



South East Coast
Ambulance Service
NHS Foundation Trust



Out of Hospital Cardiac Arrest Annual Report

April 2021 – March 2022



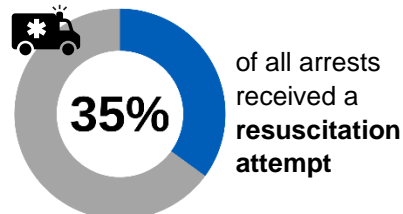
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Key figures at a glance:

All cardiac arrests

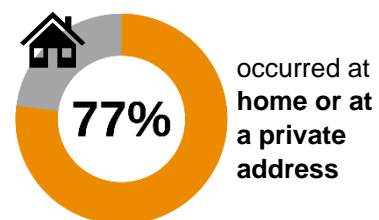
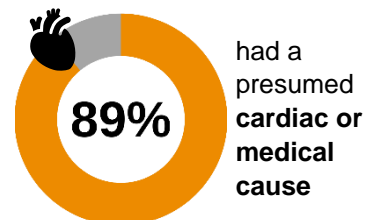
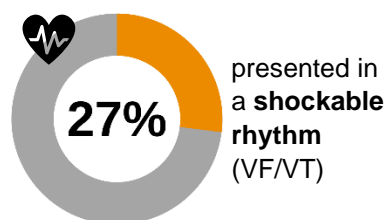
8005
cardiac arrests attended
2788
resuscitation attempts made



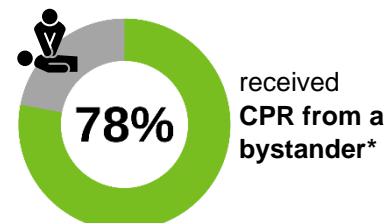
Our patients

66% male
Median age: 68
34% female
Median age: 70

Profile of resuscitation attempts

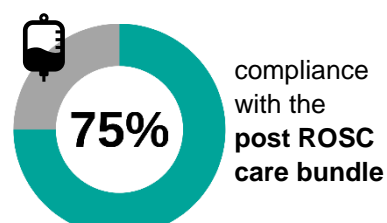


Bystander response



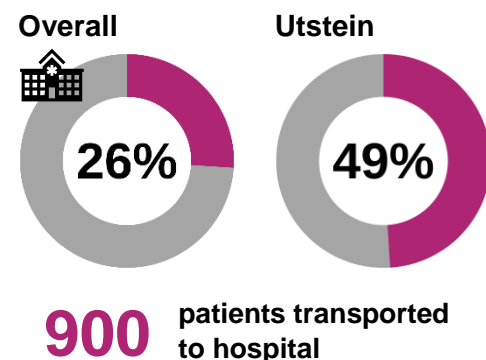
194
public access AEDs used

EMS response

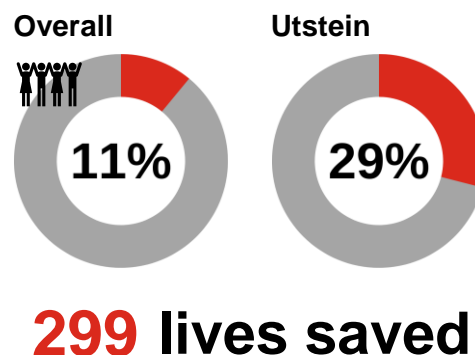


10m
mean response time*

ROSC at hospital



Survival to 30 days



*non EMS witnessed resuscitation attempts

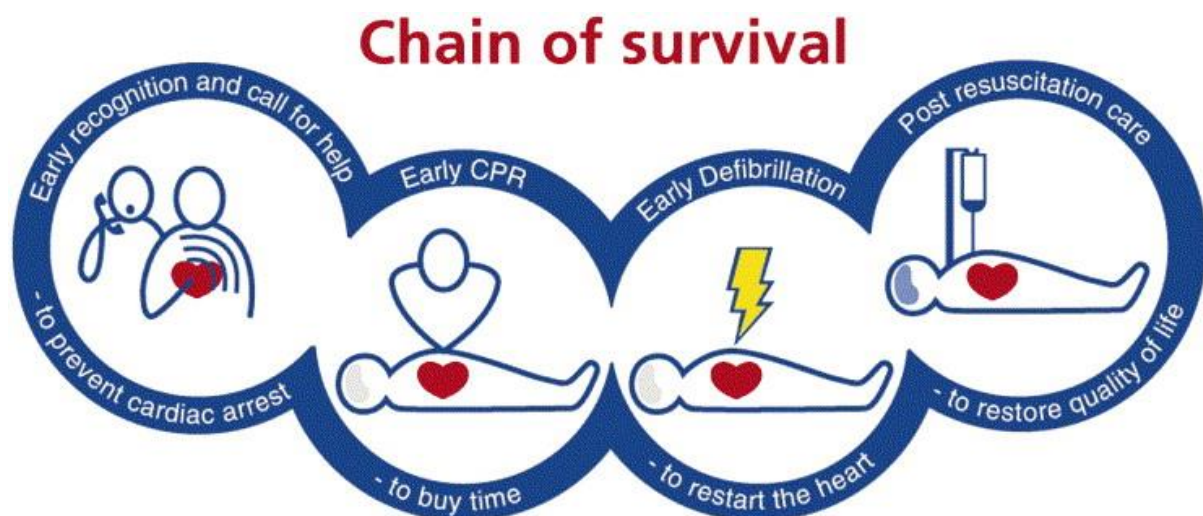
Introduction

Out of hospital cardiac arrest (OHCA), where the heart stops beating and blood stops circulating around the body, is the most time-critical type of incident for ambulance services; without intervention, it takes only ten minutes from initial collapse to irreversible death.

Globally, survival rates from OHCA vary hugely, from less than 5% to over 60%, and depend on a multitude of factors. Many of these factors, such as patient age or cause of arrest, ambulance services have little

control over. However, improvements in responding to OHCA, from treatment to timeliness, can and absolutely do save lives.

These controllable characteristics, known as 'system and therapy factors', are summarised in the four links of the Chain of Survival. This report is structured to examine the strength of each link within South East Coast Ambulance Service (SECamb) to both identify aspects with room for improvement and to highlight areas where we can be proud of our performance.



The data for this report comes from our Cardiac Arrest Registry – a database of all cardiac arrests attended by SECamb. Information is taken from a wide range of sources, including ambulance patient care records (both paper and electronic), the

Trust's computer aided dispatch (CAD) program, defibrillator downloads, and from other supporting organisations, including hospital survival data, helicopter emergency medical services (HEMS), and volunteer and private providers.

The registry is based around the Utstein style of reporting, which allows significant figures to be benchmarked against other services and against targets from the Global Resuscitation Alliance, by collecting and categorising data in agreed upon ways.

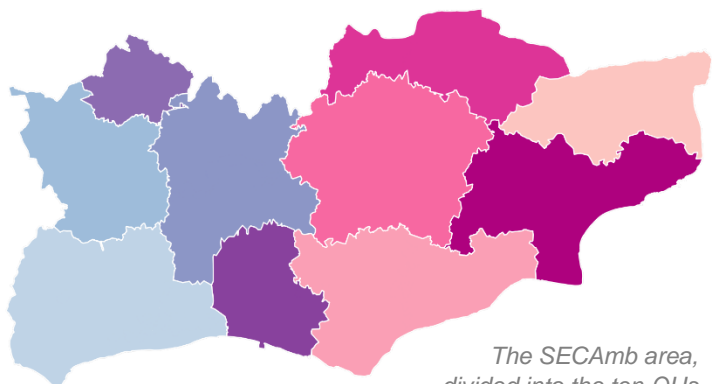


Who are SECamb?

SECamb has over 4000 staff working at over 100 sites, operating in an area of around 3,600 square miles, including Brighton & Hove, East Sussex, West Sussex, Kent, Surrey, and North East Hampshire. We provide emergency healthcare to a population of roughly 5.1m, with our ten Operational Units (OUs) covering densely populated urban areas, sparsely populated rural areas, 440 miles of coastline, and some of the busiest stretches of motorway in the country.

Around 90% of our workforce are operational staff. 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. The ambulance service care for a wide variety of conditions, ranging from the critically ill and injured in need of specialist treatment, to those with minor healthcare needs who can be treated at home or in the community.

