National Ambulance Service

Out of Hospital Cardiac Arrest Register

17th Annual Report 2024

Out-of-Hospital Cardiac Arrest Register

OHCAR Ireland

At the heart of evidence

Contents

OHCAR Key Facts 2024

Overall Patient and Event Characteristics

- 2,885 out-of-hospital cardiac arrest incidents attended by EmergencyMedical Services (EMS) where resuscitation attempted or had Return of Spontaneous Circulation (ROSC) recorded on OHCAR (56 per 100,000 population in 2024)
  - 61% occurred in an urban area
  - 68% Male
  - Median age 68 years (interquartile range 53 – 78)
  - 83% Presumed medical cause
  - 68% Happened in the home
  - **84%** Bystander CPR attempted
  - 52% Bystander witnessed
  - 33% of patients had defibrillation attempted
  - **12%** of patients had defibrillation attempted pre EMS arrival
  - 27% had ROSC pre-hospital arrival
  - 18% had sustained ROSC to Hospital arrival

Survivors - Patient and Event Characteristics

232 patients survived

- 8.0% Discharged alive
  - 210 (99%) had good to moderate neurological function on discharge (data available for 212 patients)

Utstein Group

- 16% of patients were in the Utstein Group [b]
  - 51% ROSC pre-hospital
  - 40% ROSC on arrival at hospital
  - 29% Discharged alive

[a] Definition of urban is matched with the CSO definition of a settlement i.e. defined as having a minimum of 50 occupied dwellings, with a maximum distance between any dwelling and the building closest to it of 100 metres, and where there is evidence of an urban centre.
[b] The Utstein subgroup includes patients who are >17 years, with presumed medical aetiology, bystander witnessed event and an initial shockable rhythm.

Abbreviations

Acronym	Term
B-CPR	Bystander Cardiopulmonary Resuscitation
BLS	Basic Life Supporter
CFR	Community First Responder
CPC	Cerebral Performance Category
CPR	Cardiopulmonary Resuscitation
CRI	Call Response Interval
CSO	Central Statistics Office
D-CPR	Dispatch assisted Cardio-Pulmonary Resuscitation
DAFR	Dublin Airport Fire and Rescue
DFB	Dublin Fire Brigade
ED	Emergency Department
EMS	Emergency Medical Services
ePCR	Electronic Patient Care Record
ERC	European Resuscitation Council
EuReCa	European Registry of Cardiac Arrest
GP	General Practitioner
HRB	Health Research Board
HSE	Health Service Executive
IQR	Interquartile Range
NAS	National Ambulance Service
OHCAR	Out-of-Hospital Cardiac Arrest Register
PCR	Patient Care Records
PEA	Pulseless Electrical Activity
PHECC	Pre-Hospital Emergency Care Council
pVT	Pulseless Ventricular Tachycardia
ROSC	Return of Spontaneous Circulation

Mattie Reynolds

On Saturday 16th November 2024, Matthew "Mattie" Reynolds was driving his jeep with his nephew, Christopher, in the passenger seat to help a friend with a job. At the outskirts of Trim, Mattie went unresponsive and stopped breathing. He was experiencing a cardiac arrest while still behind the wheel.

With quick thinking, Christopher steered the vehicle to the side of the road bringing it to a safe stop. He rang for an ambulance as Mattie was not awake and not breathing. With the instructions of the emergency call taker in the NAS National Emergency Operations Centre (NEOC), Mattie was pulled out of the jeep and Christopher commenced CPR.

While this was happening the call was dispatched to Andy Wilson, the Advanced Paramedic on duty from the Trim Station where there is a Rapid Response Vehicle. The call was also automatically sent to the local CFR Group by text message and an ambulance, with Paramedics Ronan Clarke and Lee Smith, was also dispatched. Andy arrived in a matter of minutes and was met by Christopher and several members of the public providing good quality CPR. With the use of the defibrillator, Andy administered shocks and Mattie's heart started to beat on its own again.

Mattie's survival can only be attributed to the excellent quality CPR by the people first on scene – initially Christopher, then some passers-by including an off-duty nurse and retained firefighter joined my members of the general public. This was followed by rapid defibrillation due to the very quick arrival of Andy Wilson, Advanced Paramedic, in the fully equipped NAS Rapid Response Vehicle. As 4 volunteers of the local CFR group – JJ Fagan, retired NAS Paramedic; Tara Cheevers; and Mark and Jane McSherry (husband and wife team) arrived they assisted with the care of Mattie, kept the traffic moving to prevent any other incident, and also looking after Christopher and Mattie's family as they arrived. The CFRs kept them informed of what was happening and this allowed the NAS paramedics and AP to focus on stabilising Mattie. As soon as he could, Andy then briefed the family and answered any questions they had. The owners of the house where the jeep had been pulled up outside were also quick on scene to assist in any way they could by bringing out cups of tea and support to Mattie's family.

Around an hour after the initial cardiac arrest occurred and having been stabilised by Andy Wilson and the NAS paramedic crew, Mattie was taken into the Mater in Dublin where he received excellent care. The first thing he remembers of the incident is waking up with his family by his bedside.

On meeting Jane and Mark McSherry a few months following the incident to discuss his desire to give back to the local voluntary CFR groups, Mattie alluded to life began again at 40, having celebrated his 40th birthday a few weeks prior to his cardiac arrest and ROSC. His story reached far in his community and with his driving force, 107 tractors attended a tractor run in aid of 2 local CFR groups – the group in Trim who attended to him and his local group in Enfield / Baconstown area.

Joe Fitzgerald

Joseph Fitzgerald, a 72-year-old lifelong farmer, has always been defined by his energy and love of the land. Even in his seventies, Joe remained remarkably active — taking daily 6 a.m. walks, mucking out stables, and riding horses just a week before his cardiac arrest. Rarely needing medical care, he was known as a strong, healthy man, devoted to his wife, their children, and 16 grandchildren.

Joe with his wife celebrating their 50th wedding anniversary

But on an ordinary night, life changed in an instant.

Joe had gone to bed as usual when his wife heard an unusual gasping sound. Rushing to his side, she found him unresponsive. Recognising the seriousness of the situation, she called family members who lived just minutes away. They immediately rang 999, while Joe's wife began CPR — an act that would prove life-saving.

In that moment of fear and confusion, his Wife's quick thinking and immediate call to 999 set in motion a chain of events that would save his life.

Knowing the location of the nearest defibrillator at the Halfway Bar, family members collected it on their way to the house. Within moments, Joe's 2 sons & two of Joe's daughters-in-law — both trained in CPR and AED use — arrived and took over. They moved him to the floor and continued resuscitation efforts.

Pat McCartney, a Community Engagement Officer with the National Ambulance Service, happened to be nearby and was the first to arrive on scene. Calm and reassuring, he quickly assessed the situation and took over CPR.

His professionalism brought order to the chaos. "When Patrick walked in, everything shifted," Joe's daughter Michelle remembered. "He was so calm. He just knew exactly what to do. In those terrifying minutes, it meant everything to us."

