



Out of Hospital Cardiac Arrest Annual Report April 2023 – March 2024



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Key figures at a glance



Who are SECAmb?

SECAmb responds throughout the south east of England, providing emergency healthcare to a population of around 5 million people in 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. The communities we serve are equally diverse, including both areas of affluence as well as some of the country's most deprived areas.

We employ more than 4,300 people, with 80% providing direct care to our patients. This includes those working in the pre-dispatch phase, caring for patients remotely at our operations centres where we receive 999 and 111 calls, as well as staff providing face-to-face care out on the road. 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 answer more than two million calls each year through our 999 and 111 services, which is more than four calls every minute.

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), and volunteers, including our community first responders (CFRs) and GoodSAM responders.

The main helicopter emergency medical services (HEMS) 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 14% of resuscitation attempts in SECAmb in 2023/24 (332), including 75% of those with a traumatic cause.

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Introduction

Out of hospital cardiac arrest (OHCA) is when a patient's heart stops beating and their blood stops circulating around their body. It is the most life-threatening condition and therefore the most time-critical type of incident for ambulance services. Without intervention, it can take only 10 minutes from the patient's initial collapse to their irreversible death.

A cardiac arrest is not the same as a heart attack – a heart attack is when there is a blockage in the supply of blood to the heart muscle, which, if not treated, will cause the heart to start dying. However, a heart attack can cause a cardiac arrest, and both are emergency situations.

Globally, patient survival rates from OHCA vary hugely, from less than 5% to over 60%. Last year, ambulance services in England made over 31,000 resuscitation attempts on patients suffering from OHCA, yet less than one in ten of those patients survived to 30 days post arrest.

Patient survival depends on a multitude of factors. Many of these, 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. This relies not only on the effectiveness of emergency medical services (EMS) but the preparedness of the community to respond rapidly to cardiac arrest before the arrival of EMS.

These controllable 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 identify aspects with room for improvement and to highlight areas where we can be proud of our performance. It also examines the epidemiological data that will drive decision making in future improvement plans.

All SECAmb staff along the patient journey can play a vital link in this chain of action required to save a life following OHCA. Improving patient outcomes from OHCA is a key element in the Trust's clinically-led five-year strategy, including the aim of increasing survival by 5%.

SECAmb data for this report comes from our cardiac arrest registry – a database of all cardiac arrests attended by the Trust. 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 (SCR), and from other supporting organisations, including Helicopter Emergency Medical Services (HEMS), volunteer and private providers, and hospital survival data.

SECAmb's cardiac arrest registry is based around the Utstein style of reporting, which provides uniformity to the data and allows significant figures to be benchmarked against other services by collecting and categorising data in agreed ways.



Cardiac arrests in SECAmb

Between 1 April 2023 and 31 March 2024 SECAmb attended 9,065 cardiac arrests. Resuscitation was commenced or continued by SECAmb crews on 2,709 (30%) of these patients.

The annual proportion of SECAmb's cardiac arrests receiving a resuscitation attempt has been falling, which is also true nationally. This is likely to be due to an improvement in the recognition of cases where resuscitation would be futile or not in the patient's best interests, combined with an increase in patients with a do not resuscitate decision, such as a DNACPR or ReSPECT form.



Our busiest month this year was January, with 11% of total cardiac arrests and 12% of resuscitation attempts.

On average per month, SECAmb attended 755 cardiac arrests, and made 226 resuscitation attempts. That works out at more than one cardiac arrest every hour, and nearly one resuscitation attempt every three hours.





Our busiest period in the day for overall cardiac arrests remained between 8am - 11am, with 23% (2,063), whilst the greatest proportion of resuscitation attempts occurred between 9am - 12pm, accounting for 18% (485).

The total number of cardiac arrests does not include incidents where SECAmb was not primarily responsible for the patient, for example where SECAmb assisted either another ambulance trust or hospital staff.

Compared to last year:

- We attended 241 more cardiac arrest patients this was our highest ever recorded number of total cardiac arrests attended.
- We resuscitated 182 fewer patients.
- Our proportion of resuscitations attempted fell from 33%.
- Our busiest month changed from December to January.

Resuscitations not attempted



Does not total 100% due to rounding

Included in the total cardiac arrests for the year were the 38 patients who were successfully resuscitated by bystanders before SECAmb arrival, and did not rearrest (referred to as 'post resuscitation' patients).

The most common reason for a resuscitation attempt not being made by SECAmb was that the patient was beyond medical help (3,867).

The second most common reason was the patient having a formal CPR recommendation, such as a ReSPECT (Recommended Summary Plan for Emergency Care and Treatment) form which specifies that CPR is not recommended, or a DNACPR (Do Not Attempt Cardiopulmonary Resuscitation) (1,977). Patients with other types of Advance Decisions to Refuse Treatment (ADRTs) or Treatment Escalation Plans (TEPs) made up 0.4% of incidents where a resuscitation was not attempted (27).

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 medical 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 – overall, a DNACPR was held by just under 40% of all patients who did not receive a resuscitation attempt. 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 for whom comorbidities or lifelimiting conditions would make a resuscitation attempt inappropriate. There were 273 'best interests' patients in this period.

The 'end of life' category is for patients who are recognised as end of life or an expected death, but who do not hold a DNACPR, ReSPECT form, or other advance care plan available to attending crews at the time of their arrest.

Compared to last year:

- The proportions of reasons for a resuscitation not being attempted by SECAmb saw no significant changes.
- The number and proportion of post resuscitation patients has decreased from last year's total of 45.



Advance treatment plans help ensure that patients receive appropriate care according to both what matters to them and what is realistic. When it comes to resuscitation, such plans can make sure that attempts are only made when it is clinically appropriate and in line with the patient's desires, allowing those who do not wish for resuscitation to have a more dignified and peaceful death.

For such plans to be effective, communication between all parts of the healthcare system is vital. SECAmb currently uses IBIS (Intelligence Based Information System) to make patient care plans available to attending ambulance clinicians – patient details are matched against the IBIS database during the 999 call so that plans can be accessed both from the control room and from scene.

IBIS currently holds over 40,000 patient care plans, including ReSPECT and DNACPR forms, patients' wishes for treatment and preferred place of care. It is used by healthcare 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.



Graeme's story

Graeme Martin and partner Lori were taking part in the Gillingham parkrun in Kent in December 2023, when, just a short while into the run, and while separated from Lori, Graeme suffered a cardiac arrest and collapsed.