We work alongside other emergency services, including the police, fire, and other ambulance services, as well as specialist emergency organisations such as helicopter emergency services (HEMS), private and volunteer ambulance providers, and individual volunteers.



*The SECamb area,
divided into the ten OUs*



Mike's Story

Mike Ferguson, 54, from Barham, near Canterbury, had been suffering from chest pains for about four weeks, until he came home from work on the 6th October 2020.

"I had been experiencing some discomfort for a few weeks but it suddenly got a lot worse and felt as though someone was tightening a belt around my chest. I arrived home not feeling great at all and said to [my partner] Helena, that I thought I should call 111 – but things suddenly got a lot worse and I said 'I think you're going to have to call 999'."

A crew attended to carry out checks on Mike's heart, and when they decided that he required further hospital treatment, he was taken to the awaiting ambulance. However, as the crew continued their assessment in the vehicle, Mike went into cardiac arrest.

Mike required seven shocks from a defibrillator to restart his heart, before being rushed to William Harvey Hospital where he underwent emergency treatment to have a blockage in a main artery cleared and a stent fitted.

"I'm just so grateful for everything everyone in the ambulance and hospital teams did for me. Quite simply, without them, I wouldn't be here."

"My subsequent treatment and rehab has gone really well and I feel like a new man but I would strongly urge people not to ignore the signs of a problem and to get themselves checked out if they have any discomfort or concerns like me."

Robert's Story

Robert Ingram was returning from a football match by train in September last year when he collapsed not far from Sevenoaks Railway Station.

Luckily for Robert, he hadn't quite reached the station car park and so his collapse was witnessed by others at the station.

Robert has no memory of what happened, however Tristan Woods-Scawen recalls:

"I saw this man collapsed on the road and as it was quite late, I thought maybe he had had one too many drinks but when I went up to him, I could see that he wasn't breathing."

James McSharry had just arrived at the station to collect his wife, when he saw a small crowd of people standing around Robert. James, who is a physiotherapist, quickly manoeuvred his car so that he could put some light on the events unfolding and jumped out of the car to offer his help.

"There was a group of about ten people standing there and I went over and someone asked if anyone could do CPR and as a physio, I had some training, albeit

I felt a bit rusty! So, I started chest compressions and then about halfway through he let out this breath and I knew it was agonal breathing. Someone then went off to get the defibrillator from the railway station and I carried on doing chest compressions with the support of the call taker who was fantastic. Tristan then took over the CPR because I was getting tired."

Robert received three shocks from a public access defibrillator before the crews and other emergency services arrived, and by the time the crews left the scene to take Robert to hospital, he was able to give them his name. Robert was then rushed to the cardiac unit at William Harvey Hospital for specialist treatment.

Operational Team Leader Natalie Bone said: "It is without doubt that these quick actions of the public, and easy access to a community defibrillator, saved this patient's life. It is definitely also great evidence for why community AEDs are so important."

Robert has since gone on to make a full recovery.



James McSharry, Paramedic Bronwyn Davidson, Robert Ingram, Robert's partner Vicki, and Tristan Woods-Scawen at the SEC Amb Awards 2022

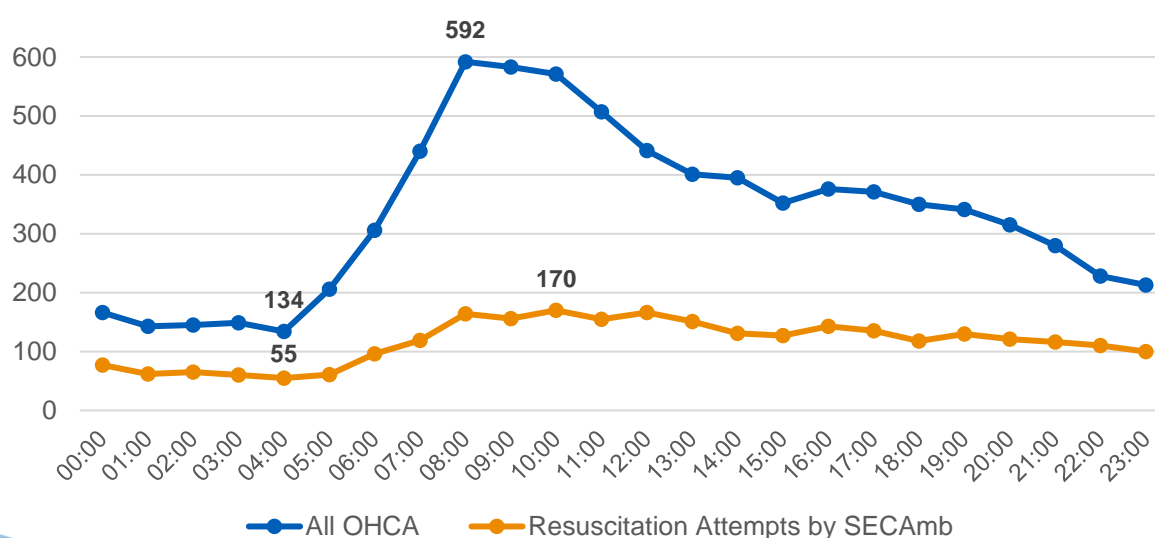
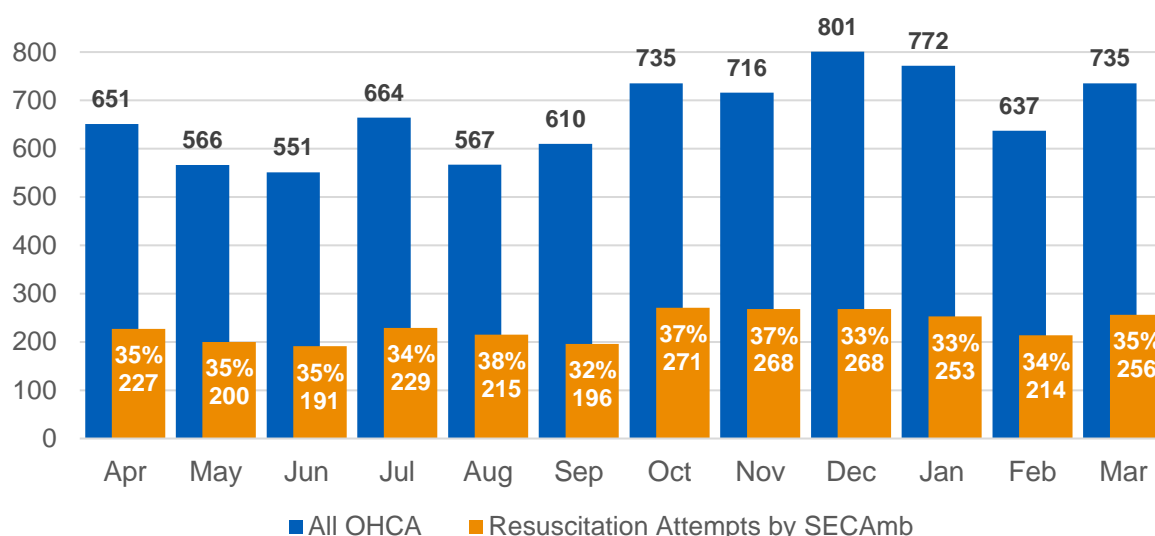
Cardiac arrests in SECamb

From the 1st April 2021 to 31st March 2022 SECamb attended **8005 out of hospital cardiac arrests (OHCA)**. Of these, **2788 patients (35%) received a resuscitation attempt** from our crews.

Our peak time of day for cardiac arrest calls is between 8am and 11am, with 22% (1746) of cardiac arrest calls and 18% (490) of resuscitation attempts.

In line with previous years, cardiac arrests tend to increase in the winter months, with our busiest month being December.

On average, we receive around 670 calls for cardiac arrest a month, or nearly one every hour.