Paramedics soon joined him, and together they worked tirelessly. After intense efforts, Joe's pulse was restored, and he was transported to Cork University Hospital. He spent a week and a half recovering — first in intensive care, then on a ward. Joe had no memory of the collapse or his time in ICU, but his family never left his side. They even kept up a sense of normality, listening to a horse race with him by phone from his hospital bed, though he couldn't recall it the next day.

For his daughter, those moments remain vivid. "It all felt so unreal," she said. "But the way Patrick and the team worked — so focused, so determined — gave us hope when we had none. I honestly don't know how to put into words what it means to us that Dad is still here."

The experience left its mark, particularly on Joe's wife, who initially struggled with anxiety and sleepless nights. With the love and support of her family, she gradually regained her confidence.

The emergency responders, particularly Pat McCartney and the CUH staff, were described by the family as compassionate and reassuring. After ensuring Joe was safely in ED care, they even returned to update the family and wish them well.

Today, Joe is back to his normal routine — rising early, walking, and tending to the farm. Most importantly, he's enjoying life with his wife, children, and grandchildren. a testament to timely intervention and resilience.

Joe's story is a powerful reminder of the chain of survival — the lifesaving combination of immediate bystander CPR, rapid access to a defibrillator, and the seamless teamwork of first responders and hospital staff. His recovery is a testament to resilience, preparedness, and the strength of community.

Joe and his wife celebrate their 50th wedding anniversary with all 16 Grandchildren!

Seamus Tansey

On 2nd January 2024, at around 3.30am Jean Tansey was at home in her house in Co. Meath. She woke up to hear an unusual noise from her husband, Seamus. Jean realised this wasn't normal breathing.

He then had some seizure like activity and Jean rang 999. As a nurse she recognised he was having a cardiac arrest, and with the aid of the emergency call taker, started CPR. The 999 call generated an automatic text notification to National Ambulance Service volunteers in the area, and just over 6 minutes into the 999 call an Off Duty Responder, Paramedic Jack Byrne, arrived at the Tansey household.

Jean had opened the door and made sure the lights were on. Jack went upstairs to find Jean doing excellent CPR. He applied his NAS issued defibrillator, which he had only received two weeks prior. Jack administered two shocks with the AED. An ambulance crew with AP Catriona and Paramedic Michael arrived at that point. They had been going to a lower priority call in the area and were diverted to the Cardiac Arrest by the dispatcher on duty. They provided advanced care, including 3 more shocks, and a return of spontaneous circulation (ROSC) was achieved. Assisted by a second crew, Paramedic Greg and AP Dave, they transported Seamus to hospital. He has since made a good recovery and is glad to be home with his family.

Seamus, Jean and family are very grateful for for the excellent response from NAS and for the care received in hospital. This incident was a perfect example of the chain of survival at its best. Jean recognised the cardiac arrest early and called 999. The Emergency Call Taker continued this by appropriately categorising the call, ensuring that the Off Duty Responder was notified. They assisted Jean with reminders on doing CPR. Jack arrived quickly to bring early defibrillation and started the next steps of care. He was followed rapidly by the Advanced Paramedics and Paramedics who brought ALS care to the patient. The chain was then completed with excellent post resuscitation care provided to Seamus both in the emergency department and as an inpatient in Connolly Hospital Blanchardstown.

Chapter 1

The National Out-of-Hospital Cardiac Arrest Register (OHCAR)

The OHCAR Steering Group and Governance

The Aim of OHCAR

OHCAR reporting to Service Providers

Ireland and the EuReCa Studies

Chapter 1

1.0 The National Out-of-Hospital Cardiac Arrest Register (OHCAR)

The OHCAR project was established in June 2007 in response to a recommendation in the "*Report of the Task Force on Sudden Cardiac Death*" [1]. The need for OHCAR was also emphasised in the policy document "*Changing Cardiovascular Health*" [2] and the "*Emergency Medicine Programme Strategy*" [3]. OHCAR is one of four OHCA registries in Europe with full national coverage.

1.1 The OHCAR Steering Group and Governance

OHCAR is an integral part of the Clinical Directorate of the National Ambulance Service (NAS), Health Service Executive (HSE) and is guided by the OHCAR Steering Group (Appendix 1).

1.2 The Aim of OHCAR

The aim of OHCAR is to support improved outcomes from OHCA in Ireland by:

- Collecting information on the population who suffer OHCA and the arrest circumstances
- Collecting information on the pre-hospital treatment of OHCA patients
- Monitoring the survival to hospital discharge of OHCA patients
- Establishing a sufficiently large patient database to enable identification of the best treatment methods for OHCA and optimum organisation of services
- Providing regular feedback to service providers
- Facilitating research on best practice nationally and internationally using OHCAR data.

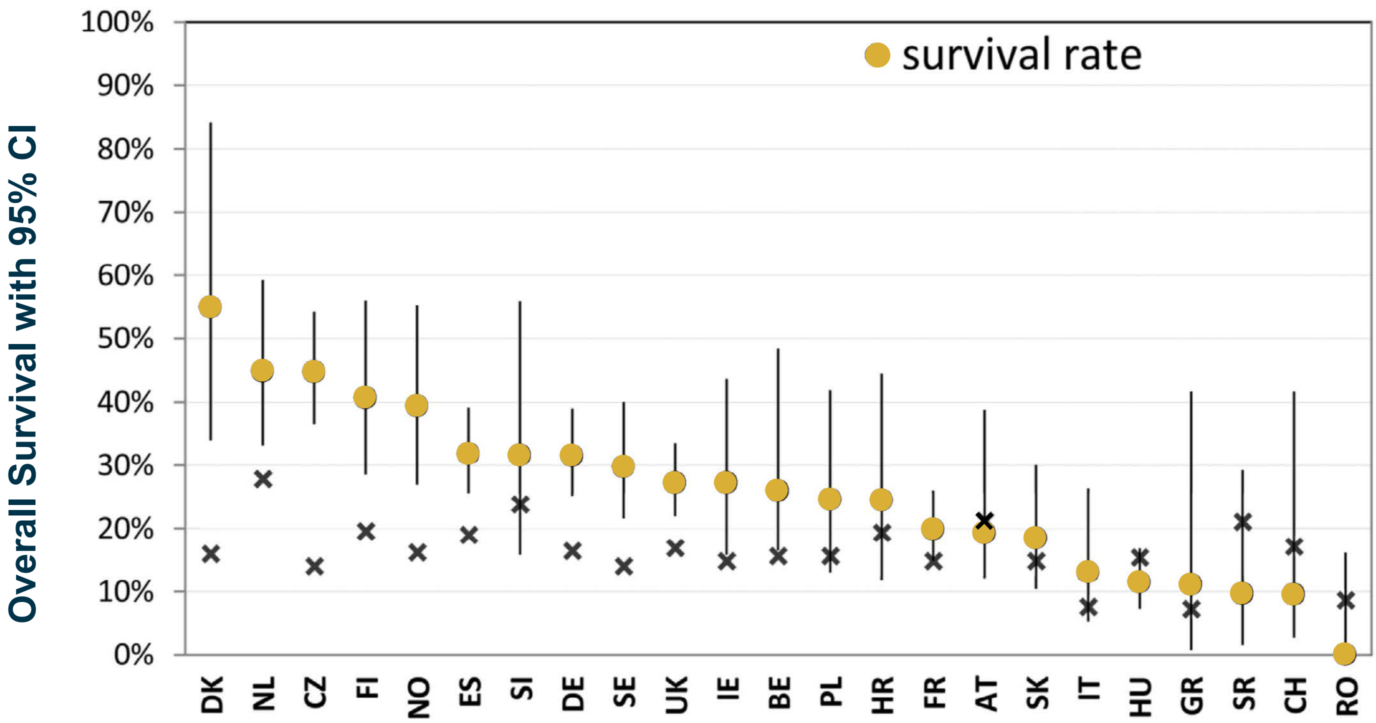
1.3 OHCAR reporting to Service Providers