Thankfully, SECAmb Paramedic and fitness fanatic Chris Treves was participating in the event with his trusted companion and dog, Clara. A short distance into the race he came across Graeme lying on the floor, with other runners surrounding him, including two local off-duty nurses.

Chris immediately started CPR as nearby runners called 999 and assisted with timing the CPR and alternating with Chris while they waited for ambulance crews. In the meantime, run organisers quickly located the public access defibrillator (PAD) which enabled Chris to administer a shock to Graeme.

Chris said, "Clara was having a nervous day, and so we were running slower than usual. I noticed a fellow runner on the floor and made my way towards them to see if they needed help. He appeared to be having a seizure, so I quickly checked his pulse and breathing. I then confirmed with the other passers-by that Graeme had no pulse and was not breathing."

Chris continued performing CPR as ambulance colleagues arrived. Together, the team achieved a return of spontaneous circulation (ROSC) with further investigations confirming that Graeme required airlifting to the William Harvey Hospital in Ashford.

Lori, who was transported by police escort to the hospital said, "It was the quickest drive I've ever had, but I was pleased to be there for Graeme's arrival. I am so thankful that Chris was taking part in the race that day, alongside the off-duty nurses, and together they were able to save his life."

Since the incident, Graeme has been recovering well and is keen to spread the word that hands to chest time is key to saving lives. Graeme and Lori attended an event specifically for parkrun volunteers to help them gain confidence in how to perform CPR effectively. The event, which was hosted by Chris and local Community First Responders (CFRs) Steve Joyce and Jade Clabon, took place at SECAmb's Make Ready Centre in Medway and saw Graeme and Lori joined by 24 parkrun volunteers.

Graeme said, "This was a fantastic initiative organised by Chris, in the hopes that future parkrun volunteers can help to restart a heart with these life-saving skills if needed. I owe Chris and the team a huge thank you for ultimately saving my life, I wouldn't be here today without them."



Community First Responder Jade Clabon, Lori Martin, Graeme Martin, Paramedic Chris Treeves, and Community First Responder Steve Joyce at Medway Make Ready Centre

Our patients

For patients who received a resuscitation attempt

from SECAmb, men outnumbered women two to one. This imbalance in the proportion of patients from each gender is seen consistently in both SECAmb and international data. Men also continued to have the slightly lower median age, of 68, compared to the median for women of 71. The overall median age was 69.

Just over one in 10 patients receiving a resuscitation attempt were under 40, and just under half were 70 or over. Over a quarter of our patients were in their seventies. Paediatric patients made up approximately 2% of resuscitation attempts (52).





Compared to last year:

- There has been a slight increase in the proportion of male patients from 66%.
- Average ages have fallen slightly, with the overall median age decreasing by one year from 70.
- The percentage of paediatric patients attended remained the same.

Arrest locations



Cardiac arrest at private residences made up the majority of resuscitation attempts in SECAmb for 2023/24. **Nearly three quarters of all resuscitation attempts occurred at individual homes**, which is similar to figures seen nationally.

Compared to last year:

- The proportions of resuscitation attempts occurring at different location types remained similar. This has been the case for every year that location type data has been available for all resuscitation attempts.
- The percentage of resuscitation attempts occurring at private homes or residences decreased from 77%, and is down from the high of 80% seen during the height of the COVID pandemic.



Incidence

While our cardiac arrest patients are spread across all of the SECAmb area, there are regions of particularly high incidence. Unsurprisingly, areas with higher populations are likely to have a higher number of cardiac arrests, as are areas with greater proportions of older patients.

The map below shows the home postcodes of our patients (excluding those who live outside the SECAmb area):



Health inequalities in SECAmb

It is recognised by the Resuscitation Council UK that **deprivation can affect the incidence of sudden OHCA within communities**. Lower socioeconomic status directly correlates with the likelihood of suffering an OHCA, and with that happening at a younger age. Those in areas of higher deprivation have worse access to healthcare and spend a greater proportion of their life living in poor health.

Compounding this, lower socioeconomic status is also correlated with lower rates of bystander CPR, training and confidence in CPR, and poorer access to public access defibrillators (PADs). This gap in preparedness doubly disadvantages areas of higher deprivation.

Similar issues also apply when discussing ethnicity – evidence confirms that **certain ethnic minority groups have a disproportionately high incidence of OHCA**. People from minority ethnic groups are more likely to report having a long-term health condition and poor health, including cardiovascular disease. They are also less likely to be trained and/or confident in CPR, have less access to PAD sites, or know the locations of these when available. Just 22% of people with ethnic minority backgrounds received CPR training in the last 10 years, compared with 41% of the UK population in the same period. As well as this, language barriers can compound issues. Deprivation varies greatly within SECAmb – we have pockets of great deprivation alongside areas of great affluence. **Our greatest overall demand is seen from our most deprived areas**, with 14.9% of all incidents coming from the most deprived areas, compared to 6.1% from the least deprived. Geographically, the majority of people living in the Kent & Medway and Sussex Integrated Care System (ICS) areas are in deprived locations.



When examining the home postcodes of our patients receiving a resuscitation, 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).

SECAmb has begun further work and analysis into how different areas of the Trust have different demographic profiles and healthcare needs, and how this will affect us as a service, having undertaken a Population Needs Assessment for 2022/23 data. Cardiac arrest incidence in our area is likely to increase due to forecast increases in underlying health conditions, an aging population, and increases in both deprivation and ethnic minority populations.

The English Indices of Deprivation report measures deprivation through 37 indicators, organised into seven distinct domains:

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



Causes of arrest



Does not total 100% due to rounding

The aetiology, or cause, of cardiac arrest is taken from the patient care record, and is therefore a presumed cause based on the information available to clinicians on scene at the time of the incident.

The proportions of aetiologies for resuscitation attempts in SECAmb remained broadly in line with those seen nationally. **Nearly nine out of 10 resuscitation attempts in SECAmb were presumed cardiac or medical in origin**.

Compared to last year:

- The proportions of aetiologies remained almost identical to last year.
- The proportion of cases with a presumed cardiac or medical aetiology has remained between 88% and 90% for the past five years.

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.

Aetiology by age

Whilst the majority of patients within each age group had a presumed cardiac / medical cause of cardiac arrest, the prevalence of different aetiologies varied by age group. Both the highest proportion of traumatic aetiologies and lowest proportion of presumed cardiac / medical aetiologies occurred in the 20-29 age group.

Patients with a presumed medical aetiology were significantly older than those with non-medical aetiologies (71 years vs. 49 median years respectively).