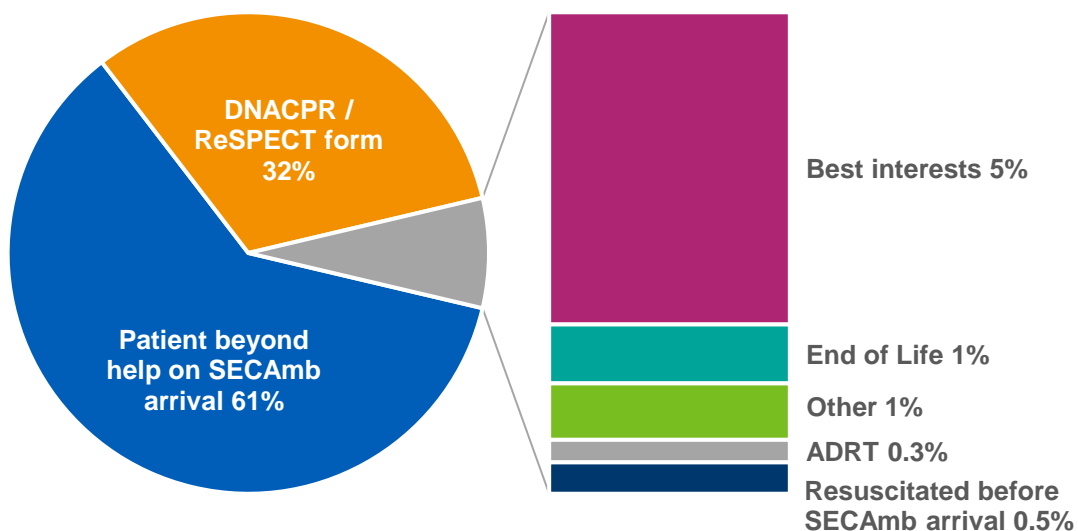


Resuscitations not attempted

The most common reason for SECamb not attempting resuscitation was that the patient was beyond medical help by the time of SECamb attendance (3173 patients). This is followed by patients with documentation refusing resuscitation, such as Do Not Attempt Cardiopulmonary Resuscitation (DNACPR) orders, or Recommended Summary Plan for Emergency Care and Treatment (ReSPECT) forms (1654 patients).

Those with other types of advanced decisions to refuse treatment (ADRTs) made up less than 1% of patients not receiving a resuscitation attempt.

Clinicians may sometimes deem it to not be in a patient's best interest to attempt a full resuscitation; for example where no formal care decisions are in place, but wishes regarding care have been expressed, or where severe comorbidities would make a full resuscitation attempt highly unlikely to be successful but there has not been a prior written or spoken agreement that the patient is nearing a natural end to their life (known as 'End of Life'). These 'best interests' patients make up approximately 5% of cases where resuscitation was not attempted.

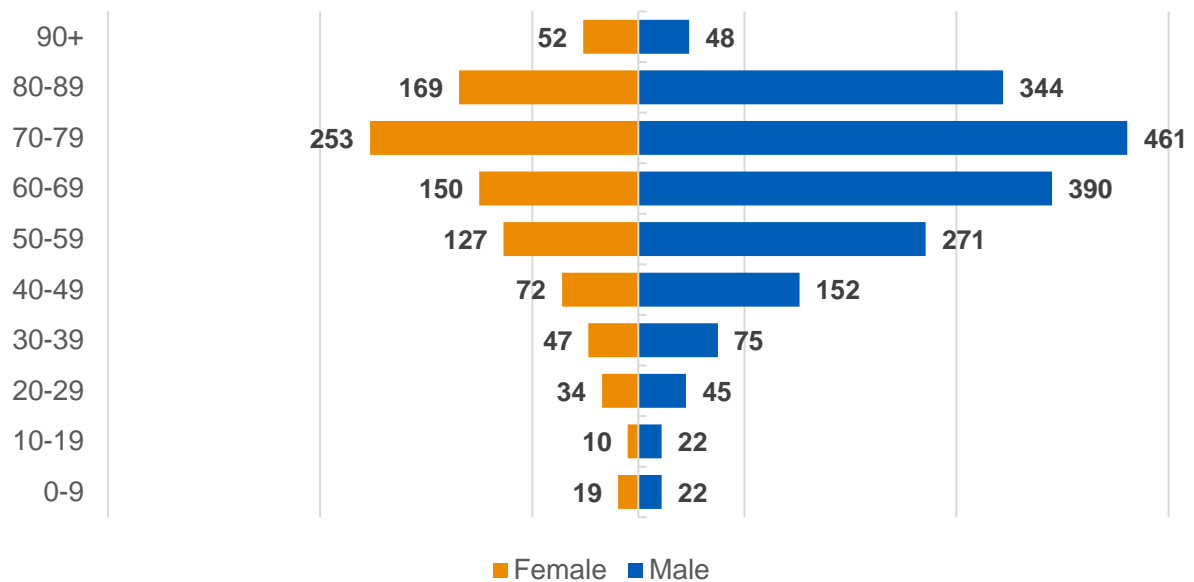
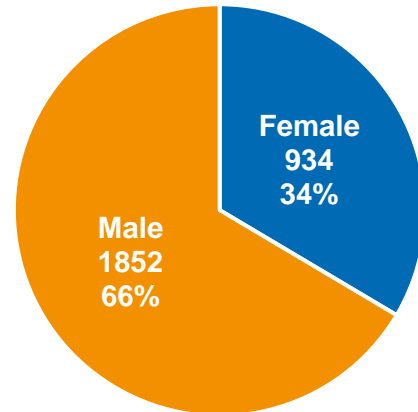


Included in the total number of OHCA were patients who were successfully resuscitated before SECamb arrival. For 2021-22 this was 25 patients, or 0.5% of cases where resuscitation was not attempted.

Our patients

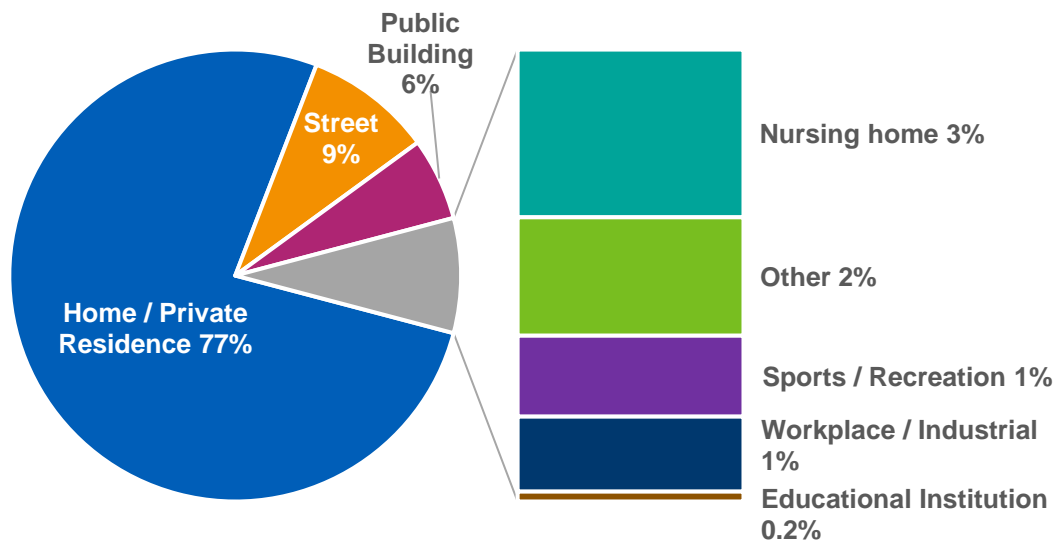
Consistently there is a strong gender bias in patients receiving a resuscitation attempt, **with men outnumbering women two to one**. Men receiving a resuscitation attempt also have a slightly lower average age, with a median average of 68 years, compared to 70 for women.

These average ages reflect the distribution of overall ages of our OHCA patients: **over half are over 70**, and **only one in ten are under 40**.