OHCAR is used to provide data for the 'ROSC at Hospital' monthly clinical Key Performance Indicator for NAS, and also to provide detailed regional quarterly reports. These include descriptive data elements and outcome variables at regional level and constitute the data source for reports circulated by NAS to stations for the ONELIFE initiative, which is a NAS run quality improvement programme. A quarterly report is provided to Dublin Fire Brigade (DFB) with outcome data and descriptive information. OHCAR Annual reporting is undertaken according to the HSE Health Regions (Map 1).

1.4 Ireland and the EuReCa Studies

EuReCa THREE was launched in June 2022. OHCAR has provided National OHCA data for incidents in Ireland to the EuReCa THREE study, which covered the time period from 1st September to November 30th 2022. In 2017 Ireland participated in the EuReCa TWO study, which was a three month study from October to December 2017, and was published in 2020 [4]. Ireland was one of only four countries that contributed data for the entire country for the study period. In October 2014, Ireland participated in the EuReCa ONE [5, 6] study – a one-month survey of OHCA cases in 27 countries across Europe. Ireland was one of only seven countries that contributed data for the entire country for the study period.

Figure 1: EuReCa TWO overall survival rates in Utstein group (Ireland = 'IE')



Chapter 2

Methods

Inclusion / Exclusion Criteria

Source of OHCAR Data

Data Collection

Aetiology

Data Quality Management

Data Analysis

Chapter 2

2.0 Methods

2.1 Inclusion / Exclusion Criteria

OHCAR registers “all patients who suffer a witnessed or un-witnessed out-of-hospital cardiac arrest in Ireland which is confirmed and attended by Emergency Medical Services (EMS) including patients who have achieved Return of Spontaneous Circulation (ROSC) before EMS arrival (Figure 2). A resuscitation attempt is defined as performance of cardiopulmonary resuscitation (CPR) and/or attempted defibrillation where there is evidence of a cardiac arrest rhythm.

Figure 2: Inclusion criteria

Total number of OHCAR cases

n = 4,959

Number that a resuscitation attempt

n = 3,197

Number that had ROSC or that resuscitation was continued on EMS arrival

n = 2,802

2.2 Source of OHCAR Data

The primary sources of OHCAR data are Patient Care Records (PCRs) and dispatch data from the two statutory ambulance services, the National Ambulance Service (NAS) and the Dublin Fire Brigade (DFB). OHCAR has data sharing agreements with other organisations including the Dublin Airport Fire and Rescue (DAFR), Red Cross, Civil Defence, Irish Coastguard and Order of Malta, but almost all data is provided from statutory services.

2.3 Data Collection

OHCAR collects data in the format of the internationally agreed Utstein dataset [7, 8].

National Ambulance Service: NAS uses electronic PCRs (ePCR), and during 2023 OHCAR identified all cases via the ePCR system. Following validation, OHCAR staff upload the data onto the OHCAR database. OHCAR receives NAS dispatch data monthly from the National Emergency Operations Centre (NEOC) in Tallaght and this data is added to each record in the OHCAR database. Data from the Community First Responders is gathered electronically and is matched via incident numbers and added to NAS data. Cases are also matched with data from NAS defibrillators.

Dublin Fire Brigade: PCRs are sourced by DFB's EMS Support Unit and data are provided to OHCAR on a quarterly basis in a summarised electronic format. These records are integrated with data from the DFB East Region Command Centre in Townsend Street. Electronic copies of DFB PCRs are also sent to OHCAR to enable case validation.

Hospitals: OHCAR has a data sharing agreement with all hospitals who receive OHCA patients except Our Lady's Children's Hospital, Crumlin. Data collection from hospitals is facilitated by various hospital staff, including administrators, resuscitation officers, clinical nurse managers and consultants. Acute hospitals provide information on survival status and Cerebral Performance Category (CPC) score [9, 10].

[C]Cerebral Performance Category (CPC) score is an assessment score developed to assess both traumatic and anoxic cerebral injuries.

2.4 Aetiology

As per the Utstein definition, where there is no evidence of another cause, e.g. trauma, asphyxiation, drug overdose cases were presumed to be of medical aetiology.

2.5 Data Quality Management

The Utstein guidelines state that, "organisers of OHCA registries should implement monitoring and remediation for completeness of case capture [8]". The quality of data variables for each OHCAR case is vital to the usefulness of the register. Responsibility for accurate and comprehensive data recording lies with the emergency practitioners who attend the OHCA scene. OHCAR works with NAS and DFB to enhance data quality by providing quarterly reports which include a summary of the availability of some core data elements. NAS then produces and circulates OHCAR summary reports to ambulance stations on a quarterly basis. DFB also provide each practitioner access to their quarterly reports.

The following data quality checks are also undertaken:

- Case duplication searches
- Checking for inconsistent and/or conflicting data values
- Validation of initial data entries and against OHCAR inclusion criteria
- Clinical expertise is provided by the OHCAR Steering Group when required.

2.6 Data Analysis

Data analysis was performed using IBM SPSS version 29. In all cases $p<0.05$ was used as the level of statistical significance. Where appropriate, relationships between categorical values were expressed in percentages and examined by the Chi square test for significance [11].

Chapter 3

Chapter 3

3.0 Results for 2024

3.1 Incidence

In 2024, a total of **2,885** OHCA were attended where resuscitation was reported to have been attempted by NAS, DFB, DAA or bystanders, and continued by the EMS or had achieved ROSC pre-EMS arrival. This equates to 56 OHCA resuscitation attempts per 100,000 in 2024 [12]. In Europe, the estimated incidence of OHCA ranges between 27 and 91 per 100,000 per year [13].

In 2024, the majority of OHCA incidents were presumed to be of medical aetiology (47/100,000 persons) compared to a small proportion of cases of non-medical aetiology (trauma, asphyxia, drug overdose or submersion, 10/100,000 persons). (Map 1[d]).