Chain of Survival

The Chain of Survival is an internationally recognised description of the key elements of addressing out of hospital cardiac arrests. It covers action from community readiness, through bystander involvement, to interventions from trained responders and paramedics, and ending with post-arrest care from ambulance services, hospitals, and after discharge in the community.

A chain is only as strong as its weakest link, and this applies too to the steps in the Chain of Survival, needing 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 chance of survival.

The four links of the Chain of Survival are:



Early recognition and call for help

This can either be recognition of the cardiac arrest itself, or of a condition which may lead to cardiac arrest, such as severe chest pain arising from a heart attack.



Early CPR

To buy time until the arrival of emergency medical services. For every minute that chest compressions are delayed, an individual's chances of survival reduce by 10%.



Early defibrillation

This temporarily 'stuns' the heart with the intention that it will restart in a normal, life-sustaining rhythm. Shocks are more effective the earlier they delivered.



Post-resuscitation care

To prevent recurrence of cardiac arrest and to restore the patient's quality of life.

Early recognition and call for help

87% (2,358) of SECAmb resuscitation attempt patients were in cardiac arrest before the arrival of EMS. When considering response times, intervention times, and bystander involvement, it is only these 'non-EMS witnessed' resuscitation attempts which are examined. This figure includes both those who arrested before the 999 call and those who arrested between the call and SECAmb arrival.

Early recognition of cardiac arrest is vital for survival – without intervention, it can take only 10 minutes from initial collapse to irreversible death. The odds of survival are therefore higher when a collapse is witnessed, in particular by EMS. However, when a patient arrests before EMS arrival, it is crucial that bystanders can recognise the signs of cardiac arrest or conditions which may lead to cardiac arrest, and know how to respond, including calling for help without delay.

Early recognition also depends on EMS and telephone triage. Highly trained emergency medical advisers (EMAs), using an effective clinical decision support system, such as NHS Pathways, play a pivotal role in ensuring that cardiac arrests, or symptoms of imminent cardiac arrest, are recognised as quickly as possible. This is particularly important for symptoms which may not be immediately recognised by laypeople, such as agonal breathing.

One of the inherent risks of telephone triage is that it is not possible to visualise the patient or carry out a physical assessment. **SECAmb EMAs therefore use the 'No, No, Go' tool to streamline detection of cardiac arrest** – if the patient is not breathing and not conscious, they should 'go' ahead and commence CPR. Since 2020, SECAmb has measured 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 arrest during the call. **94% of resuscitation attempts were identified as cardiac arrests by SECAmb EMAs** in 2023/24 (2,174/2,321).

The time-critical nature of OHCA means that these calls should be assigned the highest priority available to ambulance services; a 'Category 1'. If features suggestive of OHCA are present or the patient is critically unwell and there is a high risk of arrest, a Category 1 ambulance will be arranged. For 2023/24, **95% of resuscitation attempts were classified as a Category 1** (2,248/2,358).



Response times

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 9 minutes 36 seconds, with 90% of these incidents responded to within 16 minutes 32 seconds.

For resuscitation attempts which were assigned a Category 1, the mean response time was 8 minutes 51 seconds, with 90% of these incidents responded to within 15 minutes 31 seconds. This difference in the mean response time between all resuscitation attempts and those which were assigned a Category 1 highlights the importance of recognising cardiac arrest as soon as possible.

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 attended 43% of resuscitation attempts which were assigned a Category 1 within 7 minutes (1,022/2,352).

Compared to last year:

- The proportions of resuscitation attempts witnessed by different groups have remained very similar. These proportions have remained stable for the past five years.
- The proportion of calls recognised as cardiac arrest during the call remained the same.
- The proportion of resuscitation attempts assigned a Category 1 remained the same.
- The mean response time improved by nearly a minute, from 10 minutes 35 seconds.
- The mean response time to Category 1 resuscitations improved by 46 seconds, from 9 minutes 37 seconds.



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Early CPR keeps blood flowing to vital organs, buying time before the arrival of EMS and the interventions needed to treat the underlying cause of the cardiac arrest, and keeping the heart sufficiently oxygenated to restart.

It is therefore vital to ensure that CPR starts as quickly as possible after OHCA is recognised. Bystander CPR is a critical part of this, and **immediate, high quality bystander CPR can double survival rates**.

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. CPR on a patient who is not in cardiac arrest is unlikely to do harm, but failure to deliver CPR when needed has serious consequences. The 'No, No, Go' tool used by SECAmb EMAs helps to reduce the threshold to beginning CPR and ensure it is started as rapidly as possible.

Bystander CPR



The proportion of resuscitation attempts receiving bystander CPR for 2023/24 was 77%, or 1,824 patients. This remains above the national average of 70% for the same period.

For 2023/24, 38 patients were successfully resuscitated before SECAmb arrival thanks to the efforts of bystanders.



Time to hands on chest

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 starting, as the exact time of the patient's arrest is not usually known.

Time to hands on chest is taken from EOC data, using a mixture of retrospective and live call audits. Thanks to ongoing improvement work over the year this time has been improving – for 2023/24, **the mean time until bystander CPR was 3 minutes 22 seconds**, with a mean time of 2 minutes 38 seconds seen in February.



Compared to last year:

- Bystander CPR has fallen slightly from last year's high of 79%.
- Whilst time to hands on chest was not recorded for all of last year, there has been a significant improvement from last year's value of 4 minutes 8 seconds.



Limitations of bystander CPR metrics

There are several elements to 'High Performance' CPR, as defined by the Global Resuscitation Alliance, however under the current audio-only dispatch systems used by most ambulance services it is not possible for EMAs to monitor all elements remotely. Only the rate of compressions can currently be monitored, and only in a limited manner, as EMAs rely on the bystander to be accurately following instructions and counting as they perform each compression. Other vital aspects such as positioning, depth, and recoil cannot be confirmed during the call.

Because of this, data used for this report cannot differentiate between effective and ineffective bystander CPR, and so is likely to understate the importance of high-quality CPR on patient outcomes, as all bystander CPR is categorised together, regardless of effectiveness.

CPR training for the public therefore remains crucial, so that people are familiar with the skills in advance. Even if it becomes possible to more easily monitor and guide bystanders in performing high-quality CPR, for example by using videocall capabilities, it remains essential to both minimise response times for the Trust and improve the rapid attendance of trained volunteers to ensure that patients receive the highest quality CPR possible as quickly as possible. According to the Resuscitation Council UK, 38% of UK adults have never done any form of CPR training, and 61% of people are not confident enough to use a PAD.

