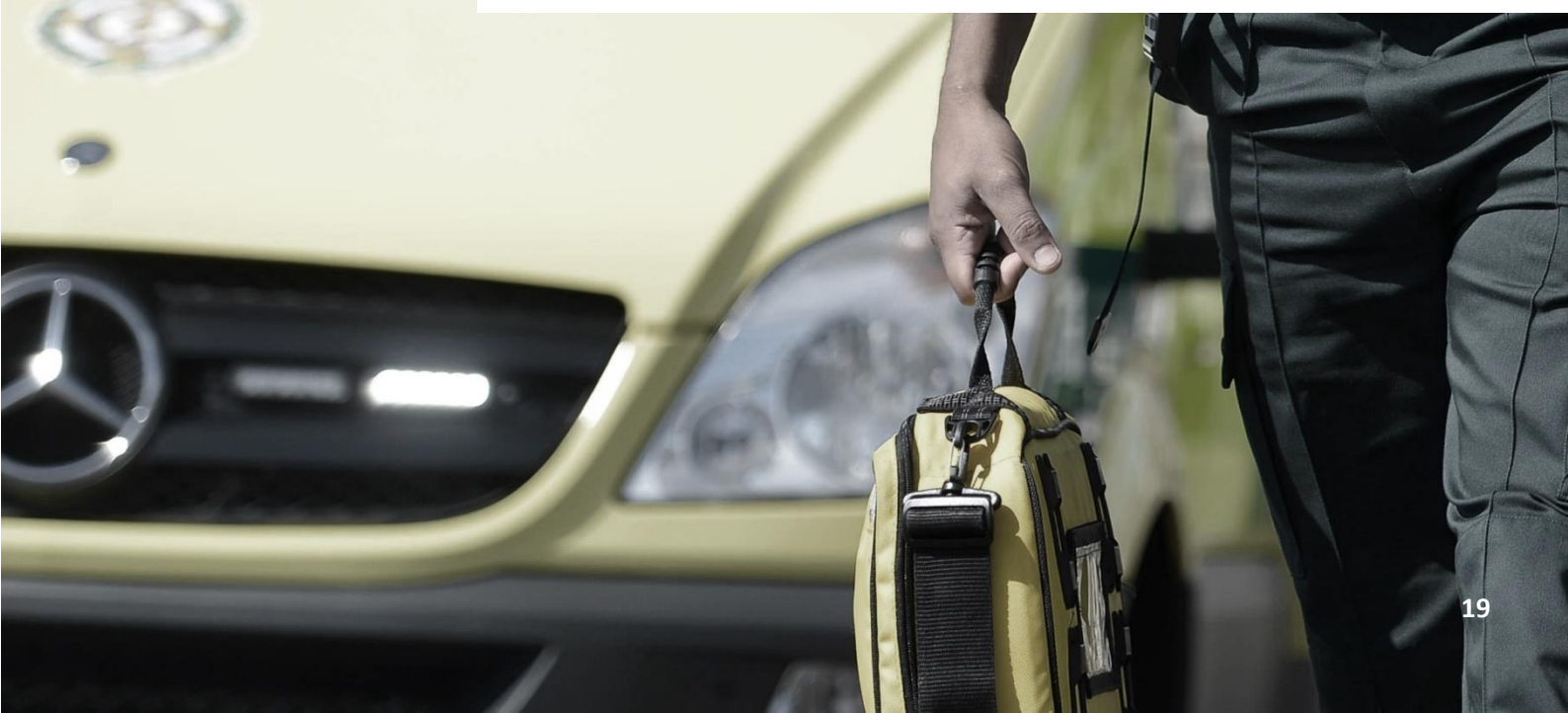
Category 1 calls have a nationally mandated mean response time of 7 minutes, and a requirement that 90% of these calls are attended within 15 minutes.

Because of the narrow window for effective interventions, it is vital that as many cardiac arrests as possible are identified during the 999 call and that the correct incident priority is assigned. Without rapid recognition, response times can be delayed significantly, leading to knock-on delays in further care.

SECAmb’s overall mean response time for resuscitation attempts was 10 minutes 35 seconds, with 90% of all calls responded to within 17 minutes 47 seconds.

Compared to last year:

- The mean **response time to Category 1 calls has increased slightly**, by 37 seconds.
- The **mean response time to all resuscitation attempts has increased slightly**, by 35 seconds.
- The **proportion of arrests assigned a Category 1 has improved slightly**, by 1%.



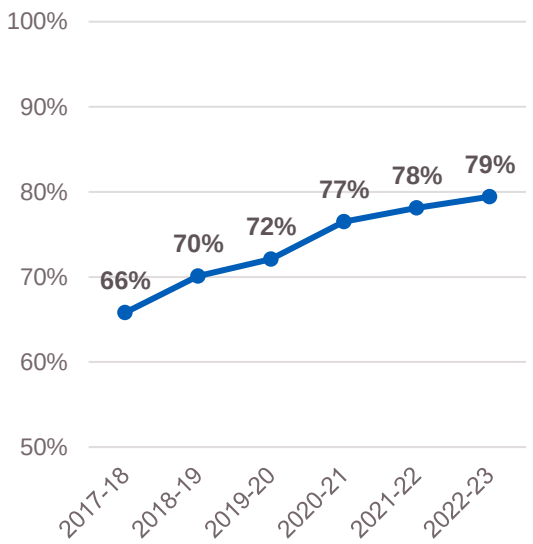
Early CPR

Early CPR keeps oxygenated blood flowing to vital organs and buys time before the arrival of EMS. Reducing the time taken to start CPR is therefore a vital step in improving outcomes from OHCA, since **a patient's chance of survival falls by 10% for every minute that CPR is delayed.** Bystander CPR is a critical part of improving patient outcomes, and **immediate, high quality bystander CPR can double survival rates**.

For 2022-23, 45 patients were successfully resuscitated before SECAmb arrival thanks to the efforts of bystanders. A remarkable 95% of these patients survived to 30 days post arrest (n=41*).

EMAs play an essential role in this process, rapidly coaching callers to commence and continue CPR. This requires empathy, assertiveness, and confidence to control the call and provide effective instructions. SECAmb EMAs use the 'no, no, go' tool to detect cardiac arrest: if the patient is not breathing and not conscious, they should 'go' ahead and commence CPR instructions.

The proportion of resuscitation attempts who received **bystander CPR continued to trend upwards**, and now sits at **79%**, or 2,027 patients, **our highest value to date** and **higher than national average** of 70%.



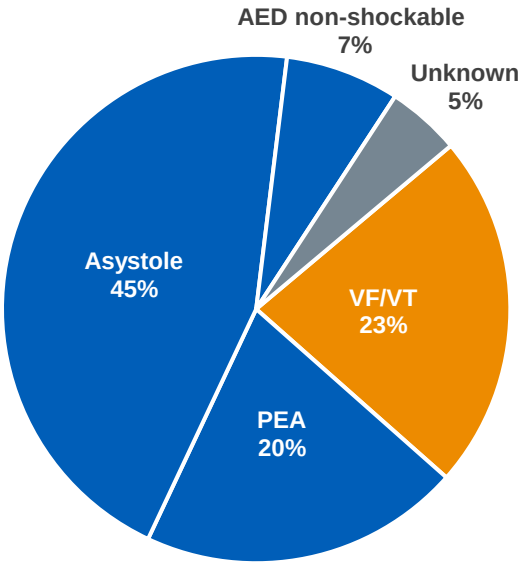
Although international evidence shows that men are more likely to receive bystander CPR than women, SECAmb's data showed almost equal proportions for both genders, with women more likely to receive bystander CPR by just under 2%.

The measure of time taken to commence CPR, known as 'time to hands on chest' is generally recorded as the time between the 999 call being answered and CPR beginning, as the exact time of the patient's arrest is not usually known.

Whilst time to hands on chest was not routinely recorded during this time, EOC (Emergency Operations Centre) audit data, taken from a mixture of retrospective and live call audits, has been included in these figures since July 2022. For this period, **the mean time taken for a patient to receive bystander CPR was 4 minutes 8 seconds.**

Early defibrillation

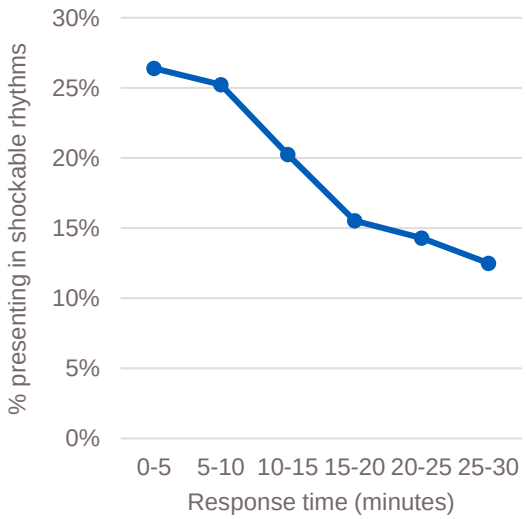
Treatment for OHCA depends on the heart rhythm of the patient – those in ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT) can receive a shock from a defibrillator, which 'stuns' the heart to help it restart in a normal, life-sustaining rhythm. Shocks are more effective the earlier they are delivered: **defibrillation within 3-5 minutes of collapse can produce survival rates as high as 50-70%**.