[d] Population data from Census of Population 2022 [14].

Map1: Incidence of OHCA with resuscitation attempts in 2024

Map of six new Regional Health Areas

AREA A

Overall
52/100,000 population

Medical
44/100,000 population

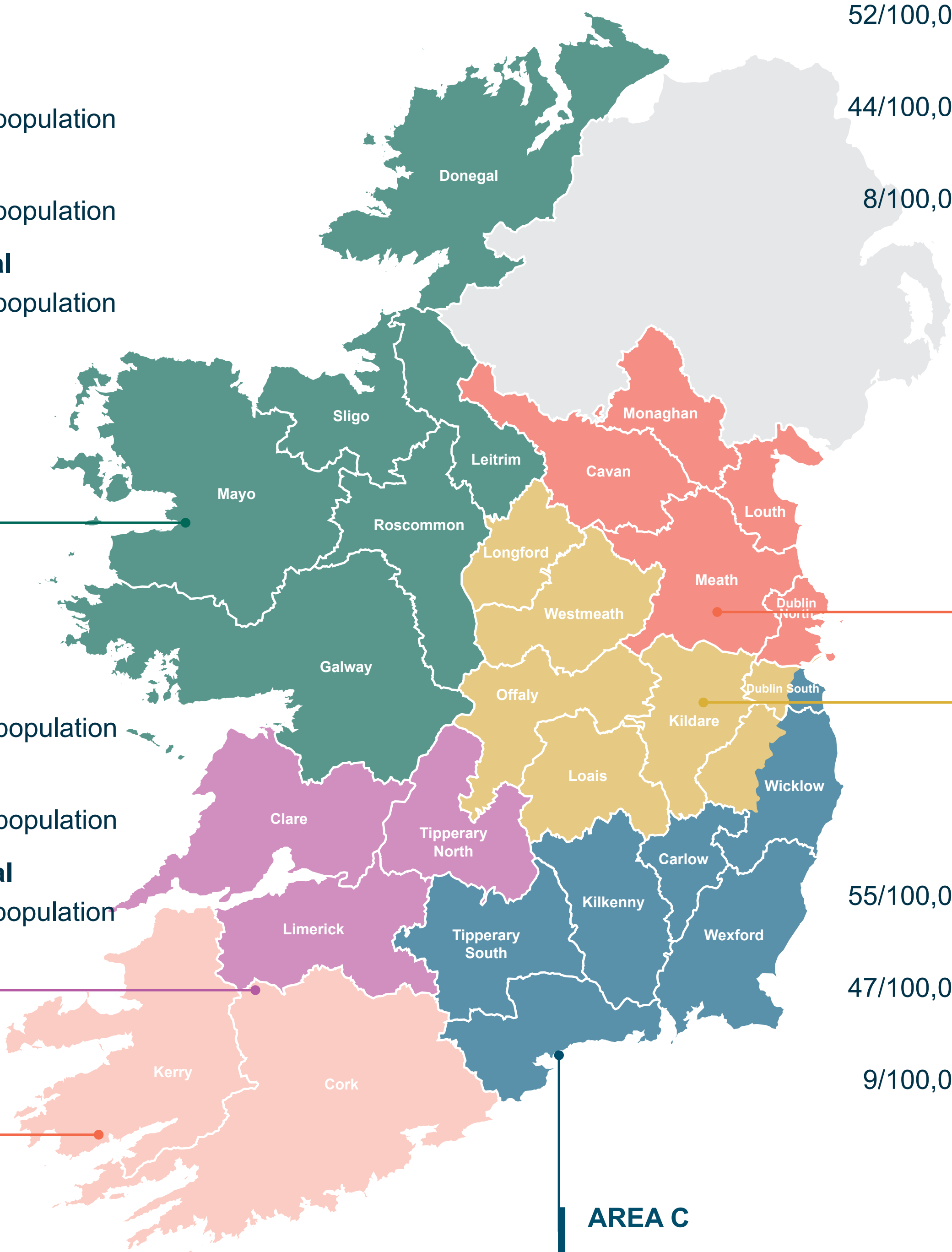
Non-medical
8/100,000 population

AREA F

Overall
60/100,000 population

Medical
50/100,000 population

Non-medical
10/100,000 population



AREA E

Overall
59/100,000 population

Medical
48/100,000 population

Non-medical
11/100,000 population

AREA B

Overall
55/100,000 population

Medical
47/100,000 population

Non-medical
9/100,000 population

AREA D

Overall
54/100,000 population

Medical
44/100,000 population

Non-medical
11/100,000 population

AREA C

Overall
59/100,000 population

Medical
48/100,000 population

Non-medical
11/100,000 population

Health Atlas Ireland

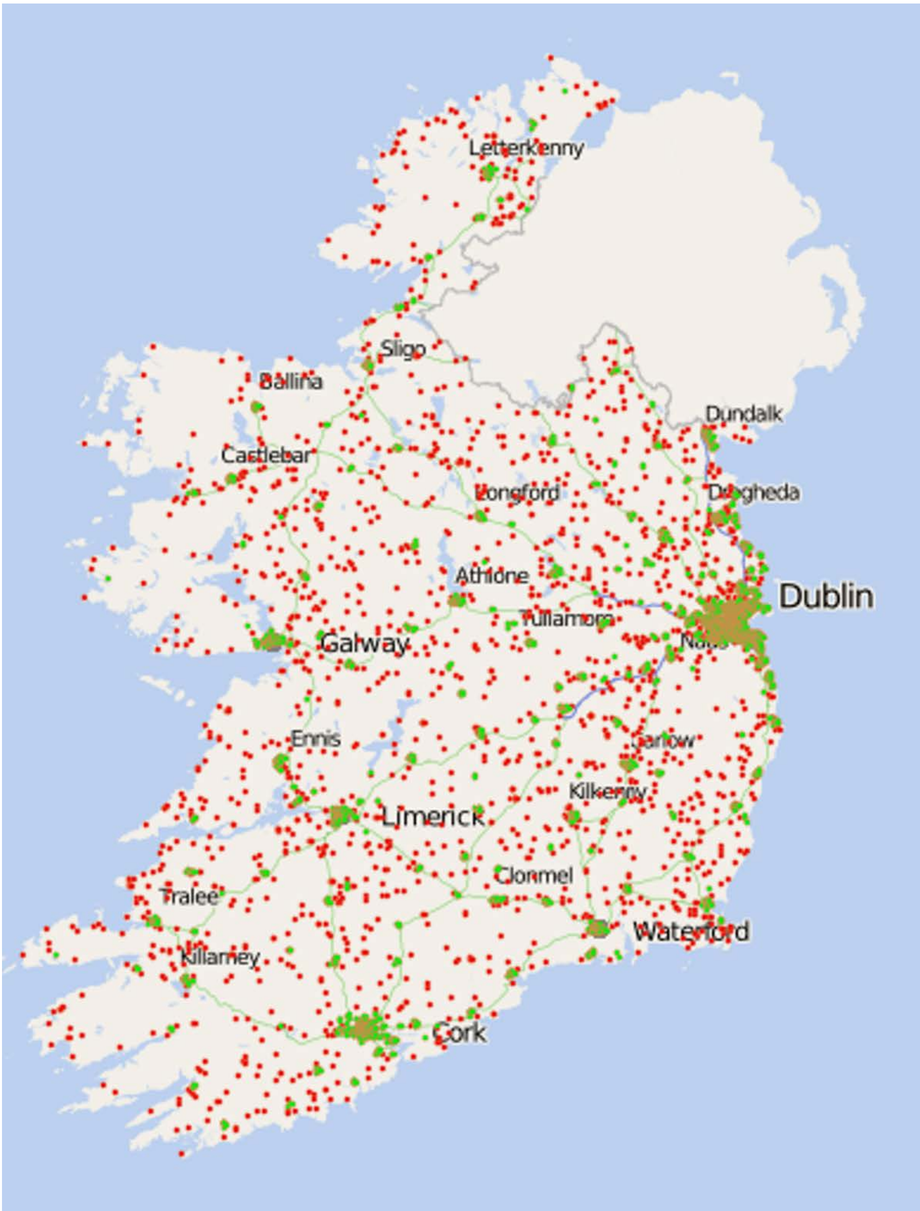
3.2 Geographical Distribution of Incidents