In-person CPR training is available throughout the UK from multiple organisations, whilst both the Resuscitation Council UK and the British Heart Foundation now offer online training in CPR and defibrillator use.

Chris's story

Chris Bax, now aged 72, collapsed in cardiac arrest at home in Margate in September 2023, in front of his wife of 50 years, Judith.

Judith said, "We are an active couple and enjoy playing bowls, and so it was rare that I was at home on a Wednesday afternoon. Thankfully I was, and able to call an ambulance for Chris immediately."

The first ambulance crew arrived on scene within two minutes of the 999 call, finding Chris unconscious on the living room floor. CPR was commenced, followed by a shock with a defibrillator to bring Chris's heart back into a more normal rhythm.

A team from Air Ambulance Charity Kent Surrey Sussex joined crews on scene and stabilised Chris's breathing before airlifting him to St George's Hospital in London, where he spent a week in the intensive care unit. When he woke from being sedated, he was unable to speak, walk or eat.

He said, "This was an extremely frustrating period of my life, as prior to the collapse I was fit and healthy, and enjoyed riding around 400 miles per week on my bike, so it really was life changing."

Judith said, "I am a retired teacher, and so when Chris woke, I put my skills to the test and was helping him with speech therapy and teaching him the basics. We're still taking every day as it comes."

Once out of intensive care, Chris was transferred to the Queen Elizabeth The Queen Mother Hospital in Margate, and finally the Kent and Canterbury Hospital from where he was discharged, having spent a total of 19 weeks in hospital following his collapse.

Chris continued to face a challenging recovery with extensive rehabilitation. As part of his journey, Chris and Judith were extremely pleased to visit Thanet Make Ready Centre, where they were reunited with Shannon, Rachael, Ben, and Christie, who together were able to answer some of their questions.

Paramedic Shannon Reed said, "I was so happy to be able to meet Chris and Judith in such positive circumstances, and to see how far Chris has come since his collapse. It's great to see he has made such positive steps in the few months which he has been home." Associate Ambulance Practitioner Benjamin Mayo, Paramedic Shannon Reed, Judith and Chris Bax, Emergency Care Support Worker Christie Thompson, and Student Paramedic Rachael Baker at Thanet Make Ready Centre.



Associate Ambulance Practitioner Benjamin Mayo said, "It's rare that we get to meet survivors, and so it was a pleasure to sit with Chris and Judith to hear more about Chris's busy lifestyle before his collapse, and how he plans to get back out on his bike soon. I, along with the entire crew, would like to wish them both the all the best for the future."

Chris added, "I'm very grateful to have had the chance to be reunited with my lifesavers. It was emotional seeing them and bringing back the memories of such a challenging period of my life, but I am grateful for everything they did and to be here today."

Chris is currently part of a wellbeing walk program which is helping him with his recovery and enjoys a game of bowls with Judith. He is looking forward to enjoying some longer bike rides again, but for now his grandchildren are keeping him busy!

Early defibrillation

Initial rhythm

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. **The quicker defibrillation takes place, the greater the patient's chance of survival**: defibrillation within 3-5 minutes of collapse can produce survival rates as high as 50-70%. For SECAmb non-EMS witnessed resuscitation attempts which presented in a shockable initial rhythm, **patients with a time to first shock of less than 5 minutes had a survival rate of 57%**.



For 2023/24, **more than a quarter of resuscitation attempts presented initially in a shockable rhythm**. The breakdown of initial rhythms has remained stable over the past five years, with asystolic patients representing between 40-50% of resuscitation attempts, and shockable patients representing approximately a quarter of resuscitation attempts.

39% of all patients receiving a resuscitation attempt from SECAmb required defibrillation at some point during their cardiac arrest (1,049).

Compared to last year:

- The proportion of patients presenting in a shockable rhythm has increased from 23%.
- The proportion of patients presenting in asystole has fallen from 45%.
- The proportion of patients who required defibrillation at any point during their arrest has increased from 37%.

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').



Initial rhythm and other factors

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 effective bystander CPR was performed, and with EMS response times.

This is supported by SECAmb data for 2023/24: **the proportion of patients presenting in a shockable rhythm decreased as response times increased**, (as seen in the graph below), whilst patients were more than twice as likely to present in a shockable rhythm when their arrest was witnessed (as seen in the graph to the right). Relatedly, patients were around half as likely to present in asystole when their arrest was witnessed (also as seen in the graph to the right).



Response times of greater than 20 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.

68% of post resuscitation patients were confirmed by a non-SECAmb defibrillator to have presented in an initially shockable rhythm (26/38). These patients are not included in overall resuscitation figures, as SECAmb did not need to provide a resuscitation.



The effect of bystander CPR can also be seen in the proportions of patients presenting in different initial rhythms according to whether they received bystander CPR – **bystander CPR is associated with a higher likelihood of a patient still being in a shockable initial rhythm** on EMS arrival, and with a lower likelihood of the patient being in asystole (as seen in the graph below). Given the well-documented correlation between shockable initial rhythms and higher rates of survival, this highlights the importance of high-quality bystander CPR.

Whilst who witnessed the arrest is not a factor that can be controlled by ambulance services, **response times and bystander CPR rates are both links in the Chain of Survival which can be strengthened**.



Public Access Defibrillator use

Although the aim is always to respond to cardiac arrest patients as quickly as possible, **the most effective way to strengthen the 'Early Defibrillation' link of the Chain of Survival is the use of public access defibrillators** (PADs), placed in locations where there is a high probability of a cardiac arrest occurring nearby.



The use of defibrillators before SECAmb arrival remains around the national average figure, at **9.5%** of resuscitation attempts, or 223 patients. 100 (45%) of these patients were treated with a shock from these devices.

For 2023/24, 27 patients were successfully resuscitated before SECAmb arrival thanks to shocks from a non-SECAmb defibrillator.

When looking at all patients who received a shock from a non-SECAmb defibrillator, including these post resuscitation cases, 21%, or more than one in five, needed no further resuscitation from SECAmb (27/127).

Compared to last year:

 The use of a defibrillator before SECAmb arrival has fallen from last year's high of 10.1%, however it remains our second highest value recorded.

PADs and location type

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. PAD usage falls dramatically when they are located more than 1-200m from the incident.

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 – **a non-SECAmb defibrillator was used in only 2% of resuscitation attempts occurring at home**, compared to 27% of resuscitation attempts occurring in public locations.

Looking at this from the other direction, resuscitations in public locations account for 74% of non-SECAmb defibrillator use (166/223).

For cases where the patient was successfully resuscitated before SECAmb arrival thanks to a non-SECAmb defibrillator, 100% were arrests in public locations.