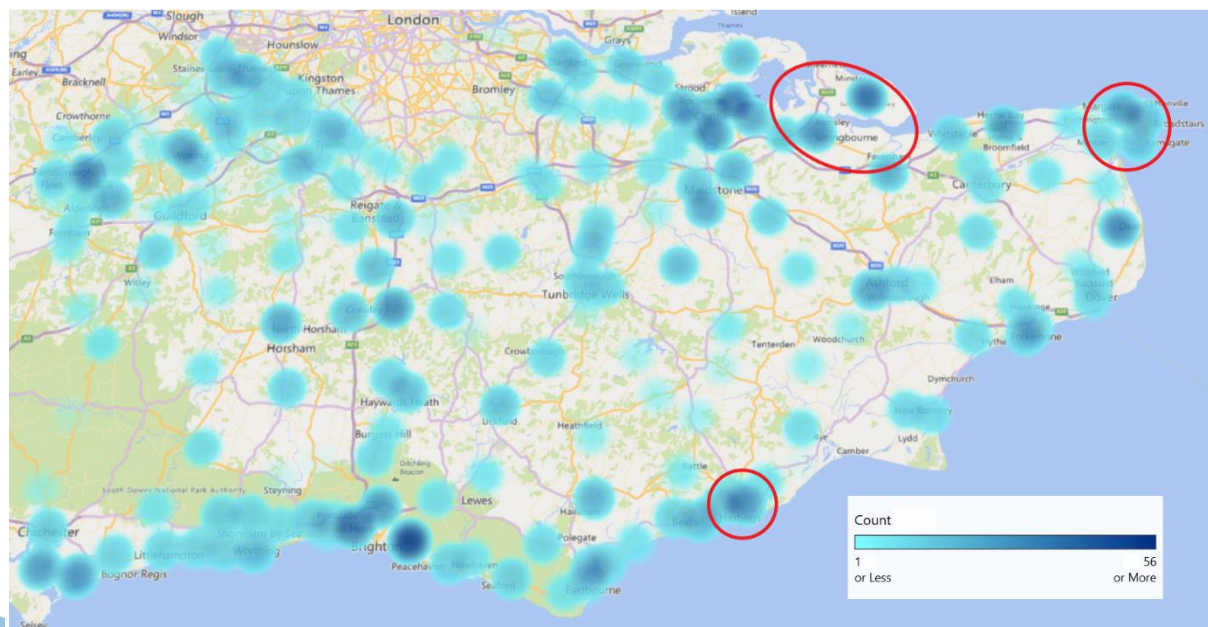


Arrest locations

Arrests at private residences, such as home addresses and care homes, made up nearly 80% of all resuscitation attempts in SECamb for 2021-22.



Whilst our patients are spread all over the SECamb area, when examining the home addresses of patients there are some notable areas of particularly high incidence, several of which correlate with the highest deprived areas as reported by the most recently available English Indices of Deprivation report (2019). The map shows the home postcodes of our patients (excluding those who live outside the SECamb area), with areas of high deprivation highlighted in red.

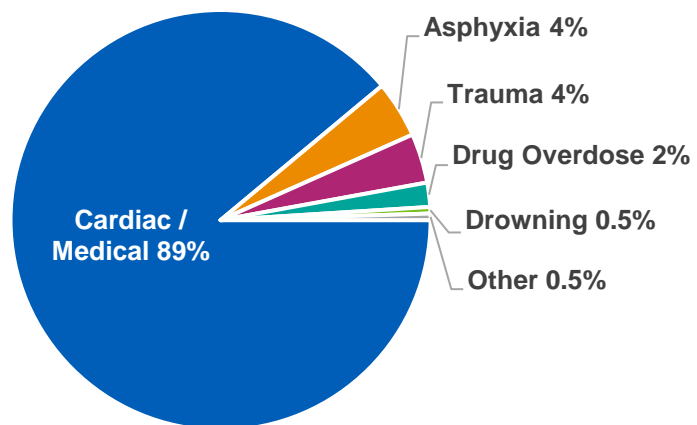




Causes of arrest

Information on cardiac arrest aetiology is taken from ambulance patient care records. It is therefore a presumed cause, based upon details available to clinicians at the time of the incident.

Nearly nine out of ten OHCA treated by SECamb are presumed medical or cardiac in origin.



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

- *Cardiac / medical includes clearly cardiac-related cases and other medical causes (e.g., anaphylaxis, asthma, gastrointestinal bleeds, 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, or strangulation, excluding drowning.*
- *Trauma is specified as an arrest directly caused by blunt, penetrating, or burn injury.*

Chain of Survival

The Chain of Survival describes the key elements of addressing OHCA. It covers action from the moment of arrest through to arrival and handover at hospital, and relies on bystanders, emergency medical advisers (EMAs), and different grades of clinical staff all working together to administer high quality treatment as fast as possible, to give patients the best chance of survival.



**Early recognition
of cardiac arrest
and call for help**



Early CPR



Early defibrillation



Post resuscitation care



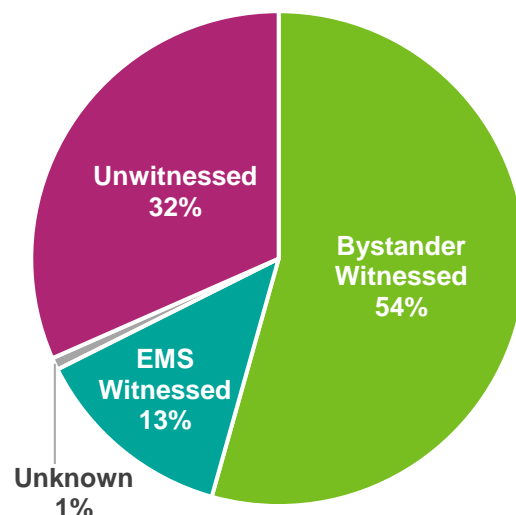
Early recognition & call for help

87% of SECamb resuscitation attempts are either unwitnessed or witnessed by someone other than a member of EMS. When examining response times and bystander interventions, it is these 'non EMS witnessed' arrests which are examined.

Early recognition and access does not just depend on bystanders, but also extends into emergency medical services (EMS) and telephone triage. Highly trained emergency medical advisers (EMAs) using an effective clinical decision support system (CDSS) ensure 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.

The time-critical nature of cardiac arrests means that these calls are assigned the highest priority available to ambulance services; a 'Category 1'. **94% of non EMS witnessed resuscitation attempts were categorised as a Category 1** (n=2262). For these incidents, our mean response time was 9 minutes, with 90% attended within 15 minutes 50 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.

SECamb also measures the sensitivity of detection of cardiac arrest during 999 calls. 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. **93% of non EMS witnessed resuscitation attempts were identified as cardiac arrests by EMAs** (n=1102), which significantly surpasses the Global Resuscitation Alliance target of 75%.

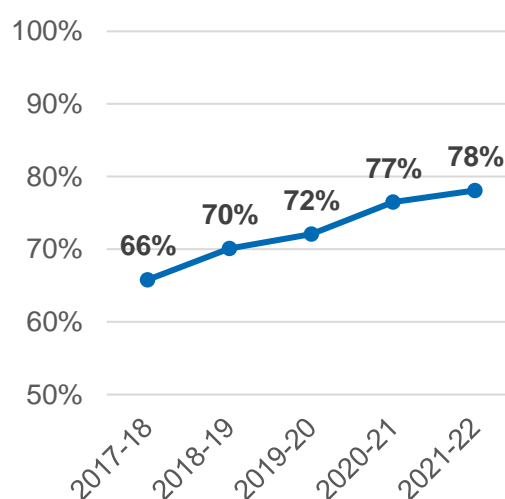
It is vital that as many cardiac arrests as possible are identified during the 999 call and the correct incident priority is assigned. Without rapid recognition, response times can be delayed significantly, leading to knock on delays in further care. For 2021-22, the mean response time for patients whose cardiac arrest was recognised during the call and were therefore assigned a Category 1 was over a minute faster than the overall mean for all patients who were in cardiac arrest on SECamb arrival (10 minutes 2 seconds).

Early CPR

One of the most important ways to improve outcomes from OHCA is the involvement of bystanders before EMS arrival, as the patient's chances of survival are reduced by 10% for every minute that CPR is delayed. Early CPR keeps oxygenated blood flowing to vital organs and buys time before the arrival of EMS.

It is a key skill of EMAs to rapidly coach callers to commence and continue CPR. 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 SECamb's non EMS witnessed resuscitation attempts receiving **bystander CPR has been on an upward trend** for every year that this metric has been recorded. In 2021-22, this figure was **78%**, or 1889 patients, which well exceeds the target of 50% set by the Global Resuscitation Alliance.