Just under **one in four SECAmb resuscitation attempts presented initially in a shockable rhythm** (23%), while more than one in three (37%) required defibrillation at some point in their arrest.

Cases presenting in non-shockable rhythms include those in asystole, pulseless electrical activity (PEA), and unspecified rhythms which have been identified by an automated external defibrillator (AED) as being non-shockable without the need for manual rhythm analysis (known as 'AED non-shockable').

The proportion of patients presenting in **shockable rhythms has decreased 4% compared to last year**. Despite a slight increase in the number of unknown initial rhythms, there has been a **corresponding increase in non-shockable initial rhythms of 3%**.



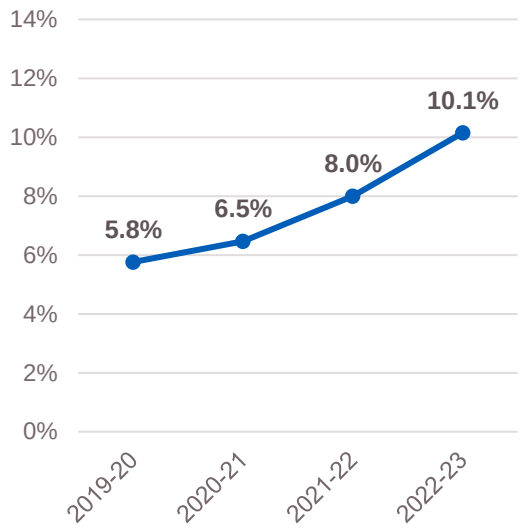
It is important to note that initial rhythm is not an entirely independent characteristic of a cardiac arrest: the likelihood of a patient presenting in a shockable rhythm has been shown to be linked with their time without high quality CPR, and therefore also linked with who witnessed the arrest, whether good bystander CPR was performed, and with EMS response times.

SECAmb data for 2022-23 supports this, with **the percentage of patients who presented in a shockable rhythm falling as response time increased.**

The **use of defibrillators before SECAmb arrival reached our highest figure to date**, 259 patients, or **over 10%** of resuscitation attempts. 104 (40%) of these patients were treated with a shock from these devices.

Additionally, 87% (39) of patients who were successfully resuscitated before SECAmb arrival had a non-SECAmb defibrillator applied, and 71% (32) received shocks from these defibrillators.

These patients are not included in overall resuscitation statistics, as SECAmb did not need to provide a resuscitation.



PADs can be highly effective at treating OHCA, as they are designed to be used by the general public with little to no training, and are placed in locations to maximise the chance that they can reach patients before the ambulance service. The distance to the nearest PAD from the scene of the arrest is therefore crucial, and strongly impacts both how often they are used and how quickly they can be brought to patients, which in turn influences their effectiveness.

PADs are used most frequently and are often most effective when located in public spaces and areas with high footfall, such as sport and leisure venues, retail centres, and transport hubs.

This link between location and PAD usage is supported by SECAmb data – while the majority of SECAmb resuscitation attempts occurred at a home address, the opposite is true for resuscitations where a defibrillator was used before SECAmb arrival. **Nearly three quarters of resuscitations involving non-SECAmb defibrillators were not at private addresses** (190), with 28% of these cases (72) at public buildings and 10% (25) at sports or recreational venues or events.

For patients who were successfully resuscitated by shocks from a defibrillator before SECAmb arrival, **this proportion is even higher,** with 94% not at home addresses (30/32).

In situations and locations where retrieving a PAD is not practical or timely, other solutions may be more effective, such as local community responders bringing an AED to the patient.

*The UK's national PAD network, developed by the British Heart Foundation (BHF), is known as **The Circuit**. It aims to map all PADs across the UK, connecting them directly and automatically to ambulance services so that EMAs can advise callers of their closest device as soon as possible.*

*PADs on The Circuit also have a named individual 'guardian' who is responsible for regular checks to ensure that the device is 'emergency ready'. There are around **3,500 defibrillators registered on the Circuit in the SECAmb area**, all of which are linked to our Computer Aided Dispatch system (CAD).*

Time to first shock

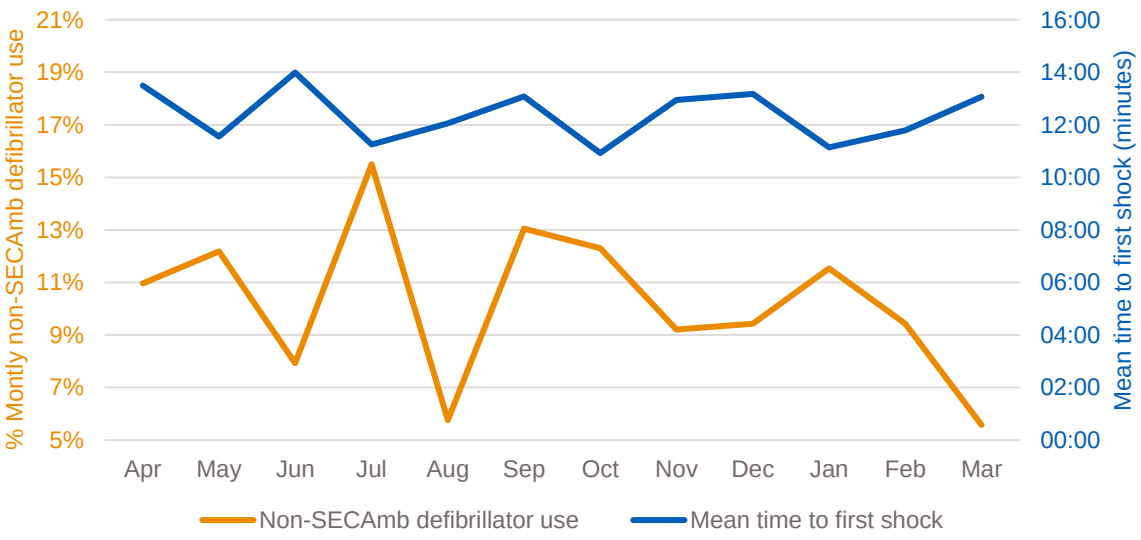
As with time to hands on chest, time to first shock is measured from the time of the 999 call, as the exact time of arrest is often not known.

In 2022-23, resuscitation attempts which presented in a shockable rhythm had a **mean time to first shock of 12 minutes 24 seconds**.

The use of a non-SECAmb defibrillator can drastically shorten the time to first shock. For all initially shockable resuscitation attempts **when a non-SECAmb defibrillator was used, patients received their first shock 4 minutes 24 seconds faster than cases where one was not used.**

When including those patients who achieved a ROSC before SECAmb arrival and did not rearrest, the mean time to first shock fell even further, by another 35 seconds.

Comparing the time to first shock against non-SECAmb defibrillator use by month, this correlation becomes even clearer. The graph below shows how the average time to first shock was faster in months when non-SECAmb defibrillators were used more often.



These figures may underestimate the effects of non-SECAmb defibrillators, as time of first shock is less likely to be recorded when administered by a bystander, and so these cases cannot be included in calculations.

Volunteers

The use of volunteer responders in the community can be invaluable in minimising the time before a patient receives high quality CPR and defibrillation.

Community First Responders

Community First Responders (CFRs) are volunteers who are dispatched by SECAmb as part of our emergency response, attending in conjunction with other SECAmb resources. As they respond in the local areas where they live and work, they are often able to attend the scene of an emergency within a few minutes, and therefore arrive on scene first. They are fully trained in basic life support (BLS), including CPR and the use of basic airways, and carry an AED.

SECAmb currently has more than 400 CFRs spread across Kent, Surrey and Sussex and north east Hampshire, who attend roughly 20,000 emergency calls per year.

A CFR was on scene in 9% of resuscitation attempts, or 255 incidents, and were **first on scene in 45% of those incidents.***

CFRs often attend incidents in locations where response times may be longer, and their attendance can drastically shorten response times to patients in cardiac arrest.