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).

PADs in schools

June 2023 saw the completion of a rollout of PADs to all state schools in England by the Department of Education, with 20,376 PADs delivered to 17,862 schools.

With one third of OHCA occurring within 300m of a school nationally, these defibrillators could reach over two thirds of patients in under five minutes, meaning they can provide a significant benefit to the community as a whole, beyond just the schools in which they are based.

Alongside the rollout of defibrillators, CPR has been a mandatory part of the secondary school curriculum across the UK since 2022.

Countries where CPR is taught in schools have survival rates two to three times higher.

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.

There are opportunities throughout the Chain of Survival, such as improving recognition, which will impact on time to first shock.

In 2023/24, resuscitation attempts which presented in a shockable rhythm had a **mean time to first shock** of **12 minutes 9 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 3 minutes 45 seconds faster** than cases where one was not used.

For cases where the patient was successfully resuscitated before SECAmb arrival thanks to a non-SECAmb defibrillator, the mean time to first shock was only 4 minutes 10 seconds.

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.

Compared to last year:

• Time to first shock has improved by 15 seconds from 12 minutes 24 seconds.

*Where time of first shock is known.

EOC improvement work

SECAmb's EMAs play a vital role in the first two links of the Chain of Survival, and so strengthening these links in our EOCs can have a significant impact on patient outcomes. Improving how we handle cardiac arrest calls has been an area of focus within the Trust this past year, with multiple projects implemented to help support our EMAs.

Call audits

Every month a sample of cardiac arrest calls are audited, looking at compliance against areas such as call control, communication skills, and use of NHS Pathways. Results of these audits are fed back to EMAs and trends in compliance are used to inform improvement projects. A selection of these audits are analysed further, including a deep dive into specific skills and competencies, helping to further highlight any areas of concern which need addressing. 83% of EMAs said that they would change something in their next cardiac arrest call after receiving feedback from an audit.

Post call surveys

A survey was run to investigate the thoughts of EMAs around handling cardiac arrest calls, and to help identify areas where they felt that they needed more support or training. Topics highlighted included additional support on defibrillators, getting patients to the floor, and real-life CPR training, with these results being incorporated into plans for future education and support.

Silent call monitoring

The EOC Practice Development Team silent monitored a selection of cardiac arrest and trauma calls over 5 months, to improve management of these calls in real time, intervening if necessary as well as providing post call feedback after every call. Whilst this project is currently paused, the extremely positive feedback it received from EMAs means that its restart is a priority.

Communicating best practice

The monthly EOC newsletter has included multiple pieces on cardiac arrest management, including both best practice and how to overcome difficulties experienced within the calls.

Training

CPR surgeries and regular "repeat and rehearse" drills are being planned for EMAs to practice basic life support (BLS) and automated external defibrillator (AED) skills. There are also upcoming pieces such as an interactive chain of survival video, a cardiac arrest webinar, and a 3-minute training video to be viewed before every shift.

Changes to processes

Changes have been made to the dispatch system used by EMAs to make including AEDs in the call easier.

No, No, Go poster competition

A competition was held in our EOCs to design a poster to raise awareness around the importance of the No, No, Go procedure, with the winning poster being displayed in our call centres.



Gemma's story

Gemma Ledger, now aged 40, suffered a cardiac arrest at her home in Sittingbourne in Kent in the early hours of the morning in January 2023, while her three children now aged two, five, and 13 were asleep next door.

Gemma's partner of 18 years, Richard, woke to what sounded like Gemma snoring, but when he tried to wake her he found her gasping for air. Gemma became unconscious moments later and Richard immediately called 999, where he was instructed on how to perform effective CPR prior to the arrival of ambulance teams.

Crews administered an astonishing 10 shocks with a defibrillator before achieving a return of spontaneous circulation (ROSC), and stabilising Gemma before taking her to King's College Hospital in London. Gemma spent a week in intensive care, before being moved to a general ward for further recovery.

Richard said, "The drive to King's was one of the scariest of my life. It felt like it took forever. I went through a range of emotions. I can't thank Graham enough for trying to keep my mind occupied while driving as quickly as he could."

Gemma said, "I have no memory of the event itself until I woke up in hospital days later, so it was an eye-opener to meet those who helped me. I am so appreciative of their efforts and truly wouldn't be here without them."

Both Gemma and Richard visited our Medway Make Ready Centre where they were reunited with the ambulance service colleagues who responded to Gemma.

Gemma is on a long road to recovery and is taking every day as it comes. She suffers with a number of sideeffects including tiredness, and since the incident has successfully been fitted with an implantable cardioverterdefibrillator (ICD). Richard said, "Originally, we thought that Gemma had a low chance of survival, so it is truly a miracle that she's here today. A big thank you to the team, they all do a great job every day and are lovely people. Many thanks from the bottom of our hearts."

Trainee Associate Ambulance Practitioner Graham Seal said, "It's rare that we ever get to meet a cardiac arrest survivor, so I am so pleased that Gemma and Richard wanted to meet us. Richard's good quality CPR played a huge factor as to why Gemma is still here, and we can't thank him enough for starting the process before our arrival."

Trainee Associate Ambulance Practitioner Graham Seal, Richard (Gemma's partner), Gemma Ledger, Operational Team Leader Paul Ellis, and Paramedic Toby Hiller-Wood at Medway Make Ready Centre.

Further demographics

There are some notable differences in the characteristics of out of hospital cardiac arrests between male and female patients.

Location

There were particular differences seen between the genders in the proportions of arrests occurring at home, and at sports and leisure locations.



Initial rhythm

Men were twice as likely to present in a shockable initial rhythm than women.

Whilst shockable presenting rhythms have been linked with bystander CPR, who witnessed the arrest, and response times, the differences seen between the genders may also be linked to the underlying cause of cardiac arrest, for example cardiovascular disease.





Initial rhythm also varies by age group, with shockable initial rhythms peaking in the 60-69 age bracket.

Aetiology

For aetiology, the most prominent difference between genders was seen in resuscitation attempts following a traumatic arrest. Traumatic causes were more than twice as common for men than for women.



PAD usage

Men were more likely than women to have had a PAD applied during a resuscitation attempt, at 10% of men and 7% of women. Whilst this finding should be examined to ensure that barriers to PAD usage are not solely based on gender, this difference may likely be related to the differences in arrest locations between men and women, as discussed above.

Volunteers and community engagement

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, and are an integral part of our service. 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, Sussex, and north east Hampshire, who attend roughly 20,000 emergency calls per year.