The geographical coordinates of incident locations were mapped using the HSE application 'Health Atlas' (https://www.healthatlasireland.ie/). Map 2 highlights that the majority of cases occurred in the most populated areas. The classification of an urban area matches with the Central Statistics Office (CSO) definition of a settlement i.e. urban settlements are towns with a population of 1,500 or more, while settlements with a population of less than 1,500 are classified as rural [13].

- 61% of cases occurred in an urban area (n=1,679/2,733); 152 cases could not be geocoded due to insufficient data or the event having occurred during ambulance transport

Map 2: Geographical distribution of OHCAR Incidents with settlement/ non-settlement classification

- **Rural**
- **Urban**



3.3 Demographics

- 1,962 patients were male (68%)
- Patients ranged in age from less than one to over 100 years old (median age 68 years, interquartile range (IQR) 53 – 78)
- Females were older than males, 71 years (IQR 56 – 81) vs. 66 years (IQR 52 – 78) respectively), ($p<0.001$)
- Females were more likely to collapse in a private setting (homes or residential institutions) than males (n=754/913, 83% v 1,419/1,962, 72%), ($p<0.001$).

3.4 Community First Responders

In December 2024 there were 314 Community First Responder (CFR) groups in 26 counties linked with NAS. The CFR group members are predominantly made up of lay people with an interest in providing life-saving support in their communities, and receive training prior to activation from the NAS National Emergency Operations Centre. The CFR groups operate on a voluntary basis and are trained in basic life support and the use of defibrillators. They are co-ordinated locally by volunteers, work under the auspices of the National Ambulance Service policy, and are dispatched by ambulance control.

- 28% of all cases had evidence of CFR involvement, either attended, supported by or were 1st on scene (n=811/2,885)
- CPR was initiated by CFR's in 9% of cases (n=243/2,824)
- CFR's first applied defibrillators pads in 16% of cases (n=458/2,882)
- In those patients that were defibrillated, the first shock was delivered by CFR's in 16% of cases (n=156/962)
- 19% of cases that received their first shock by CFR's were discharged alive (n=29/156).

3.5 Dispatch assisted Cardio-pulmonary Resuscitation

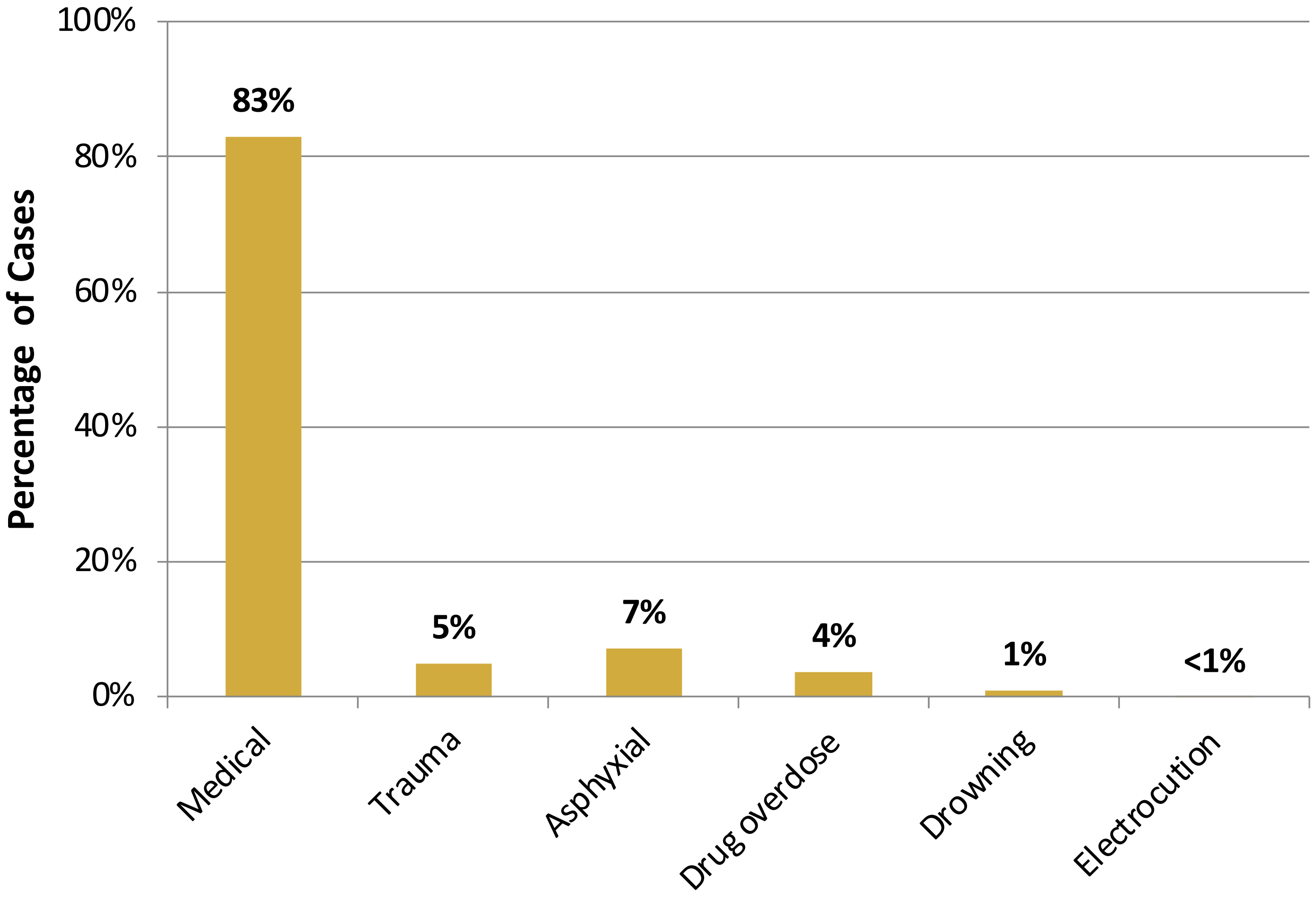
Since 2022, NAS has been recording the metric Dispatch-assisted CPR (D-CPR). When cardiac arrest is confirmed or suspected by the Emergency Call Taker, the caller is given instructions in performing CPR. The time taken to commence is measured in minutes and seconds from when the call is received by the EMS call taker to when D-CPR is offered. Only non-EMS witnessed cases are included here. It is important to note that D-CPR instructions are provided only if the call is categorised as cardiac arrest by the call taker and if the caller has not already commenced CPR.