Comparing scene times of CFRs first on scene against what otherwise would have been the first resource on scene, **CFR attendance reduced response time to patients in cardiac arrest by 4 minutes 53 seconds.**

**where CFR scene times are known*

GoodSAM

SECAmb also uses the GoodSAM smartphone app, which allows EMAs to alert trained, local individuals who have signed up as volunteers to perform CPR and/or bring a PAD to the scene of the arrest.

The app is used by more than 200 organisations worldwide and has over 1.5 million users globally, including more than 30,000 users in the UK.

At this time, SECAmb has more than 800 responders directly registered with GoodSAM, and can also alert any other registered responders who are in the SECAmb area.

The Resuscitation Council UK recommends the use of apps such as GoodSAM to help improve the proportion of resuscitation attempts receiving high quality bystander CPR, and to reduce both the time to hands on chest and to first shock.

GoodSAM volunteers in SECAmb are dispatched once 'no, no, go' has been completed, to ensure that responders can attend the scene of an arrest as quickly as possible. A GoodSAM responder was confirmed to have been dispatched to 9% of resuscitation attempts, or 220 incidents in 2022-23.*

**Data currently cannot capture whether a GoodSAM responder is confirmed to have arrived at scene.*

Student Paramedic Alex Carter, Paramedic Amy Brooker, and Paramedic Emily Payne with Steven Hawkes at Brighton Make Ready Centre.

Steven's story

Steven Hawkes, 45, from Brighton, suffered a cardiac arrest at the wheel of his vehicle in Eaton Place, close to Royal Sussex County Hospital in October 2022. Paramedic, Amy Brooker and Student Paramedic, Alex Carter were in the same road close by, coming from another patient, when they heard a crash as Steven, who was driving home from working away in Bath fitting hospital medical equipment, crashed into parked cars.

Alex's GoodSam app and Emergency Operations Centre colleagues alerted the pair that the RTC involved a cardiac arrest, and they were quickly on scene, along with a nearby Patient Transport Service crew. Support arrived from Paramedics, Emily Payne and Paul Ellis, Operational Team Leader, Tom Graves, Paramedic Practitioner, Sarah Gilby, and Critical Care Paramedic, Andy Hitt.

Together the team were able to resuscitate Steven, delivering four shocks with a defibrillator. He was amazingly already attempting to speak before his arrival at the nearby hospital.

Alex said, "Responding to Steven was a real team effort to ensure he received the care he needed almost immediately. He is the perfect example of why early CPR is so vital to patient survival."

Steven, also father to Yasmine, Howard, and Olivia, spent two weeks at Royal Sussex County Hospital and was fitted with an Implantable Cardioverter Defibrillator (ICD), which will deliver a shock to his heart if required in the future.

Steven said, "I'm so grateful for everything every single person did to ensure I am still here today. It's been a really tough year but I'm now looking forward to the future much more. I'll be forever grateful."

Community programmes

Community programmes are a vital part of strengthening the Chain of Survival, actively empowering people in how to recognise out of hospital cardiac arrest and provide potentially life-saving aid.

The Resuscitation Council UK states that **only 51% of people would feel confident responding to a family member in cardiac arrest**, and recommends ambulance services engage with the public to train as many individuals as possible in CPR, including children of all ages.

Our staff and volunteers, including our CFRs and Community Resilience Team, used their free time to support and run education and outreach programmes in the SECAmb area during the year.

Junior Citizen

Junior Citizen is run each year with schools, families, and communities, to help children learn valuable skills, including first aid. It takes an interactive approach to education by delivering hands-on events in partnership with the emergency services and local safety agencies. So far, SECAmb have trained around 6,000 children in basic life support as part of Junior Citizen.

Restart a Heart

Restart a Heart is an annual, week-long initiative led by Resuscitation Council UK. Every October an alliance of partners all over the world (including UK ambulance services, universities, and other charitable and public sector, community-based organisations and first aid training groups) come together to increase public awareness of OHCA and train people in CPR and defibrillation.

Within SECAmb, the Community Resilience Team, supported by Fire and Rescue Services, organised and facilitated training events for over 10,000 members of the public. This included teaching CPR at secondary schools and colleges across the South East, and providing opportunities for people to learn CPR and defibrillation online from their own homes.

Safety in Action

Sussex Safety in Action 2023 showcases the community's commitment to promoting safety and well-being. This annual series of events brings together emergency services and schools to educate participants on a wide range of safety topics. As a collaborative partner, SECAmb trained more than 2,400 children in life-saving first aid skills over the summer, with 4,200 children trained by the end of 2023.

CPR metrics

High-quality CPR is crucial to keep blood flowing to vital organs, buying time for further interventions to treat the underlying cause of the cardiac arrest. ‘High Performance’ CPR, as defined by the Global Resuscitation Alliance, is centred around evidence-based metrics linked with improved patient outcomes and increased survival.

Compression ratio of over 80%

In a ten minute period, no more than two minutes in total should be spent not doing chest compressions (known as time ‘off the chest’)

Pauses no longer than 10 seconds

Any breaks in CPR (e.g., to insert airways or check the heart rhythm) should be kept to less than ten seconds

Compression rate between 100-120 compressions per minute

Both slower and faster rates are linked with a reduced likelihood of ROSC and survival

Compression depth of 5-6cm

To achieve the maximum output of blood from the heart

Full chest recoil

To allow the heart to properly refill

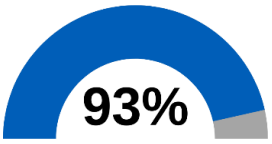
CPR in SECAmb

SECAmb is able to analyse the performance of our clinicians' CPR against three of the above metrics, using data downloaded from the Trust's defibrillators. The first 10 minutes of arrest on the download are examined, as this is deemed to be the most critical period of the resuscitation.

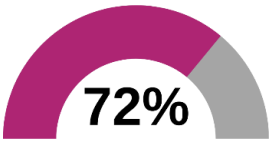
Data can be produced and fed back to clinicians on the CPR ratio, rate, length of pre and post-shock pauses, length of longest pause, and total number of pauses over 10 seconds, allowing clinicians to analyse their own performance. SECAmb aims to resume routine feedback of this data to crews in 2023-24.

During 2022-23 an audit was conducted into CPR skills, based on these defibrillator downloads, also including the use of AED mode and recognition of shockable rhythms. This sample data of 215 incidents showed:

of cases had the recommended CPR rate. Use of the metronome built into defibrillators is key to this continued excellent performance.



of cases had all shockable rhythms* shocked. *(*as identified post-event by the auditing clinician)*



of cases had a compression ratio of at least 80%. Whilst this is good performance, this has fallen from last year's figure of 87%.

of cases had no pauses of 10 seconds or more. Improvement is needed here, due to the impact of long pauses on outcomes.

The change in performance seen in compression ratio and pauses is likely a direct relation to the introduction of the mandatory use of AED mode on the Trust's Lifepak defibrillators. The intent of AED mode is to avoid the missed recognition of shockable rhythms and subsequent missed or delayed defibrillation, which can be catastrophic for patients. However, AED mode takes time for the device to analyse the rhythm, which has the knock-on effect of adding time to pauses in compressions and influencing the overall time spent off the chest. While the risks of missing shockable rhythms are understood to be more significant, there is a need to explore this further.

In-person key skills training for staff, including hands-on CPR and basic and advanced life support training, returned in 2022 after the suspension and move to online training during the COVID-19 pandemic.

Post-arrest care

Successfully achieving a return of spontaneous circulation (ROSC) is the first step towards the goal of complete recovery from OHCA. However, the consequences of cardiac arrest on the body are complex, and the ROSC period presents a unique clinical management challenge. As well as the potential harm caused by the period of cardiac arrest, in many incidents the underlying cause, (for example, a heart attack) is still likely to be present and in need of emergency treatment.

All UK ambulance services measure performance against a nationally agreed EMS post ROSC care bundle. This is a small collection of assessments and treatments which aim to ensure the best chance of survival and recovery from cardiac arrest.