A SECAmb CFR was on scene for 8% of resuscitation attempts, or 222 incidents, and were first on scene in nearly half of those incidents (48%)*.

Whilst CFR attendance at resuscitation attempts overall has fallen compared to last year, the proportion of cases where they were first on scene has risen. 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. In those cases where a CFR was first on scene, response times were on average 4 minutes and 13 seconds faster compared to the next arriving vehicle.

Improvements in dispatching CFRs has been key area of focus for SECAmb in 2024-25, with work ongoing to ensure that we make the best use of our volunteers to provide the maximum benefit to our patients. This has included setting a milestone of deploying a CFR on average every four and half hours.

GoodSAM

The Trust also uses the GoodSAM smartphone app, which allows EMAs to alert trained, local volunteers to perform CPR and/or bring a public access defibrillator (PAD) to the scene of the arrest, in order to minimise the time spent without high quality bystander CPR and reduce the time before defibrillation. GoodSAM acceptance has been associated with a threefold increase in survival.

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.

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.

A GoodSAM responder was confirmed to have been dispatched to 9% of resuscitation attempts, or 202 incidents in 2023/24*.

*SECAmb's cardiac arrest registry currently cannot capture whether a GoodSAM responder was confirmed to have arrived at scene. RESILIE

*where CFR scene times are known.

Community programmes

Community programmes are a vital part of strengthening the Chain of Survival, actively empowering people in how to recognise OHCA 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 is run each year with schools, families, and communities, to help Year Six children from local schools learn valuable skills, including first aid and CPR. It takes an interactive approach to education by delivering hands-on events in partnership with the emergency services and local safety agencies. SECAmb trained around 3,000 children in basic life support as part of Junior Citizen in 2023/24.

Restart a Heart is an annual, week-long initiative led by Resuscitation Council UK. Every October an alliance of partners worldwide (including UK ambulance services, universities, first aid training groups, and other charitable, public sector, and communitybased organisations) 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 6,000 members of the public in 2023. 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.

Sussex Safety in Action showcases the community's commitment to promoting safety and wellbeing. This annual series of events brings together blue light services and schools to educate participants on a wide range of safety topics. As a collaborative partner, SECAmb trained more than 4,700 children in 2023/24.

Over the past year SECAmb staff and volunteers have attended and/or run events for:

- CPR and defibrillator demonstrations
- PAD launch parties
- Lifeboat, police, HEMS, and fire and rescue open days and charity days
- Community safety days
- Events at village halls, schools, sports clubs, and summer fêtes
- Farmers' markets and country shows
- Residents' associations meetings
- Pride
- Summer camps / play schemes

Post arrest care

All UK ambulance services measure performance against a nationally agreed care bundle for patients who achieve a return of spontaneous circulation (ROSC) whilst under their care. This care bundle consists of six elements, and 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.

The six elements of the care bundle are:



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.

For this period, **compliance with the post ROSC care bundle was 75%**, or 840 of 1,124 patients receiving the care bundle when it was requried. This is slightly below the national average of 76%.

75%

Compared to last year:

- Overall performance has decreased slightly, from 76%.
- Compliance with each element remains similar, with compliance for no individual element having changed by more than 2%.





Critical Care Paramedics

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 CCPs attended more than three quarters of resuscitation attempts** (78%). CCP attendance in SECAmb is associated with higher rates of both ROSC at hospital and survival to 30 days.

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. These devices are available to the Trust's CCPs and Hazardous Area Response Teams (HART), and were used in 18% of SECAmb's resuscitation attempts.



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. 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.



Over the course of the year, **SECAmb conveyed 931 patients**, or 34% of all resuscitation attempts, **to 25 different hospitals**. Of these, 11% were taken to a Primary Percutaneous Coronary Intervention (pPCI) centre for specialist intervention for a heart attack, and 2% were taken to a Major Trauma Centre (MTC).



ROSC at hospital

In 2023/24, **SECAmb achieved a ROSC in 44% of resuscitation attempts** (1,186). 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. **29% of SECAmb resuscitation attempts maintained a ROSC to hospital** (793).





Compared to last year:

- The proportion of patients achieving a ROSC at any time increased from 42%.
- The proportion of patients with ROSC at hospital increased from 27%, and from 784 patients.

There continue to be significant correlations between the characteristics of cardiac arrests and the likelihood of maintaining ROSC to hospital, in particular the initial rhythm and whether the arrest was witnessed.

- Nearly half (45%) of EMS witnessed arrests maintained ROSC to hospital, making them almost three times more likely to maintain ROSC to hospital compared to unwitnessed arrests (17%).
- More than half (52%) of arrests with an initially shockable rhythm maintained a ROSC to hospital, making them almost four times more likely to maintain ROSC to hospital compared to initially asystolic arrests (14%).



Survival

The second, and more important, metric used for outcomes from cardiac arrest is patient survival, or more simply, how many lives were saved. For English ambulance services, this is measured as survival to 30 days post arrest.





The nationally-reported survival measure changed from survival to discharge to survival to 30 days during the 2020-21 period, and so an annual average for either measure cannot be included on this graph.

As in previous years, survival figures varied significantly over the year, with a low of 7.8% in September and a high of 15.9% in August.

Survival to 30 days is gathered using the NHS Summary Care Record (SCR) for all patients who were not confirmed deceased by ambulance clinicians. The SCR is a database of important patient information, including date of death, allowing patients who survived to at least 30 days to be identified. If no date of death is available on the SCR then it is assumed that the patient is alive. National guidance recommends that the SCR is checked at least 90 days post-arrest to factor in any delays in SCR population. It is possible that delays in populating dates of death onto the SCR may cause patients to be incorrectly identified as survivors, however SECAmb data from the last year has confirmed this to have affected survival figures by less than 0.3%. As this appears to be a very rare occurrence, no changes are considered necessary to the process, however this will continue to be monitored by the Trust.

*Patients with unknown outcomes are not included in survival calculations

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.

Compared to last year:

- Survival to 30 days has increased from 10.5%.
- The total number of patients surviving to 30 days has increased from 271 individuals.

Profile of survivors

There are numerous factors which influence outcomes from out of hospital cardiac arrest. These include aspects summarised in the links of the Chain of Survival, and 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 which are supported by international research.

The graph below compares the percentage of patients surviving to 30 days according to different characteristics, highlighting which elements are associated with the largest differences in survival:



Gender

As in previous years, **men had a higher likelihood** of survival from out of hospital cardiac arrest than women.