- Of those cases that were NAS, and not EMS witnessed, had B-CPR performed, 57% required D-CPR (the other 43% had already commenced CPR. The median time in minutes was 2:37 (IQR 1:35 – 4:44) (n=1,063/1,872).

3.6 Presumed Aetiology

- 83% of incidents were presumed to be of medical aetiology (n=2,396/2,885)
- Non-medical aetiologies included (Figure 3):
  - 7% asphyxia (n=207)
  - 5% trauma (n=145)
  - 4% drug overdose (n=108)
  - 1% submersion (n=26)
  - <1% Electrocution (n=3)
- 82% of male patients had a presumed medical aetiology (n=1,616/1,962) compared to 85% of female patients (n=774/913), (p<0.042).
- Patients with a presumed medical aetiology were significantly older than all other aetiologies (68 years vs. 49 median years respectively), (p<0.001).

Figure 3: Presumed aetiology (n=2,396)



3.7 Call Response Interval

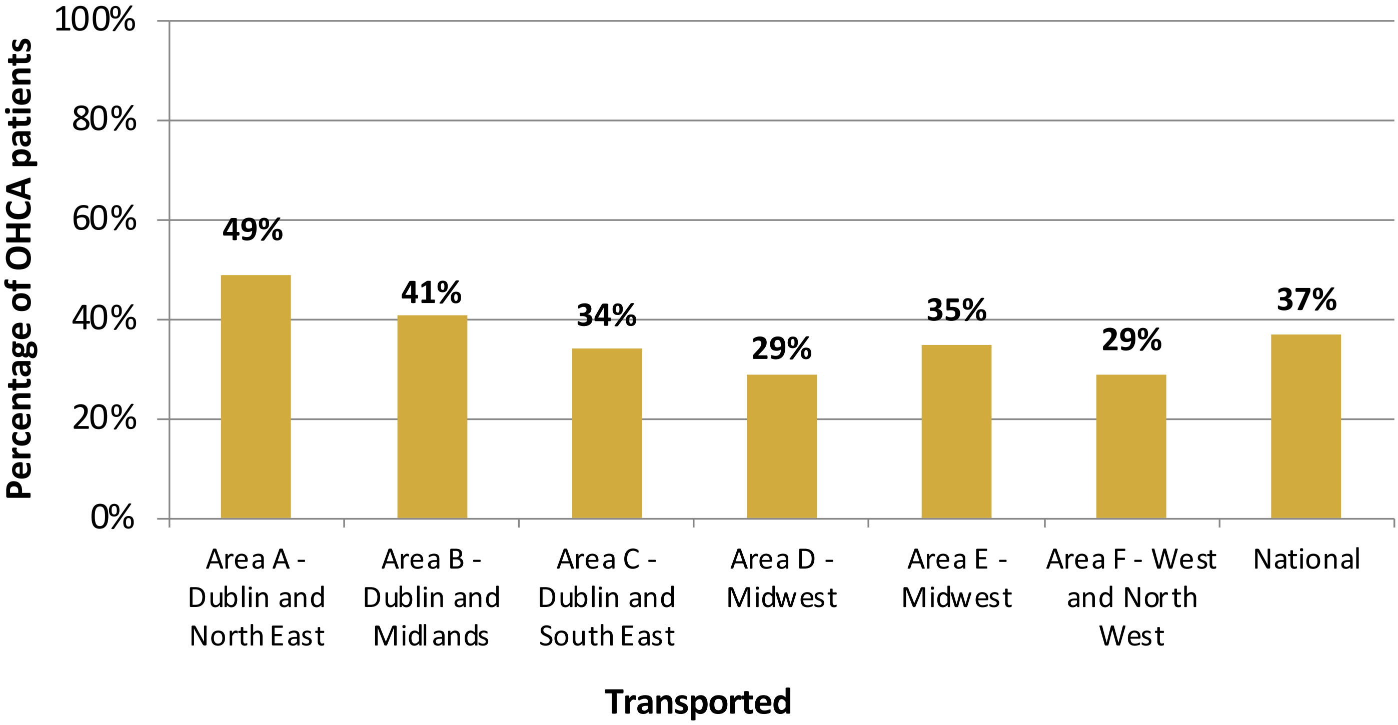
As per the Utstein definition [10], the call response interval (CRI) is the interval from the time the emergency call was received at the dispatch centre to arrival of EMS at the scene. Only the CRI for non-EMS witnessed cases are included in this analysis (n=2,560/2,885). As CRI is not normally distributed, the median value for each category is given:

All non EMS witnessed cases	14 minutes (IQR 9 – 20 minutes)
Rural non EMS witnessed cases	18 minutes (IQR 13 – 25 minutes)
Urban non EMS witnessed cases	11 minutes (IQR 7 – 16 minutes)
Utstein comparator group	13 minutes (IQR 9 – 19 minutes)

3.8 Transported to Hospital

- 37% of patients were transported to either an Emergency Department or a cardiac catheterisation laboratory (n=1,074/2,885)
- The percentage of patients who were transported to hospital was 49% in Regional Health Area (RHA) A – Dublin and North compared to 29% in Area D – South West, (Figure 4)
- More patients were transported in urban areas compared to rural areas (43% vs. 25%, p<0.001).