The care bundle applies to resuscitation attempts where ROSC was achieved by EMS before leaving scene, the patient was 18 years old or over, and the cause of the arrest was non-traumatic. It consists of six elements:

Administer intravenous fluids
- if required

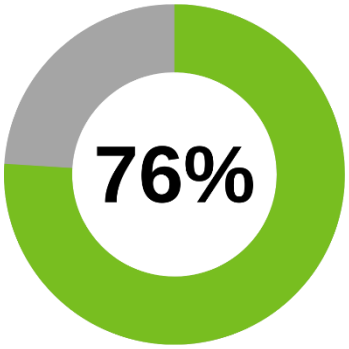
Measure end-tidal carbon dioxide ($EtCO_2$)
- if advanced airway used

Administer high flow oxygen
- if required

Measure blood pressure
- or note radial pulse

Obtain a 12 lead electrocardiogram (ECG)

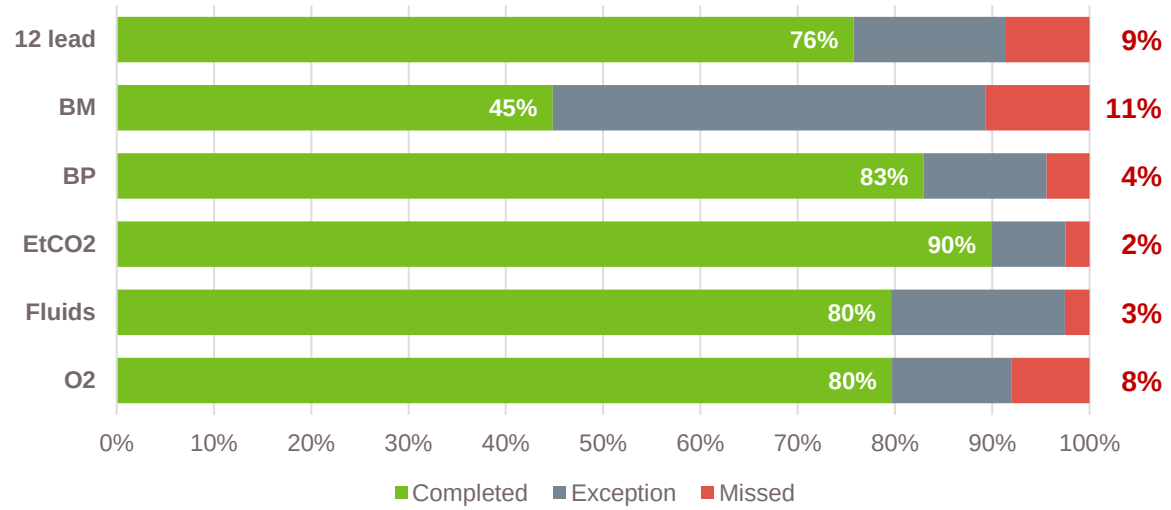
Measure blood glucose
- unless normal pre ROSC



Our compliance against the care bundle measures the delivery of these elements. Elements are considered compliant if they have been completed, or if a valid exception applies.

Overall, **compliance with the care bundle was 76%**, or 868 patients receiving the full care bundle out of the 1,138 patients where it was required. This is an **increase on last year**, but still lower than SECAmb's historic compliance.

Fluids, EtCO2, and blood pressure all had compliance of more than 95%, while blood glucose was the only element with compliance of less than 90%.



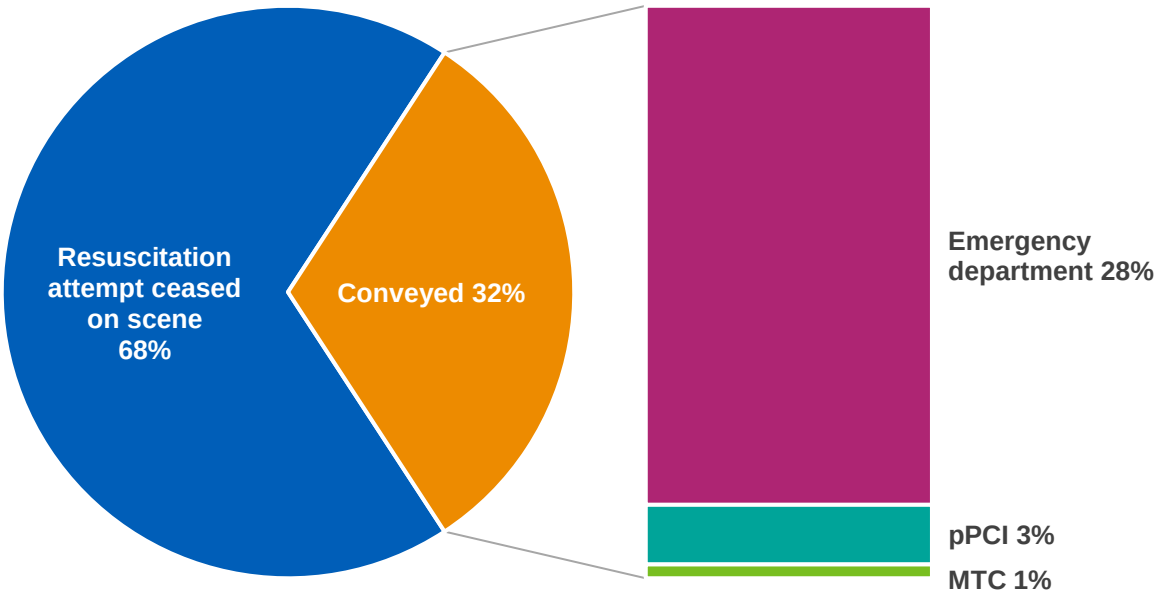
During 2022-23, trials began to feed back post ROSC care bundle compliance to clinicians, with the aim of rolling out similar feedback programmes Trust-wide. By sharing this learning with our clinicians we aim to improve performance and ensure that our post ROSC patients are given the best care.

In addition, SECAmb's Critical Care Paramedics (CCPs) provide an extended care bundle aimed at addressing more detailed and advanced elements of care. This includes:

- Supporting and providing advanced airway management techniques.
- Administering certain anaesthetic drugs to sedate and/or provide an anaesthetic, so that breathing can be supported with a ventilator and patient comfort can be improved.
- Targeting derangement in physiology, such as blood pressure, to ensure optimal blood supply to the brain.
- Treatment of abnormal heart rhythms to restore normal blood flow.

CCPs are specialist paramedics in SECAmb with postgraduate training. They are specifically assigned to critically unwell patients, as they can provide an enhanced range of interventions and support complex decision making. SECAmb employs more than 60 CCPs, who attended more than three quarters of resuscitation attempts (76%).

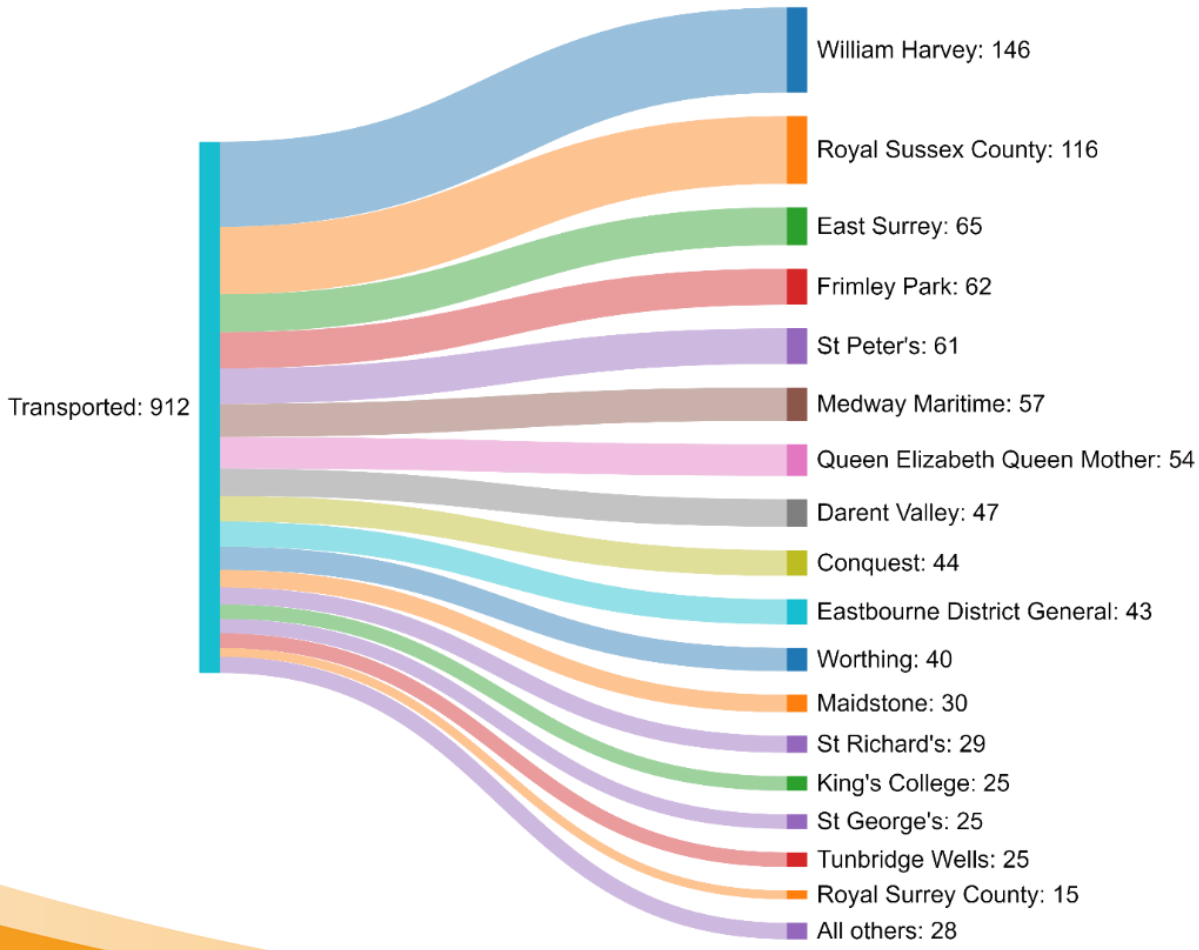
Transported to hospital



SECAmb clinicians will usually continue a resuscitation attempt on scene until a definitive outcome is reached, rather than convey the patient to hospital still in cardiac arrest. However, exceptions can apply, for example when there are clear reversible causes which cannot be addressed out of hospital, such as a major loss of blood, or when there are other special circumstances, such as in paediatric arrests, drownings, or overdoses / poisonings.