- Men made up 77% of survivors, compared to 68% of resuscitation attempts.
- Women made up 23% of survivors, compared to 32% of resuscitation attempts.
- The gender difference in survival rates has increased compared to last year.
- Survival for men has increased from 10% last year, whilst survival for women has stayed the same.

Witnessed by

The proportion of patients who survived was more than eight times higher if their arrest was witnessed by EMS compared to patients whose arrest was not witnessed. Unwitnessed arrests had less than a one in 20 chance of survival, whilst EMS witnessed arrests had a one in four chance.

- Unwitnessed arrests made up 12% of survivors, compared to of 32% all resuscitation attempts.
- EMS witnessed arrests made up 28% of survivors, compared to 13% of all resuscitation attempts.

Compared to last year:

- The difference in survival between EMS witnessed and unwitnessed arrests has increased
- Survival for EMS witnessed resuscitation attempts has increased from 22%
- Survival for bystander witnessed resuscitation attempts has increased from 10%

Location type

Survival varies greatly between different arrest

locations. This is likely due to multiple factors which also vary across different location types, including the likelihood of arrests being witnessed, receiving bystander CPR, and PAD availability, as well as response times, and differences in the profiles of patients at different types of locations, such as levels of health and age.

- Arrests in private locations, such as homes and care homes, made up 58% of survivors, compared to 77% of resuscitation attempts.
- Arrests in public locations, such as public buildings, sports centres, and the street, made up 42% of survivors, compared to 23% of resuscitation attempts.
- The survival rate for those who arrested in public locations was more than twice as high than for those who arrested in private locations.

NHS

Response time

Comparing survival rates for patients according to response times demonstrates clearly how vital a rapid EMS response is for survival, and how much survival falls when 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*:



This can also be seen in the average response times for those who survived compared to those who did not survive – **those who survived were responded to on average 1 minute and 52 seconds faster than those who did not** (7 minutes 57 seconds, compared to 9 minutes 49 seconds).

Initial rhythm

The proportion of patients who survived was nearly 10 times higher for those presenting in a shockable rhythm compared to non-shockable rhythms, and was nearly 30 times higher compared to patients presenting in asystole.

- 74% of survivors presented in a shockable rhythm, compared to of 26% all resuscitation attempts.
- 22% of survivors presented in a non-shockable rhythm, despite making up 71% of all resuscitation attempts.
- Only of 4% of survivors were initially asystolic, despite having been 41% of all resuscitation attempts.

Compared to last year:

- Survival for patients presenting in shockable rhythms increased from 31%.
- Survival for patients presenting in an asystolic rhythm decreased from 6%.

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

The correlation between survival and shockable initial rhythms can also be seen in how these often trend together over the year, as shown in the graph below:



*Response times of greater than 20 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=2,326).

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*:



This can also be seen in the average times to first shock for those who survived compared to those who did not survive – **those who survived received their first shock on average 2 minutes and 23 seconds faster than those who did not** (10 minutes 29 seconds, compared to 12 minutes 52 seconds).

Asystolic survivors

The profile of asystolic survivors remained notably different from the overall profile of survivors. However, the profile is quite different from last year. Variations are not unexpected in this group due to its very small size.

- 15% had a non-medical aetiology, and all of these were traumatic aetiologies, compared with 11% of all resuscitation attempts having a non-medical aetiology, and 4% of all resuscitation attempts being traumatic in cause.
- 23% were EMS witnessed, compared with 13% of all resuscitation attempts

Post resuscitation survivors

Whilst patients who were successfully resuscitated before SECAmb arrival were not included in overall reported outcome figures, a remarkable 84% of these survived to 30 days (32/38). Whilst this is significantly lower than last year's figure (95%), the group size is small and so large fluctuations are not unexpected.

For those patients who were resuscitated before SECAmb arrival thanks to shocks from a PAD, survival was 93% (25/27).

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CCP SPECIALIST

*Time to first shock of more than 25 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=507).

The Utstein cohort

Patient outcomes from resuscitation are measured both overall, and for a subset known as the 'Utstein' cohort. This subset has internationallyagreed fixed criteria, allowing for a more equal comparison both between services and over time.



The Utstein cohort for this period was 461 patients, or 17% of all resuscitation attempts. Compared to last year, this is an increase in proportion (from 16%), but a decrease in total number (down from 471 patients).

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. Internationally, emergency medical services with high performance in the Utstein survival measure are regarded as being high-performing services.



ROSC at hospital

ROSC at hospital for the Utstein cohort reached our highest value recorded to date, of 53%, an increase of 2% from last year's figure of 51%, and showing a clear recovery from the low seen during the height of the COVID pandemic.

As with overall ROSC at hospital, we have remained above the national average for three years in a row, with this year's figure being 2% above the national figure of 51%.



Survival to 30 days

Survival to 30 days for the Utstein cohort reached our highest value recorded to date, of 31%

(n=448*), an increase of 3% from last year's figure of 27%, and also showing a clear recovery from the figure seen during the height of the COVID pandemic.

As with overall survival, we have remained above the national average for the past three years, with this year's figure being 2% above the national figure of 29%.



The nationally reported survival measure changed from survival to discharge to survival to 30 days during the 2020-21 period, and so an annual average for either measure cannot be included on this graph.

*Patients with unknown outcomes are not included in survival calculations.

Conclusion

From April 2023 to March 2024 ambulance services in England attempted resuscitation in over 31,000 patients. In this period SECAmb attended 9,065 cardiac arrests, and attempted resuscitation for 2,709 patients. Survival to 30 days post arrest for our patients was 11.5%, which was both SECAmb's highest ever reported survival figure, and the highest survival figure reported by all English ambulance trusts for 2023/24. This is also a 2% increase on last year and 2% higher than the national average, which we have remained above for the past three years.

SECAmb has also seen improvements in other key metrics for cardiac arrest care and outcomes:

- Average ambulance response times for cardiac arrest patients have improved by nearly a minute on last year.
- The proportion of patients handed over to hospital in ROSC has increased for the third year in a row, and has remained above the national average for this time.
- There has been a significant improvement in time to hands on chest from our Emergency Medical Advisors (EMAs) who take and triage the 999 calls.

As with previous years, and in line with international evidence, certain groups continue to have noticeably higher rates of survival:

- Witnessed cardiac arrests were almost more than five times as likely to survive than unwitnessed arrests.
- Patients presenting in a shockable rhythm had a 34% chance of survival.
- Both response time and time to first shock had a significantly favourable effect on rate of survival; in particular survival was 57% for patients who received a shock within five minutes.
- Patients who were successfully resuscitated before SECAmb arrival thanks to public access defibrillators (PADs) had a 93% rate of survival.