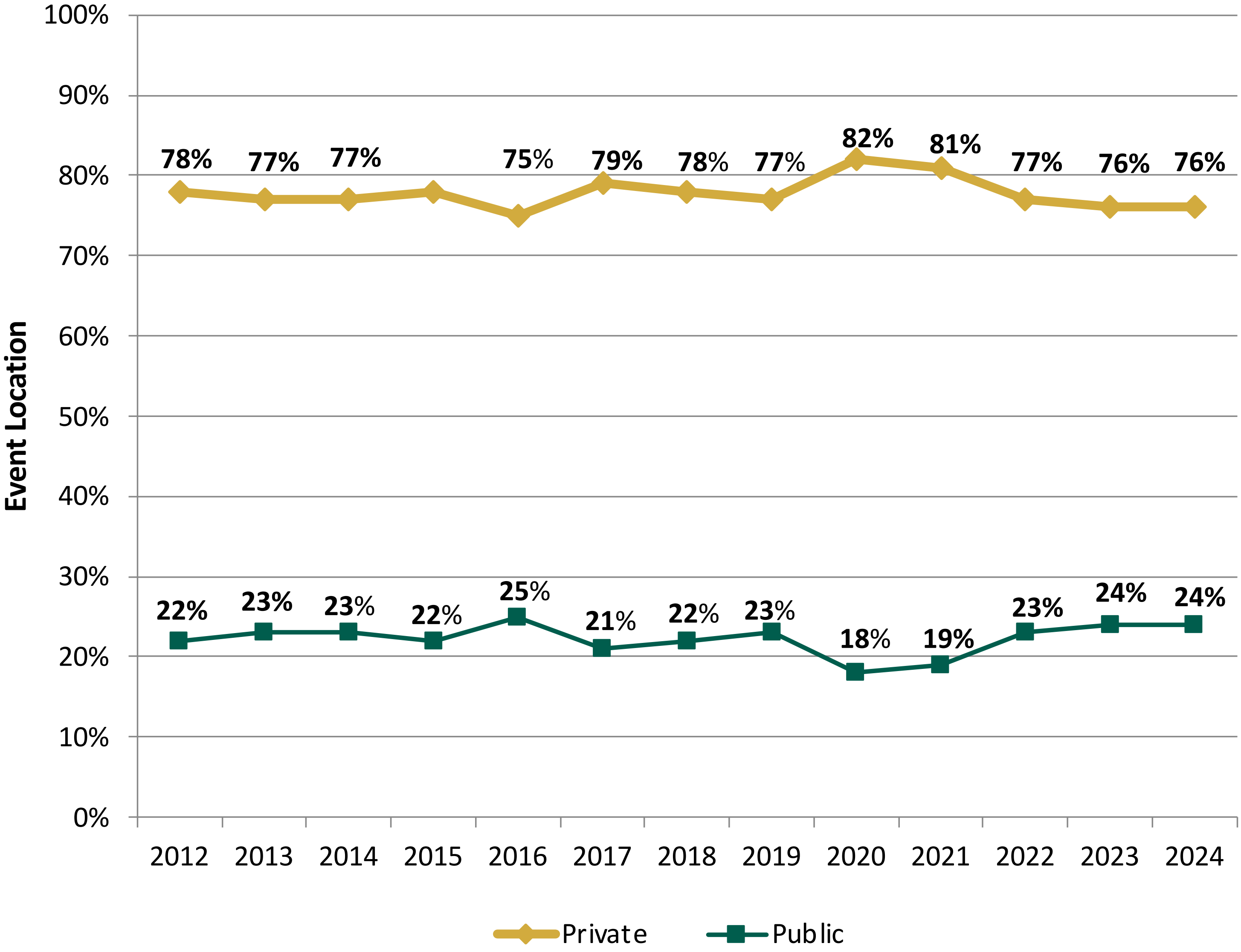
Figure 4: Proportion of patients transported to hospital by EMS area and nationally



3.9 Event Location

- 68% of incidents occurred in the home (n=1,963/2,885)
- 76% of incidents occurred in a private setting (home, farm or residential institution (n=2,179/2,885)
- 24% of cases occurred in a public setting (industrial place, public building, GP surgery, recreational or sports place, street or road, in the ambulance, and other places such as rivers, lakes or piers (n=706/2,885) (Figure 5)
- In urban areas, a higher proportion of patients collapsed in a public place compared to rural areas (22% vs. 20%), (p<0.088).

Figure 5: Event Location



3.10 First Monitored Rhythm

- 24% of cases were in a shockable rhythm at time of first rhythm analysis (n=688/2,885) (Figure 7)
- The initial rhythm was asystole in 40% of cases (n=1,124/2,826), (Figure 8).