SECAmb conveyed 912 patients, or 32% of all resuscitation attempts, to 26 different hospitals over the year. Of these transported patients, 10% were taken to a pPCI (Primary Percutaneous Coronary Intervention) centre for specialist intervention for a heart attack, and 2% were taken to an MTC (Major Trauma Centre).

In certain cases, often when patients are transported to hospital with CPR still ongoing, SECAmb also uses a mechanical chest compressions device, known as a 'LUCAS'. This can deliver consistent chest compressions while moving a patient, free up clinicians for other interventions, and help reduce 'rescuer fatigue' in prolonged resuscitation attempts. A LUCAS was used in 17% of SECAmb's resuscitation attempts.



Usman's story

Usman Hussain, 36, taxi driver and father of three, collapsed into cardiac arrest at his home in Crawley in August 2022. Usman had suffered a previous heart attack when aged just 29, and began to suffer from chest pain after an evening out with friends.

As the pain worsened, Usman dialled 999. However, prior to the ambulance arriving he collapsed and went into cardiac arrest. His friend Joe called 999 again and was quick to follow the instructions of Emergency Medical Advisor, Tom, and begin vital CPR.

Usman said, "The pain was just getting worse and worse. It started out like heartburn but then was like my chest was in a clamp and someone was just winding it tighter and tighter. I obviously don't remember after that."

Arriving at scene in just under five minutes were Paramedic, Ellis Wilson, and Associate Ambulance Practitioner, Megan Brown. Together they provided advanced life support and began administering shocks with a defibrillator to try to return Usman's heart to a more normal rhythm. They were quickly joined by Paramedics, Alison Smith and Phil Smith, and Critical Care Paramedic, Lee Davis.

Usman received a total of eleven shocks and was fitted with a LUCAS device (a machine to deliver compressions automatically) before his heart returned a more normal rhythm. He then received sedation and analgesia and was taken to Royal Sussex County Hospital. There he received specialist emergency treatment at the hospital's cath lab, and spent two weeks recovering before being discharged. He was pleased to recently be able to return to work at the start of July.

Usman said, "My dad said how persistent everyone was and that it was clear they weren't going to give up. I'll be forever grateful to the team and all the hospital staff. I think I have a different outlook on life now and try not to get as stressed out as I used to."

Lee added, "This was a perfect example of the chain of survival working, starting with excellent instructions over the phone and bystander CPR provided immediately. This meant that Ellis and Megan, as first to arrive, and then us all as a team, were given the best possible chance of resuscitating Usman. We wish him and his family the very best for the future."

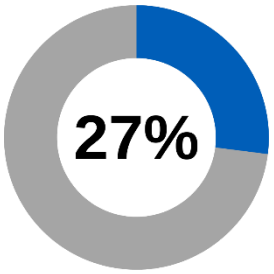
Usman with Critical Care Paramedic Lee Davis, Paramedics Phil Smith, Ellis Wilson, and Alison Smith, and Associate Ambulance Practitioner Megan Brown at Gatwick Make Ready Centre.

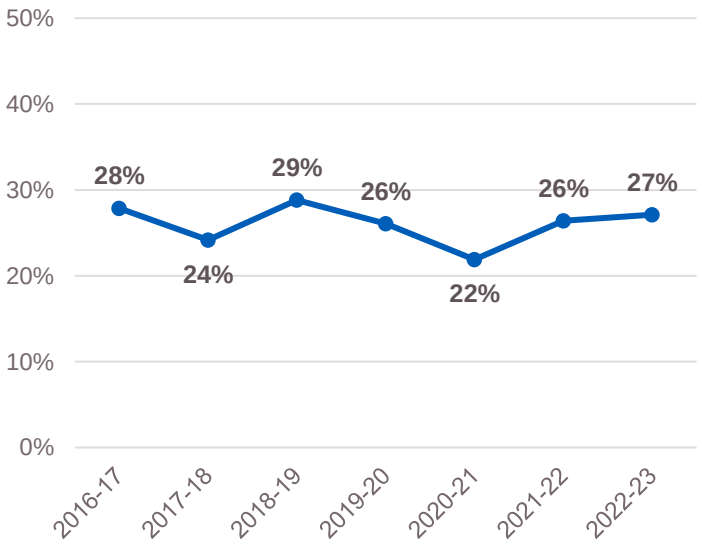
ROSC at hospital

In 2022-23, SECAmb achieved a return of spontaneous circulation (ROSC) in 42% of resuscitation attempts. However, success in resuscitation is not simply whether a ROSC was achieved, but whether it was maintained. ROSC at hospital is therefore one of the two nationally reported outcome metrics for OHCA for ambulance services.

27% of SECAmb resuscitation attempts maintained a ROSC to hospital (784). This was both an **increase from last year's figure** of 26% (734) and **above this year's national average** of 26%.

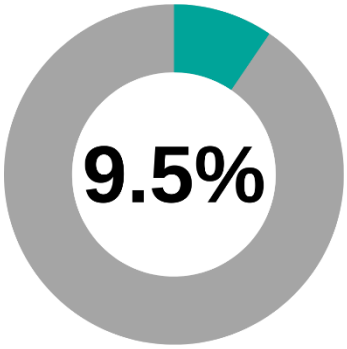
ROSC at hospital figures in SECAmb have not seen any particular trends over the time this has been reported, with a variation of only 7%. However, it has improved from the low seen during the height of the COVID pandemic.





There remain significant correlations between the features of cardiac arrests and likelihood to maintain ROSC to hospital, particularly initial rhythm and whether the arrest was witnessed. **EMS witnessed arrests maintained ROSC to hospital more than twice as often than unwitnessed arrests**, and **initially shockable arrests maintained ROSC to hospital nearly three times as often as initially asystolic arrests**.

Survival



While achieving and maintaining ROSC is important, the absolute measure of patient outcomes from OHCA is survival, or more simply; how many lives were saved. This is the second metric for measuring patient outcomes used by UK ambulance services, reported as survival at 30 days after the initial cardiac arrest.

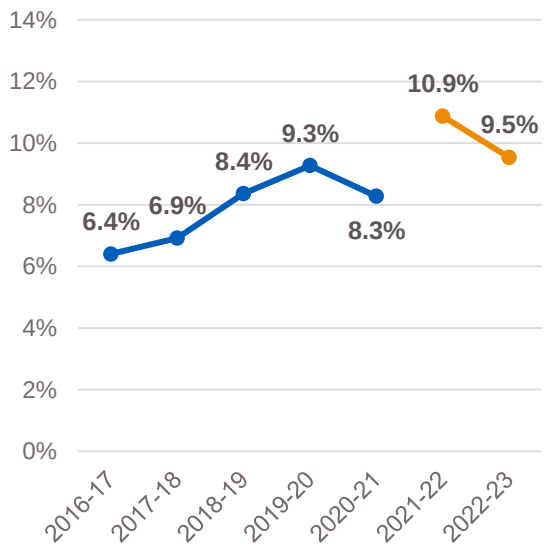
In total, 9.5**%,** or approximately **one in 10 patients receiving a resuscitation attempt from SECAmb survived to 30 days** (n=2,852*), which was **271 lives saved**.

While this is a decrease from last year, this was still our **second highest value to date**, and **remained above the national average** of 7.8%.

As in previous years, survival figures varied significantly between months, with a low of 6% in March and a high of 14% in July.