Many of these features relate to the timeliness of resuscitation, and we continue to see from our data the importance of the Chain of Survival through an early call to 999, early CPR from bystanders, and early defibrillation from a PAD.

There has been an overall small reduction in the involvement of bystanders before SECAmb arrival. Rates of bystander CPR, PAD use, and GoodSAM dispatch have all fallen slightly.

There has also been a slight decrease in the utilisation of CFRs, however there was an increase in the proportion of cases where they were first on scene. In these incidents, their attendance continues to have a significant impact on response times.

This is the first year SECAmb has looked at the relationship between OHCA and deprivation. There is an increasing recognition of the challenge of healthcare inequalities, and the Resuscitation Council UK have evidenced a link between deprivation and poorer rates of bystander CPR and access to PADs, as well as underlying health issues which contribute to cardiac arrest. Looking ahead SECAmb will be exploring the relationship between deprivation and health inequalities against the incidence of cardiac arrest, the availability of PADs, rates of bystander CPR, and outcomes. This will inform a developing strategy for community engagement and mobilisation.

There is a need to recognise that not every cardiac arrest needs resuscitation, and as a Trust we should be supporting decisions to withhold resuscitation or to make best interests decisions at the time of death. We will be continuing to work with our end of life team to support patients, their families and our clinicians in their decisions to make the right decisions at this crucial time. 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 OHCA which looks at the breadth of activity that may influence outcomes.

- The project looking at barriers to telephone CPR has had significant success in reducing time to CPR, and this work continues, including particular focus on consistent best practice in telephone triage and assessment.
- There have been improvements in the dispatch process for CFRs, using technology to enhance this process, which has seen substantial increases in overall CFR attendance.
- SECAmb will be looking to extend the roll out of GoodSAM, to increase the number of responders available, helping to continue to improve the timeliness of CPR.
- Letters to crews to inform them of when cardiac arrest patients they attended survived have now been expanded to include EMAs, helping to emphasise the importance of the role they play in the Chain of Survival.
- A project to trial CCP led CPR and cardiac arrest skills feedback using defibrillator downloads is being scoped.
- Work is ongoing surrounding completion of the ambulance patient care record, which should improve the quality of data available for the cardiac arrest registry.

Improving out of hospital cardiac arrest (OHCA) survival by 5% is part of SECAmb's new clinically-led five-year strategy, as are aims to meet our Category 1 response time targets for both mean and 90th centile, which in turn should contribute to improved survival.

In order to achieve these improvements in outcomes, and to improve cardiac arrest care overall, **there are several key areas where development work should be concentrated**:

• The use of PADs should be encouraged – despite more than 70% of non-EMS witnessed resuscitation attempts receiving bystander CPR, only around one in 10 have a PAD used. Given the importance of reducing time to first shock to improve survival, and that the average time to first shock is four minutes faster when a PAD is used than when one is not used, this should be a priority if survival from OHCA is to be improved.

- Related to this, current PAD availability should be mapped to areas of high cardiac arrest incidence to identify hotspots and gaps in provision, to inform a strategy for PAD site placement.
- Work should be done on locating CFRs in areas with high demand, where run times to scene may be longer, and with low CPR skills and confidence, fewer PAD sites, and lower PAD usage, to reduce time to high quality CPR and defibrillation. Ongoing work to increase CFR utilisation overall should also be continued.
- **Community engagement remains key**, and the Trust should continue to be involved with CPR and AED training, community events, and campaigns and initiatives such as Restart a Heart, to promote CPR skills and the importance of bystander CPR.
- Hotspots should be identified both for areas with low bystander CPR and low PAD use, and PAD sites and CPR training should be focussed in these areas.
- Cases where cardiac arrest was not recognised at the time of 999 call each month should be reviewed, to identify opportunities for learning and improvement.
- Improving time to hands on chest and signposting to PADs should be balanced against the recognition of where CPR is not appropriate, including improved use of systems such as Shared Care Records to bring together patient care records from multiple health and care organisations.

There is a particular emphasis on areas which influence the earlier links in the Chain of Survival. However, ensuring the professional clinical response is competent and can deliver high-quality resuscitation and post-ROSC care remains important, as does ensuring that care provided is in line with the patient's wishes.

Overall, SECAmb continues to pursue improvements in cardiac arrest care, with ongoing development work in multiple areas intended to build on current positives and address the areas in need of improvement. This commitment to improving outcomes from cardiac arrest is now enshrined in the Trust's new strategy, and we aim to ensure that every cardiac arrest patient attended by our clinicians stands the best possible chance of survival.



Definitions

| 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 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. | | |
| Agonal breathing | An irregular breathing pattern that occurs in the early stages of cardiac arrest. | | |
| Asystole | The absence of electrical activity in the heart, i.e., a 'flatline' heart rhythm. This cannot be corrected by a shock from a defibrillator. | | |
| BLS | Basic Life Support | Basic skills to treat a patient in cardiac arrest, such as CPR and the use of an AED. | |
| 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. | | |
| 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, high-energy electric shock to the heart, 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. | |
| ICS | Integrated Care System | Local partnership bringing health and care organisations together to develop shared plans and joined-up services. Formed by NHS organisations, upper-tier local councils, voluntary organisations, social care providers, and other partners with a role in improving local health and wellbeing. | |

| Initial rhythm | The cardiac arrest rhythm at the first point that it should be possible to record. This may be on a Trust defibrillator, or from a defibrillator on scene before SECAmb arrival. | | |
|---|---|--|--|
| Mean | The average value of a data series. Unlike the median, the mean can be heavily affected by extreme/outlying data points. | | |
| Median | An average which uses the middle value of a series. | | |
| 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, AEDs at medical centres, privately-owned devices, and those brought by other services such as the police. | | |
| ΟΗϹΑΟ | 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. | |
| 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. | |
| 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 resuscitation efforts provided by SECAmb on a patient who does not have a valid plan declining resuscitation and is not end of life, during which time no signs incompatible with life have been identified. The 20 minutes includes any periods of ROSC achieved by SECAmb. | | |
| ROSC | Return of Spontaneous Circulation | Return of a pulse after cardiac arrest. | |
| VF | Ventricular Fibrillation | A heart rhythm that can be shocked by a defibrillator. | |
| VT | Ventricular Tachycardia | When pulseless, a heart rhythm that can be shocked by a defibrillator. | |
| Witnessed arrest | An arrest which has been seen or heard. | | |

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Saving Lives, Serving Our Communities

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