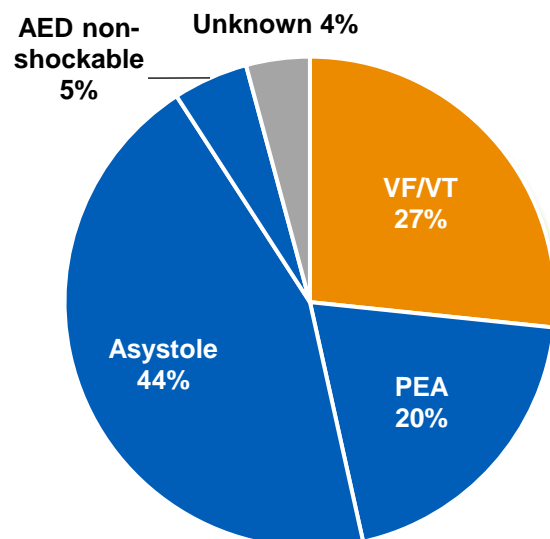


Early defibrillation

Delivering a shock from a defibrillator 'stuns' the heart to help it restart in a normal, life-sustaining rhythm. Only two heart rhythms can be shocked: ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT). 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%.

Approximately **one in four SECAmb resuscitation attempts present initially in a shockable rhythm**, whilst more than one in three require defibrillation at some point during their arrest.

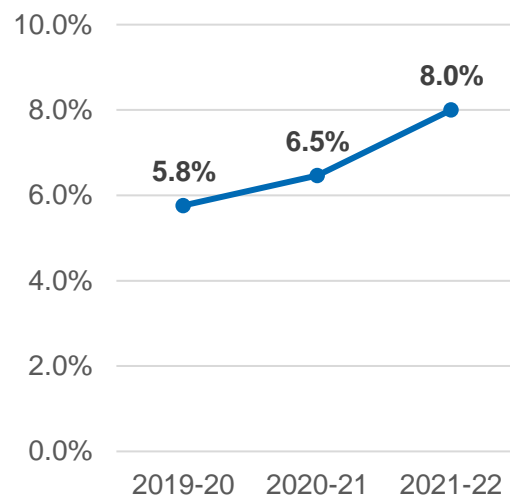
Cases presenting in non-shockable rhythms include those in asystole, pulseless electrical activity (PEA), and unspecified rhythms which have been identified by an automated external defibrillator (AED) as being non-shockable without the need for manual analysis of the rhythm (known as 'AED non-shockable').



SECamb has a **database of around 3500 public access defibrillators (PADs)**, which is linked to our computer aided dispatch system (CAD). This allows EMAs to inform callers of their closest PAD, so it can be brought to the patient as soon as possible.

For non EMS witnessed resuscitation attempts which presented in a shockable rhythm, the **median time to first shock was 11 minutes**, with 90% of these cases being shocked within 21 minutes. For cases **where a PAD was used this time drops by three minutes to a median of 8 minutes** and a 90th centile of 18 minutes.

Use of PADs is also increasing – in 2021-22 a **PAD was used on 194 patients**, or 8.0% of non EMS witnessed resuscitation attempts, compared to 6.5% (151) last year, and only 5.8% (133) the year before.



Patients successfully resuscitated before EMS arrival are not included in overall statistics, however of 17 of these 25 patients achieved a return of spontaneous circulation (ROSC) thanks to shocks from a PAD.



GoodSAM
Instant.Help

SECamb 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 public access defibrillator (PAD) to the scene of the arrest. This minimises the time spent without high quality bystander CPR and reduces any delays in defibrillation, helping to increase chances of survival. The app is used worldwide by over 200 organisations and has over 1.5 million users globally.

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 interventions which aim to ensure the best chance of survival after cardiac arrest. It applies to patients where ROSC was achieved on scene by EMS, the patient was 18 years old or over, and the cause of the arrest was non traumatic, and it consists of six elements:



Administer intravenous fluids

- if required



Measure end-tidal carbon dioxide (EtCO₂)

- if advanced airway used



Administer high flow oxygen (O₂)

- if required



Measure blood pressure (BP)

- or note radial pulse



Obtain a 12 lead electrocardiogram (ECG)

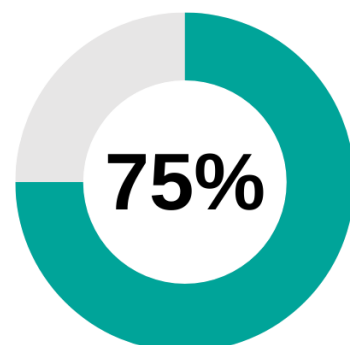


Measure blood glucose (BM)

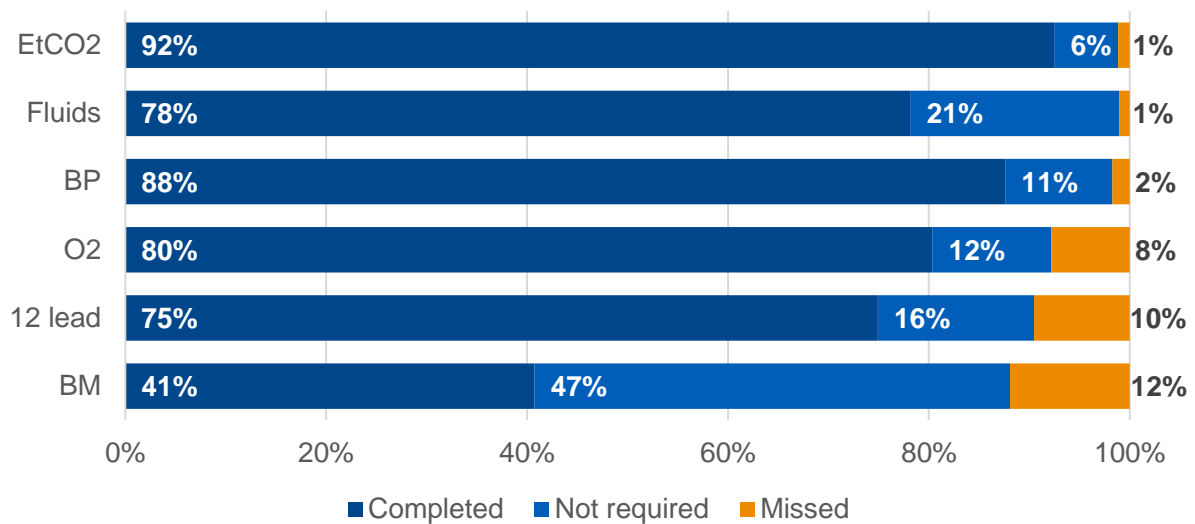
- unless normal pre ROSC

Overall, SECAmb **compliance with the post ROSC care bundle sits at 75%** for 2021-22, or 789 of the 1048 patients where the care bundle was required.

If a ROSC is lost within 10 minutes then any missed elements are counted as not required, as it is expected to take at least 10 minutes to stabilise a patient before they can be moved.