For 2020-21 and before, UK ambulance services measured survival to hospital discharge, without a timeframe.

While data compared by SECAmb showed that this and survival to 30 days produced broadly similar results, current survival figures cannot be directly compared against previous years.



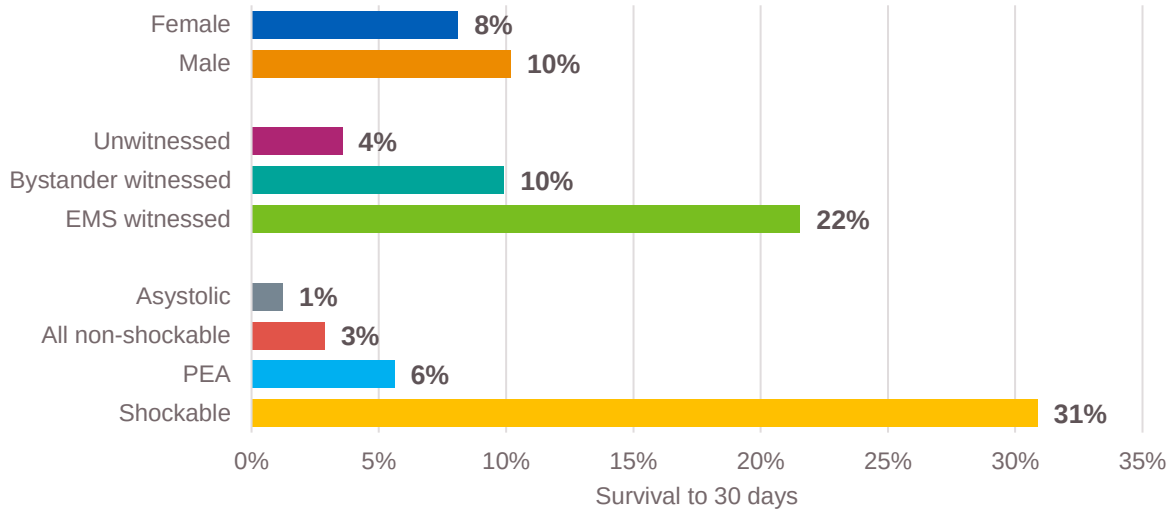
**patients with unknown outcomes are not included in survival calculations*

Profile of survivors

There are numerous factors which influence outcomes from out of hospital cardiac arrest. These include characteristics of both the patient and of the nature of their cardiac arrest, with some of these factors being dependent on each other.

There are however several key factors which are strongly associated with changes in survival rates, and are supported by international research.

The graph below compares the percentage of patients surviving to 30 days according to different characteristics:



Gender

A slightly higher proportion of men survived an OHCA than women.

- Men made up 70% of survivors compared to 66% of resuscitation attempts.
- The gender difference in survival rates has reduced compared to last year.

Witnessed by

The proportion of patients who survived was more than five times higher if their arrest was witnessed by EMS compared to patients whose arrest was not witnessed.

- Unwitnessed arrests made up only about a sixth of survivors, compared to nearly a third of all resuscitation attempts.
- EMS witnessed arrests made up just over a quarter of survivors, compared to only just over a tenth of all resuscitation attempts.

Initial rhythm

The proportion of patients who survived was nearly three times higher if they presented in a shockable rhythm, compared to patients presenting in a non-shockable rhythm, and was more than 30 times higher compared to patients presenting in asystole.

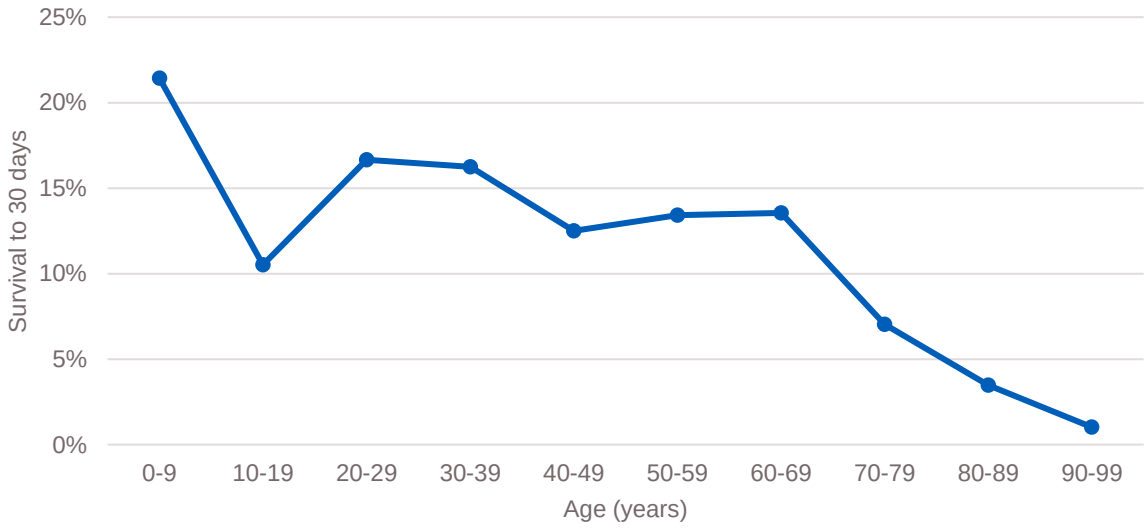
- Nearly three quarters of survivors presented in a shockable rhythm, compared to less than a quarter of all resuscitation attempts.
- Only 6% of survivors were initially asystolic, despite having been 45% of all resuscitation attempts.

As noted earlier in this report, while the initial rhythm is out of the control of the ambulance service in many cases, shockable rhythms will deteriorate into non-shockable rhythms if not treated quickly enough.

Age

- The median age of survivors was 61, compared to 70 for resuscitation attempts overall.
- Those under 40 years old were more than three times more likely to survive that those aged 70 or over.
- While patients 70 or over made up more than half of resuscitation attempts, they represented only a little over a quarter of survivors (28%).
- Patients under 40 made up 9% of resuscitation attempts overall, but 15% of survivors.

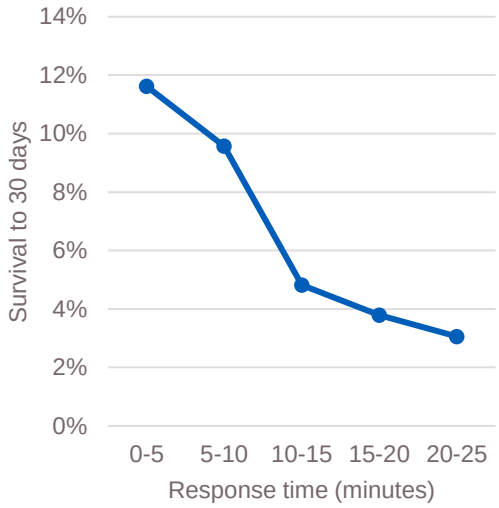
The graph below shows the percentage of patients within each age group surviving to 30 days (where patient outcomes are known)**:**



Response times

Comparing survival rates for patients according to response times demonstrates clearly how vital a rapid EMS response is for survival from cardiac arrest, and how much survival falls when EMS response is delayed.

The graph shows the percentage of SECAmb's non-EMS witnessed resuscitation attempts who survived to 30 days against the response time to the incident*:

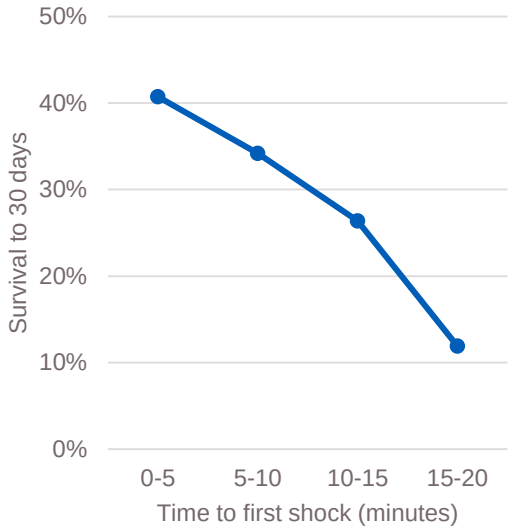


**Response times of greater than 25 minutes are not included due to low number of incidents and a disproportionately large percentage of cases where the arrest occurred after the initial 999 call. Where survival outcome is known (n=2,518).*

Time to first shock

Comparing survival rates for patients according to the time until they received their first shock demonstrates also how important rapid defibrillation is for patients presenting in shockable rhythms, and how much survival falls when defibrillation is delayed.

The graph shows the percentage of SECAmb's non-EMS witnessed resuscitation attempts who presented in a shockable rhythm and then survived to 30 days, according to the time before they received their first shock*:



**Time to first shock of more than 20 minutes are not included due to the low number of incidents and a disproportionately large percentage of cases where the arrest occurred after the initial 999 call. Where both time of first shock and survival outcome is known (n=494).*

Post resuscitation survivors

While the 45 patients who were successfully resuscitated before the arrival of EMS are not included in overall survival calculations, a remarkable **95% of these patients survived to 30 days post arrest** (n=41*).

87% of post resuscitation patients had a defibrillator on scene before SECAmb arrival (39), with 71% receiving a shock from these devices (32).

Every patient who was shocked into a ROSC before SECAmb arrival and did not rearrest survived to 30 days (n=28*).

Asystolic survivors

Examining the characteristics of survivors who presented initially in an asystolic rhythm can provide further insights, as they are notably different from the overall population of resuscitation attempts. This is especially important due to the small size of this group.

- 31% were non-medical aetiologies such as drowning, electrocution, and drug overdose, compared to 10% of total resuscitation attempts being non-medical aetiologies.
- 31% were EMS witnessed, compared to 12% of total resuscitation attempts being EMS witnessed.
- 13% were paediatric cases, compared to 2% of total resuscitation attempts being paediatric cases.
- 25% later went into a shockable rhythm.

**patients with unknown outcomes are not included in survival calculations*

The Utstein cohort

Measurements for patient outcomes are split into two groups: firstly, all patients who were treated for OHCA, and secondly, a subset known as the 'Utstein' cohort. This subset has internationally agreed fixed criteria, allowing for a more equal comparison between ambulance services.

The Utstein cohort is traditionally defined as resuscitation attempts where:

The cause is presumed **cardiac or medical**

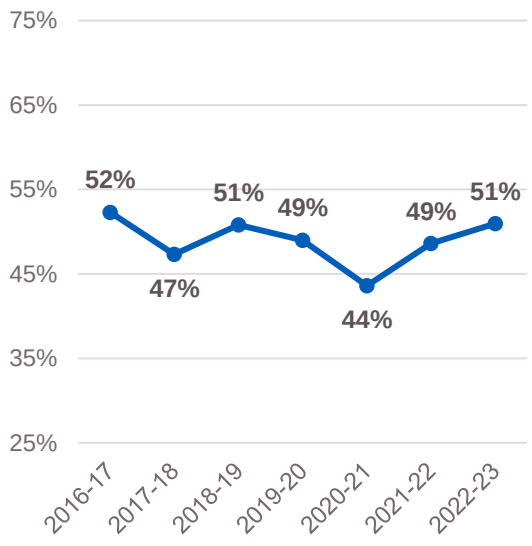
The arrest is **bystander witnessed**

The initial rhythm is **shockable**

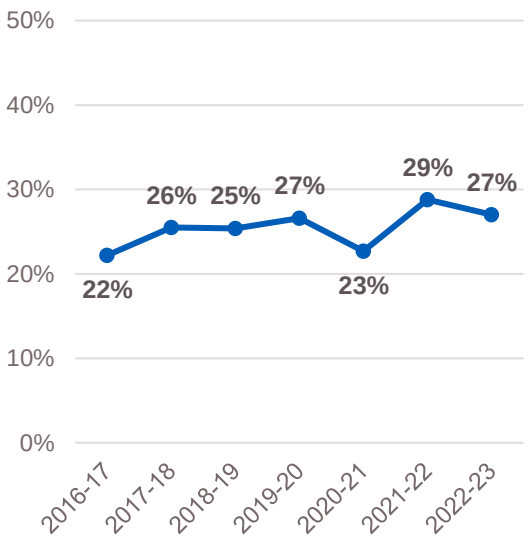
The criteria of the Utstein cohort are designed to exclude uncertainties and variables which cannot be affected by EMS systems, such as unknown aetiology or downtime, as well as focussing on arrests where timely interventions, such as defibrillation, can particularly improve survival. This means that the effectiveness of EMS systems themselves can be more clearly compared.

For 2022-23, SECAmb's **Utstein cohort was 471 patients, or 16% of all resuscitation attempts**. This was both a smaller proportion and a smaller number compared to last year, despite the increase in total resuscitation attempts made. As with all resuscitation attempts, both measures have improved from the low seen during the height of the COVID pandemic.

ROSC at hospital for the Utstein cohort was **51%**, or 240 patients, which was an increase on last year's proportion of 49% (245) and was **above the national average** of 47%.



Survival to 30 days for the Utstein cohort was **27%**, or 124 patients (n=459*). As with the overall figure, while this was a decrease from last year's figure of 29%, it **remained above the national average** of 25%.



**patients with unknown outcomes are not included in survival calculations*

Conclusion

Ambulance services in England attempt resuscitation on more than 30,000 patients a year. However, survival rates remain relatively low. For April 2022 to March 2023, SECAmb attended 8,824 cardiac arrest patients, and made a resuscitation attempt on 2,891, or 33% of these patients. Survival to 30 days was 9.5%, or 271 patients. While this is down on the previous year, this is still the second highest survival reported in SECAmb, and is 1.5% higher than the national average of 8% for the period.

As a cohort of patients, survivors are found to have predominant features related to their arrest: they are more likely to be witnessed or found early, to have bystander CPR performed, and to present in a shockable rhythm. In addition, there are aspects of care present more frequently, including the use of a defibrillator before ambulance arrival and timely ambulance response. This is in line both with established research and previous SECAmb findings.

There is one stand-out feature seen to influence survival, which is use of a defibrillator prior to ambulance arrival. The data shows that with each minute of delay in defibrillation the likelihood of survival falls.

If a defibrillator is used prior to ambulance arrival, the average time to shock is over 4 minutes quicker than when the first shock is delivered by an ambulance response, which can be pivotal for survival. For patients successfully resuscitated prior to ambulance arrival by shocks from a defibrillator, and did not rearrest, 100% survived to 30 days.

During the period of this report there have been continued challenges, with increasing demand on NHS ambulance services, and the subsequent impact this has had on providing an effective response. In numbers alone, SECAmb saw a 10% increase on the previous year in total cardiac arrests attended. Response times have continued to increase, and the data shows a link between the length of response and survival. There have also been corresponding increases in the time before key interventions, such as time to first shock.

Despite these pressures, outcome metrics have remained above the national averages. Both the number and proportion of SECAmb patients maintaining a ROSC to hospital have also increased from the previous year, and compliance with the post ROSC care bundle has improved.

While this report looks at a retrospective data set, there is a considerable amount of prospective improvement work ongoing within SECAmb. The Trust has an improvement programme for out of hospital cardiac arrest which looks at the breadth of activity and factors, aligned to the Global Resuscitation Alliance's 10 programmes that influence survival.