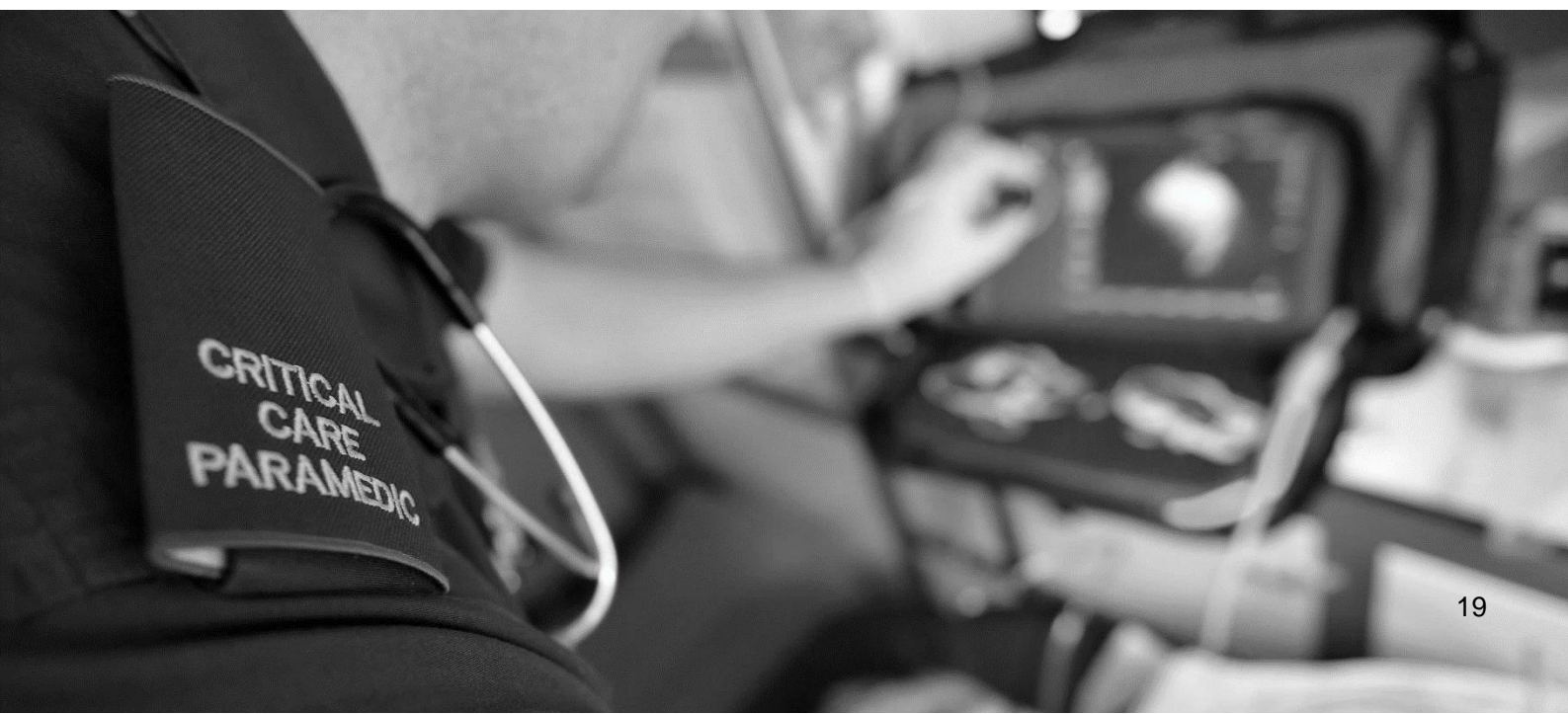
The graph below shows compliance within SECAMB for each element of the care bundle.



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 paralyse the patient, 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

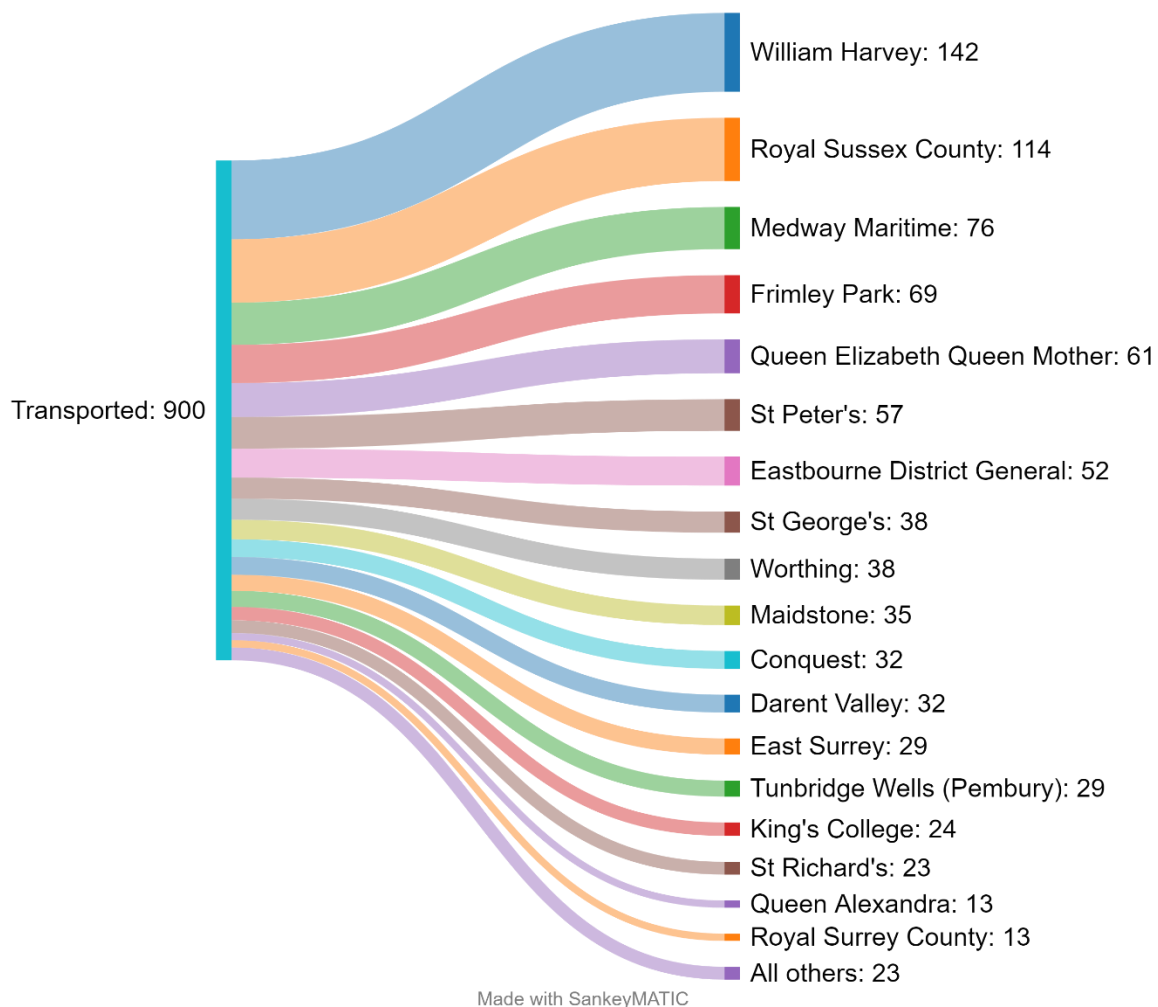
Critical Care Paramedics are specialist paramedics in SECAMB with postgraduate training. They are specifically assigned to critically unwell patients, as they can provide an enhanced range of interventions and support complex decision making.



Transported to hospital

For patients that remain in cardiac arrest despite treatment, SECAmb clinicians will normally continue resuscitation on scene until a definitive outcome is reached, rather than transport the patient to hospital in arrest. Exceptions to this apply when there are clear reversible causes that 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 or drownings.

Overall, **SECAmb transported 900 patients to hospital, or 33% of all resuscitation attempts**. Approximately 10% (96) of transported patients were taken to a pPCI (Primary Percutaneous Coronary Intervention) centre for specialist intervention for a heart attack, with 90 of these patients handed over at hospital still in ROSC.



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

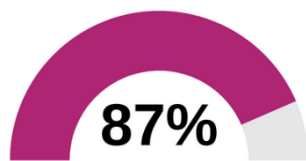
SECAmb is currently able to analyse the performance of our clinicians' CPR against three of these metrics, using data downloaded from the Trust's defibrillators. The first ten minutes of the download are examined (or, if EMS witnessed, the first ten minutes of the arrest), as this is deemed to be the 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 ten seconds.

A snapshot of data from the first two weeks of December 2021 showed:



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



of cases had no more than two minutes off the chest during the ten minutes examined. Whilst this is good performance, there is room for improvement.

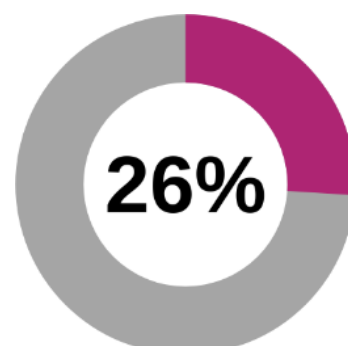


of cases had no pauses greater than 10 seconds. Improvement is needed in this area, as long pauses are linked with worse outcomes.

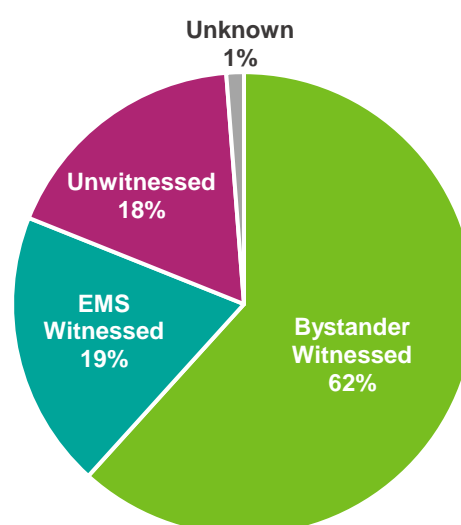
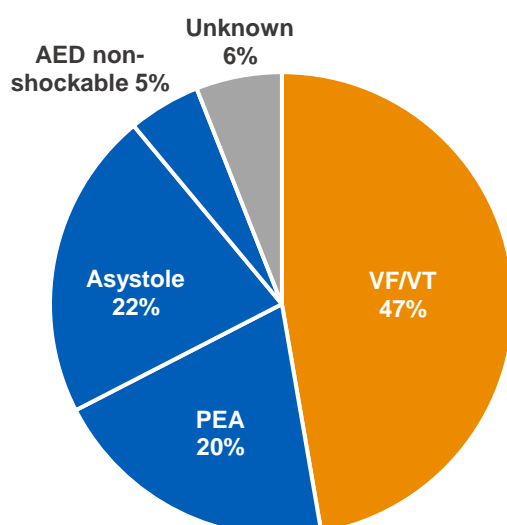
ROSC at hospital

UK ambulance services measure outcomes from OHCA with two main metrics. The first of these is whether the patient achieved a return of spontaneous circulation (ROSC) which was then maintained to hospital.

For 2021-22, **26% of patients treated for OHCA by SECamb were still in ROSC at hospital handover (734 patients)**, an improvement on last year's figures of 22% (589 patients).



There are significant correlations between the features of cardiac arrests and likelihood to maintain ROSC to hospital, in particular initial rhythm and whether the arrest was witnessed. The graphs below show these characteristics as a percentage of all patients with ROSC at hospital.

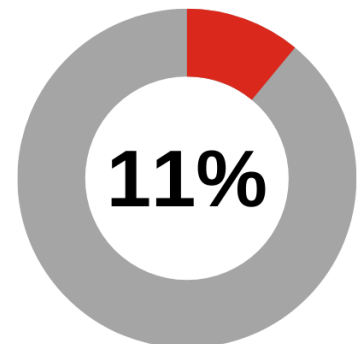


- Nearly half of all patients maintaining ROSC to hospital presented in a shockable rhythm, despite representing only just over a quarter of all resuscitation attempts.
- Initially asystolic arrests make up less than a quarter of patients maintaining ROSC to hospital, even though they represent nearly half of all resuscitation attempts.
- Less than a fifth of patients maintaining ROSC to hospital were unwitnessed arrests, despite these patients making up nearly a third of all resuscitation attempts.

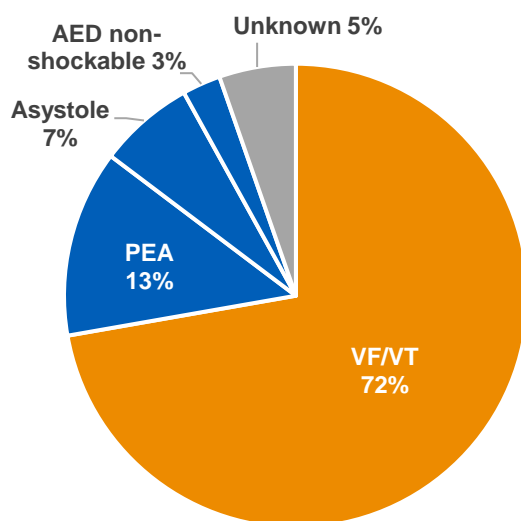
Survival to 30 days

Whilst 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.

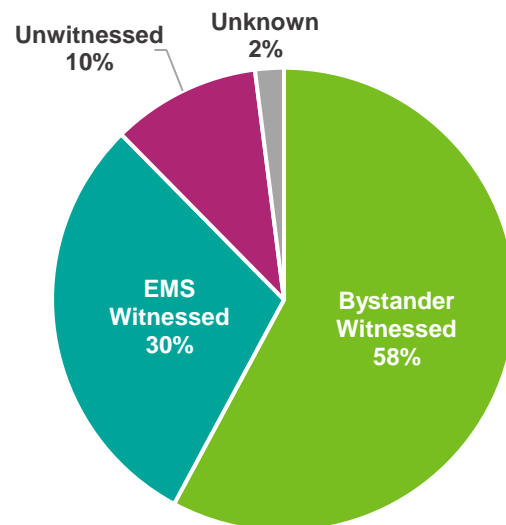
In total, **11%, or more than one in ten patients receiving a resuscitation attempt from SECamb survived to 30 days** (n=2750*), which is above the national average of 9%, and more importantly, is **299 individuals whose lives were saved**.



As with ROSC at hospital, both initial rhythm and whether the arrest was witnessed are correlated with patient survival, with initial rhythm being linked much more strongly. The graphs below show these characteristics as a percentage of all patients who survived to 30 days.




- Patients in a shockable initial rhythm make up nearly three quarters of survivors, despite making up only just over a quarter of all resuscitations.
- Less than a tenth of survivors were initially asystolic, but were nearly half of all resuscitation attempts.



- Unwitnessed arrests represent less than a tenth of survivors, despite making up nearly a third of all resuscitation attempts.
- EMS witnessed arrests make up nearly a third of survivors, despite being just over a tenth of all resuscitation attempts.

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



Before 2021, UK ambulance services measured survival to hospital discharge, without a timeframe. Whilst data for both metrics compared by SECamb showed that they produced broadly similar figures, it is not possible to directly compare current survival figures against those from previous years.

Looking at the characteristics of survivors in more detail also presents further insights:

- Three quarters of survivors are male, compared to two thirds of total resuscitation attempts.
- The median age of survivors is 63, compared to 69 for resuscitation attempts overall.
- While patients over 70 make up nearly half of resuscitation attempts, they represent only just over a third of survivors.

Patients who were successfully resuscitated by shocks from a PAD before the arrival of EMS are not included in overall statistics. However, a remarkable 94% of this group survived (n=15).

The profile of survivors who presented initially in an asystolic rhythm is also considerably different from the overall population of resuscitation attempts:

- 40% of these cases were non-medical aetiologies such as drowning, electrocution, and drug overdose, compared to 11% of total resuscitation attempts.
- 35% were EMS witnessed, compared to 13% of total resuscitation attempts.
- 10% were paediatric cases, compared to 2% of total resuscitation attempts.
- All of these patients maintained a ROSC to hospital.

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 second group has internationally agreed fixed criteria, allowing a more equal comparison between ambulance services.

The Utstein cohort is defined as resuscitation attempts where:



The cause is presumed cardiac or medical



The arrest is bystander witnessed



The initial rhythm is shockable

For 2021-22, **SECamb's Utstein cohort was 504 patients**, or 18% of all resuscitation attempts.

ROSC at hospital for the Utstein cohort was 49%, or 245 patients. As with the overall figure, this is also an increase on last year's 44% (202).

Survival to 30 days for the Utstein cohort was 29%, or 141 patients (n=490*). As with the overall figures, this is also above the national average of 25%.

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



Conclusion

OHCA is a time-critical medical emergency. For some patients it is a natural and expected end of life event, whilst others are sadly beyond medical help, but for a significant number it is a potentially reversible event that relies on a set of rapidly delivered specific actions: the chain of survival.

Between April 2021 and March 2022 SECamb responded to 8005 patients having an out of hospital cardiac arrest, of which we commenced resuscitation in 2788 cases. The incidence of OHCA appears to be related to both population density and presence of deprivation. ROSC was maintained to hospital in 26% of resuscitations, whilst 11% (299 patients) were alive 30 days after the event – a SECamb first to have an overall survival rate in double figures. Both of these statistics represent a continued increase on previous years and the survival figure exceeds the national average by 2%, representing an additional 50 lives saved. It is vital that we benchmark ourselves against other comparable services within the UK and look for excellence, and whilst our figures are worth celebrating, we have some way to go to match the highest international survival rates of 25%, as seen in Norway.

The SECamb experience mirrors the known international evidence and expert opinion that early recognition, early bystander CPR, and early defibrillation have the greatest influence on ROSC and survival of any interventions. Those whose cardiac arrest is witnessed and those who present in a shockable heart rhythm had the greatest chance of survival. Related to this, the most influential factor in survival was the early use of a public access defibrillator.