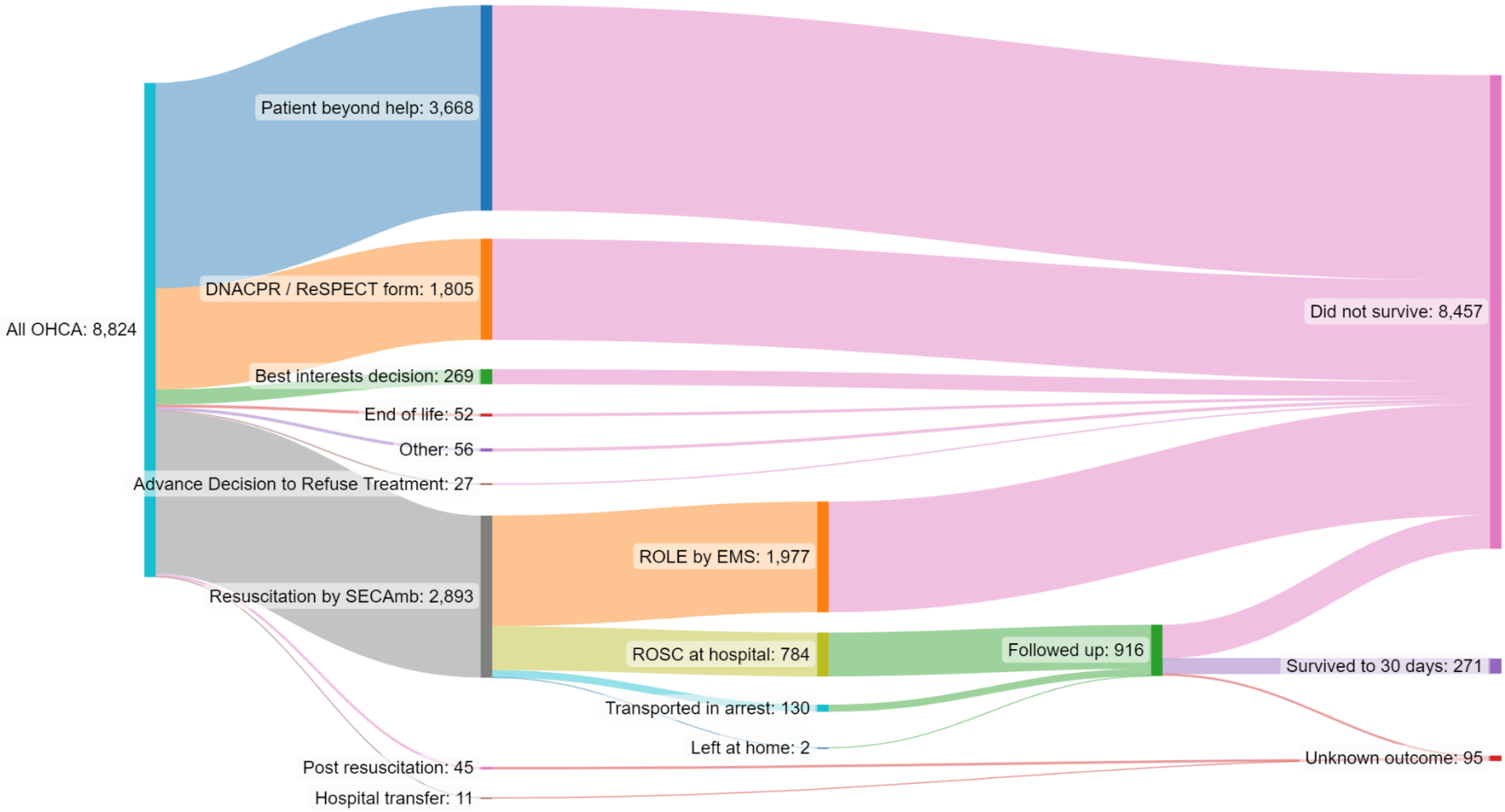
- There have been continued efforts to improve the standard of resuscitation through the roll out of feedback to clinicians, and continued data analysis to further understand the steps that can be taken to improve outcomes.
- Clinicians are now being informed when a cardiac patient they attended survives, with work also underway to include EOC staff in this project.
- The Trust has aligned all training and competency standards to the Resuscitation Council UK life support courses, and is continuing to develop training opportunities.
- There are upcoming improvements in the dispatch processes for CFRs to increase their use and reduce response time to cardiac arrests.
- SECAmb has begun further analysis into how deprivation affects our calls and the needs of our patients, including work done as part of the development of the new Trust strategy.
- There has been a project to understand barriers to telephone CPR, including a rolling monthly audit of time to hands on chest, and this greater understanding has allowed development of a targeted programme to improve rapid identification of cardiac arrest and confidence in providing telephone CPR.
- The Trust continues to be involved in community events, including the Restart A Heart initiative, providing training in CPR and PAD usage to members of our communities.

For further improvements to be made to outcomes from out of hospital cardiac arrest, development work should focus on several key areas, including:

- *Increasing community engagement in learning CPR and on increasing the availability of public access defibrillators.*
- *Mapping current PAD availability to areas of greatest incidence of cardiac arrest, to identify gaps and inform the strategy for PAD site provision.*
- *Improving the utilisation of CFRs to support an earlier response to OHCA patients.*
- *Improving time to hands on chest and signposting to PADs, while balancing this against the recognition of where CPR is not appropriate.*

Overall, despite ongoing challenges, SECAmb continues to pursue improvement in cardiac arrest care, with ongoing development work in multiple areas to build on the positives seen so far and working to address the areas in need of improvement, aiming to ensure that every cardiac arrest patient attended by our clinicians stands the best possible chance of survival.

All arrests


All OHCA: 8,824
Patient beyond help: 3,668
DNACPR / ReSPECT form: 1,805
Best interests decision: 269
End of life: 52
Other: 56
Advance Decision to Refuse Treatment: 27
Resuscitation by SECAmb: 2,893
ROLE by EMS: 1,977
ROSC at hospital: 784
Transported in arrest: 130
Left at home: 2
Post resuscitation: 45
Hospital transfer: 11
Followed up: 916
Did not survive: 8,457
Survived to 30 days: 271
Unknown outcome: 95

Definitions

ADRT	Advanced Decision to Refuse Treatment	A patient treatment plan or other documentation, separate from a ReSPECT form or DNACPR, which defines the patient's wishes regarding treatment options and circumstances under which they should be applied.
AED	Automated External Defibrillator	A portable electronic device that recognises shockable heart rhythms without manual analysis and can treat them through defibrillation.
AED non-shockable	A cardiac rhythm determined by an AED to not be treatable with defibrillation. Due to the nature of AEDs, no further details about the type of rhythm are available.	
AED used	An AED has been applied to the patient and turned on. It may or may not administer a shock, depending on the initial rhythm of the patient.	
Aetiology	The cause or origin of a condition or illness. In this report, the cause of cardiac arrest.	
Asystole	A 'flatline' heart rhythm. This cannot be corrected by a shock from a defibrillator.	
Bystander	Anyone who is not part of the organised EMS response, i.e., not alerted to the arrest by EOC. This is unrelated to skill level, and could be a layperson, a member of the police, or an off duty trained clinician who happens to be nearby.	
Cath lab	A hospital department where pPCIs are performed, along with other cardiac procedures and tests.	
CPR	Cardiopulmonary Resuscitation	A treatment to maintain circulation for patients in cardiac arrest, in particular chest compressions.
Defibrillator	A machine used to administer a controlled electric shock to the heart and 'stun' it out of an irregular rhythm, with the aim of resetting it into a normal rhythm.	
ECG	Electrocardiogram	A reading of the electrical signals in the heart that allows clinicians to read the heart's rhythm and electrical activity and diagnose certain conditions.
EMA	Emergency Medical Adviser	An individual trained to answer 999 calls, assess the patient, and provide initial care until EMS arrival.
EMS	Emergency Medical Services	Ambulance services, including HEMS, volunteer and private providers, and Community First Responders.
EOC	Emergency Operations Centre/Control	Where 999 calls are answered and a response is organised.
HEMS	Helicopter EMS / Air Ambulance	For SECAmb, this refers mainly to Air Ambulance Charity Kent Surrey and Sussex.
Initial rhythm	The cardiac arrest rhythm at the first point that it should be possible to record. This may be on Trust defibrillator, or from a defibrillator on scene before SECAmb arrival.	

Mean	The average value of a data series. Unlike the median (which takes the middle value of the series) the mean can be heavily affected by extreme/outlying data points.	
Non-EMS witnessed resuscitation attempts	Patients who were in cardiac arrest before the arrival of EMS, who then received a resuscitation attempt from SECAmb. This includes patients who arrested between the time of the initial 999 call and EMS arrival. When considering response times and bystander interventions, it is these patients who are examined.	
Non-SECAmb defibrillator	All defibrillators on scene before SECAmb arrival. This may include PADs, privately owned AEDs, and those brought by other emergency services such as the police.	
OHCA	Out of Hospital Cardiac Arrest	A cardiac arrest that occurs outside of a hospital with an Emergency Department
OHCAO	Out of Hospital Cardiac Arrest Outcomes registry	Database of national OHCAs run by Warwick University. Data is uploaded from all English ambulance trusts and sent to NHS England for national reporting.
PAD	Public Access Defibrillator	An AED placed in a public location to be used by a bystander on a patient in cardiac arrest.
PEA	Pulseless Electrical Activity	A heart rhythm demonstrating some activity, but which is too weak to produce a pulse. This cannot be corrected by a shock from a defibrillator.
pPCI	Primary Percutaneous Coronary Intervention	An emergency procedure to unblock the vessels of the heart after a patient has suffered a myocardial infarction (heart attack).
ReSPECT	Recommended Summary Plan for Emergency Care and Treatment	A patient treatment plan, separate from a DNACPR, which defines the patient's wishes regarding their treatment options and circumstances under which they should be applied.
Resuscitation attempt	At least 20 minutes of CPR performed by SECAmb on a patient who does not have a valid plan declining resuscitation, during which time no signs incompatible with life have been identified. **OR** a ROSC achieved and maintained by SECAmb.	
ROSC	Return of Spontaneous Circulation	Return of a pulse after cardiac arrest.
Sensitivity	How well a test identifies true positives, i.e., how well our system does at identifying every patient in cardiac arrest.	
TEP	Treatment Escalation Plan	An agreed care plan for a person with a serious illness who has the potential for acute deterioration or may be coming towards the end of their life.
Witnessed arrest	An arrest which has been seen or heard.	

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