Throughout the period of this report there have been some areas of significant challenge regarding ambulance service response to OHCA. The most notable of these was the COVID pandemic, which resulted in numerous changes to resuscitation practices. Some of these created delays in care, such as the requirement to wear greater protective equipment, however these were routine and regularly practiced by 2021 and were slowly adapted and scaled back throughout the year, and so the impact is not as marked as in 2020. Rising demand on ambulance services has made timely response to cardiac arrest incidents increasingly challenging, and this has negatively influenced time to defibrillation where a public access defibrillator is not used, the average time sitting at 11 minutes against an aim of defibrillating within 5 minutes of cardiac arrest.

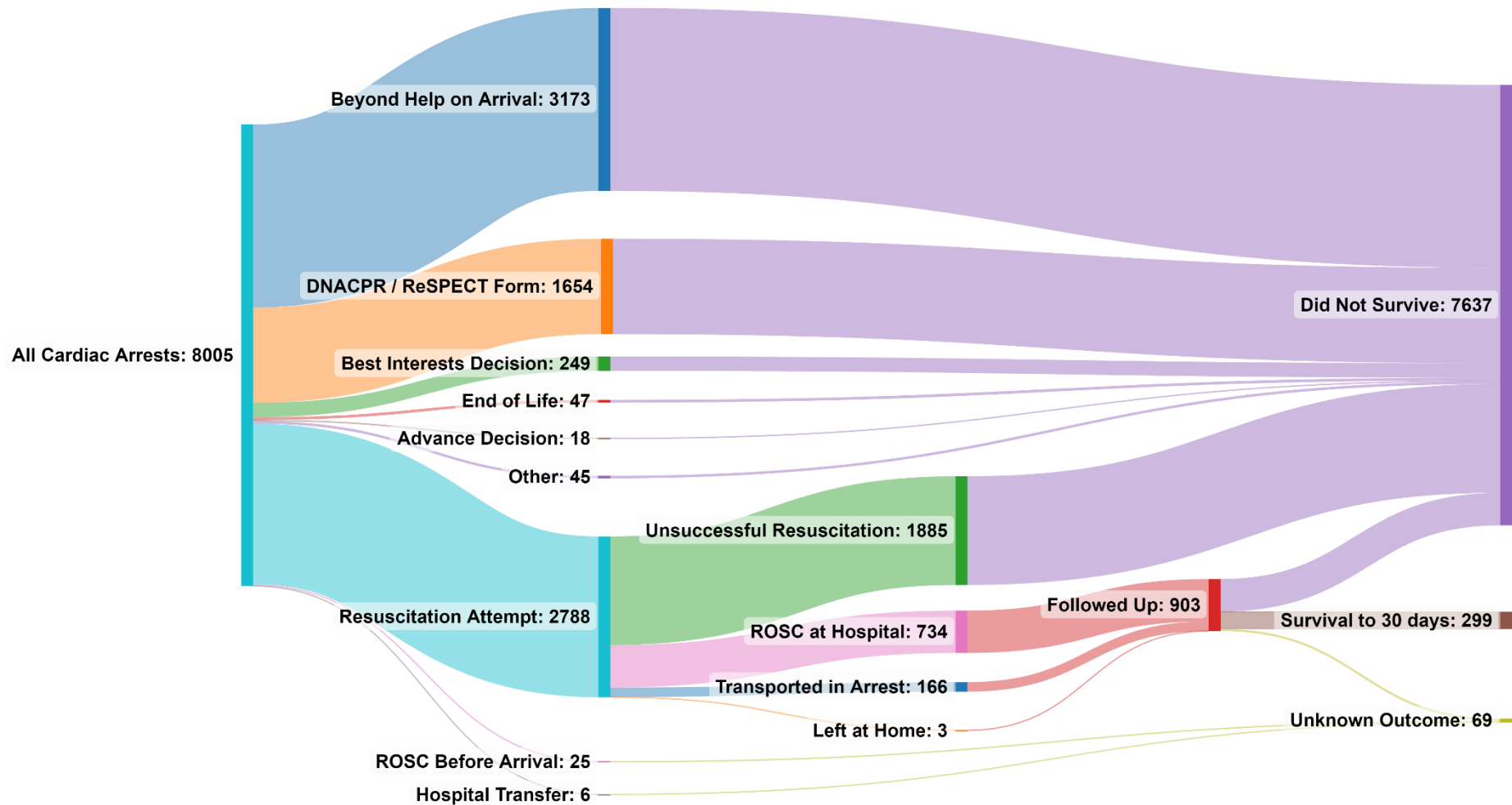
If ROSC and survival rates are to continue to increase and rival the best international experience then a programme of continuous improvement is needed, with significant focus in several specific areas:

- Increasing involvement of communities through teaching CPR, increasing the use of GoodSAM, and increasing availability of Community First Responders (CFRs).
- Improving identification of cardiac arrest at point of contact, and improving the provision of telephone CPR and signposting to PAD sites.
- Increasing the number of SECamb resources with a defibrillator, e.g., managers, non-operational vehicles, and blue light partners.
- Increasing the number and use of public access defibrillators.
- Continuing to improve the provision of professionally delivered resuscitation by using CPR feedback both during resuscitation and as part of debriefing.
- Continuing to improve post resuscitation care through increasing compliance with the standard care bundle and by developing care pathways for patients with ROSC.
- Sharing data with Integrated Care System public health experts, to explore, for example, whether focussing quality improvement measures in areas of greater deprivation may be beneficial.

Improvement work within SECamb is underway to address many of these areas, including expanding the Community First Responder programme, restarting routine feedback from defibrillator downloads, and beginning a programme of feedback for compliance against the standard UK post ROSC care bundle.

Overall, despite some unique challenges there continues to be an improvement in survival from OHCA within SECamb. However, continuing to seek a culture of excellence is essential to build on these positives and to address the areas in need of improvement, to ensure that every cardiac arrest patient attended by our clinicians stands the best possible chance of survival.

Flowchart of all cardiac arrests



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 be non-shockable. 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. |
| Asystole | | A 'flatline' heart rhythm. This cannot be corrected by a shock from a defibrillator. |
| Bystander CPR | | CPR performed by anyone who is not part of an organised EMS response. 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. |
| CCP | Critical Care Paramedic | Specialist paramedics within SECamb with postgraduate training, assigned usually to high-acuity patients. |
| CDSS | Clinical Decision Support System | A tool used to remotely triage patients and provide initial care advice. |
| CFR | Community First Responder | Volunteers trained to respond to emergency calls in conjunction with SECamb. They respond in their local areas, so often can attend before the emergency services arrive, and are therefore a vital part of OHCA response. |
| Codestat | | The database containing all data transmitted from SECamb's "Lifepak" defibrillators. This includes ECGs, CPR reports, observations, and other arrest details. |
| CPR | Cardiopulmonary Resuscitation | A treatment to maintain circulation for patients in cardiac arrest, in particular chest compressions. |
| Defibrillator | | A machine used to administer an electric shock to the heart and 'stun' it out of an irregular rhythm. |
| ECG | Electrocardiogram | A reading of the electrical signals in the heart that allows clinicians to diagnose certain conditions. |

| | | |
|-------------------------|---|--|
| EMA | Emergency Medical Adviser | An individual trained to answer 999 calls, assess the patient, and provide initial care until an EMA 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 | For SECamb, this refers mainly to Air Ambulance Kent, Surrey, and Sussex. |
| Initial rhythm | | The first recorded rhythm for the cardiac arrest. This may be from a PAD or from a Trust defibrillator. |
| OHCAO | Out of Hospital Cardiac Arrest Outcomes registry | Database of national OHCAOs 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 treatment options and circumstances under which they should be applied. |
| Resuscitation attempted | | Approximately 20 minutes of CPR has been performed on a patient without a DNACPR, ADRT, or ReSPECT form, during which time no signs incompatible with life have been identified. |
| ROSC | Return of Spontaneous Circulation | Return of a pulse after cardiac arrest. |
| VF / VT | Ventricular Fibrillation / Tachycardia | The two heart rhythms which can be shocked by a defibrillator. |
| Witnessed arrest | | An arrest which has been seen or heard. |

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