Figure 7: Initial Rhythm shockable

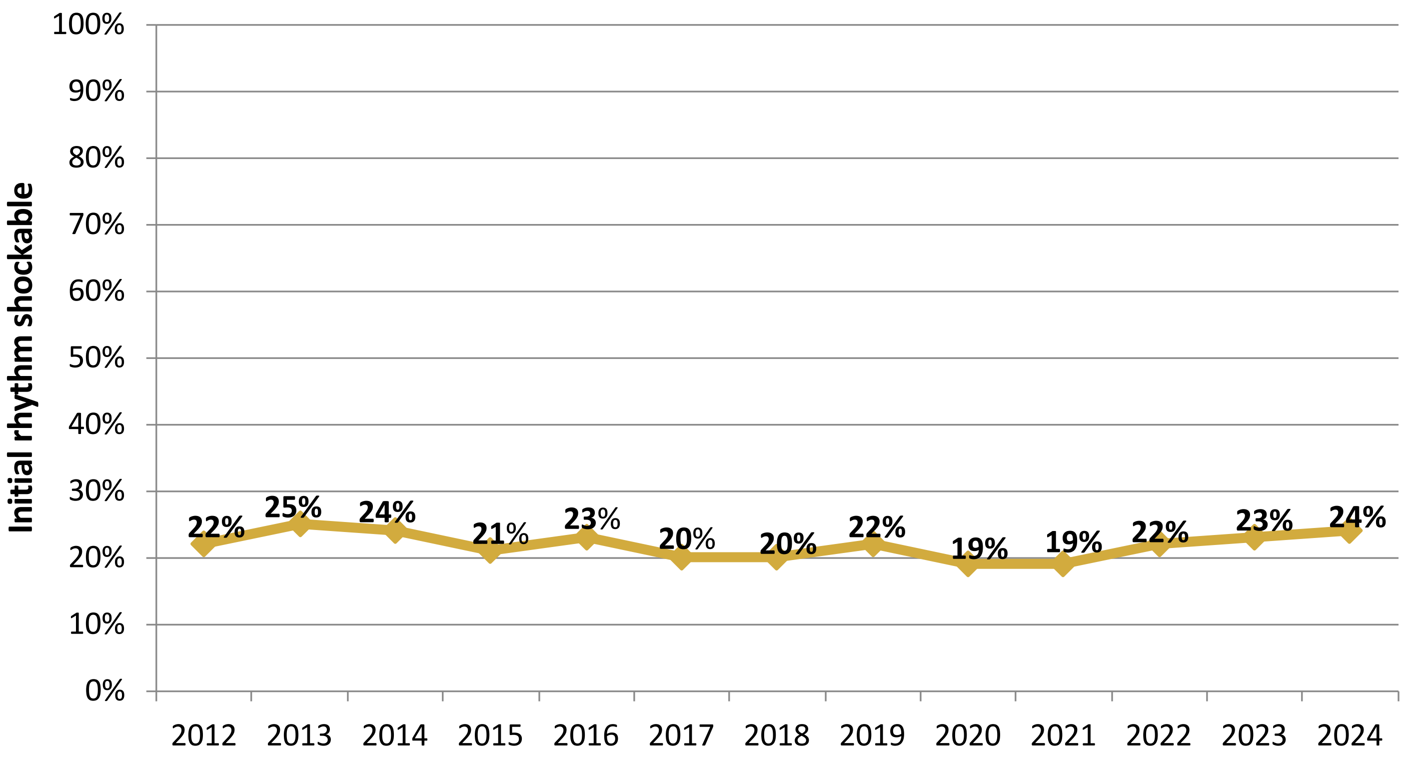
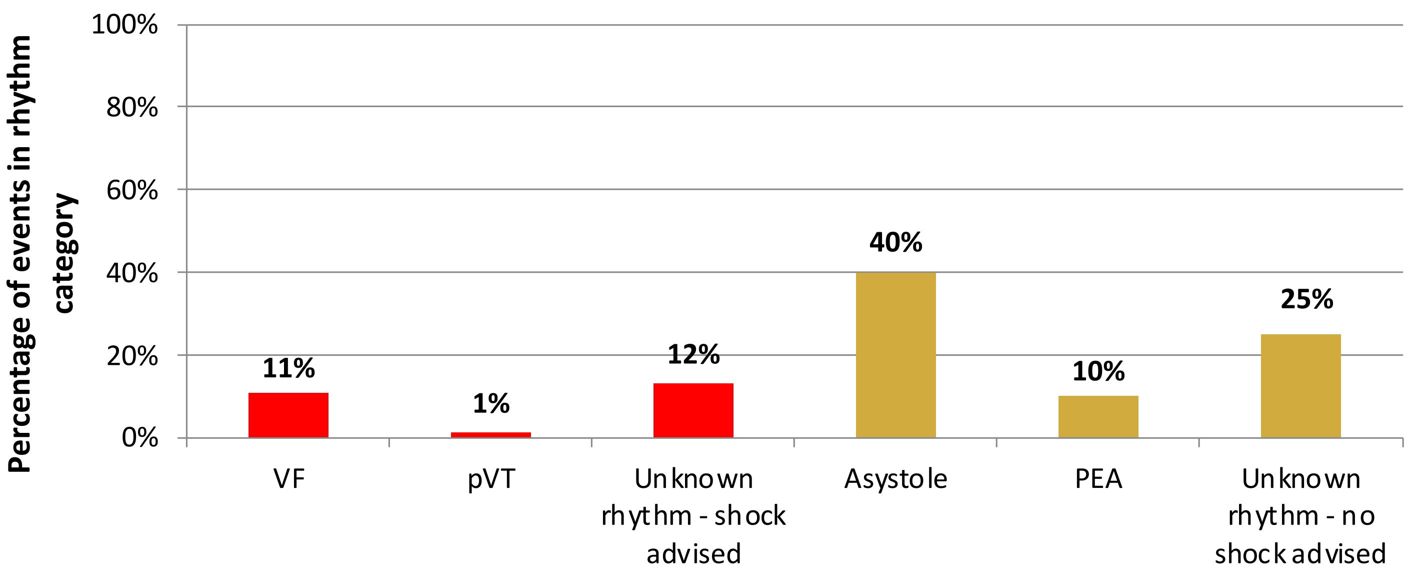


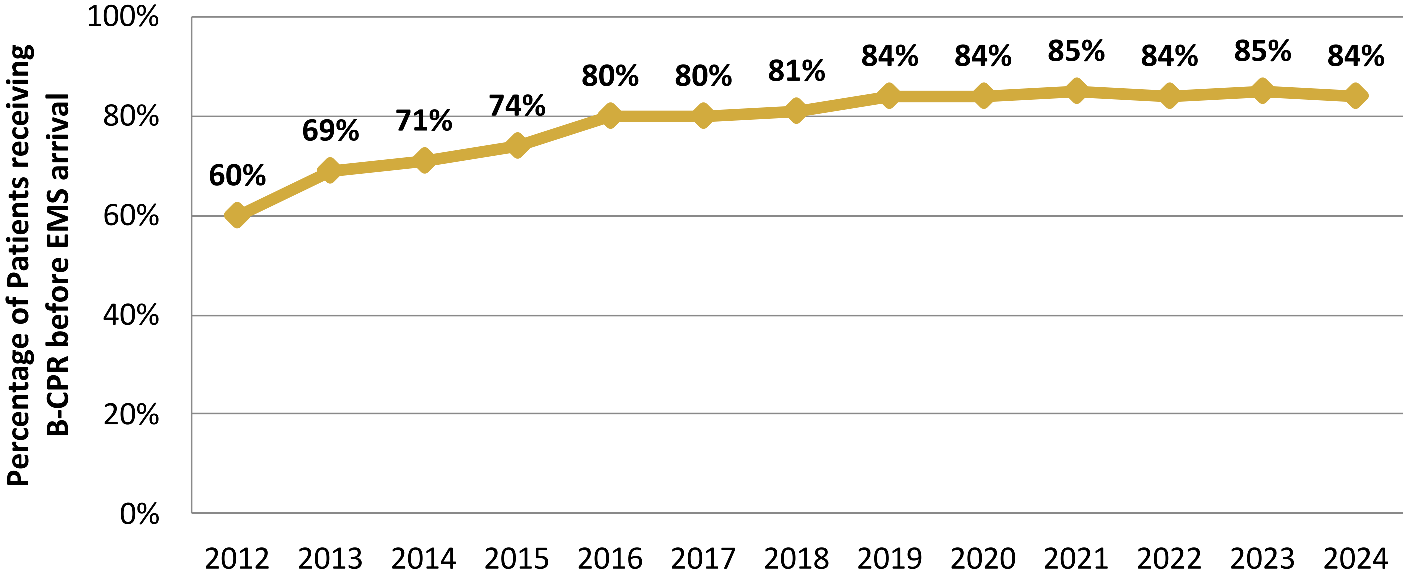
Figure 8: First monitored rhythm (n=2,826)



3.11 Bystander CPR

- Bystander CPR was attempted in 84% of non-EMS witnessed* cases (n=2,138/2,560) (Figure 9).

Figure 9: Percentage of patients receiving B-CPR before EMS arrival, years 2012 – 2024



*i.e. non-EMS witnessed cases

- In the subgroup of patients that had a bystander witnessed collapse (n=1,485) 87% (n=1,288) of patients had bystander CPR (B-CPR) attempted
- A higher proportion of cases in a rural area received B-CPR (n=871/963) compared to an urban area (n=1,197/1,518) (90% vs. 79%; $p<0.001$)
- A higher proportion of cases in a public location received B-CPR (n=510/574) compared to a private location (n=1,628/1,986), (89% vs. 82%; $p<0.001$)

3.12 Mechanical CPR

- 53% of cases had Mechanical CPR performed (n=1,463/2,746).

3.13 Defibrillation

- 33% of cases had defibrillation attempted (n=962/2,885)
- 12% of cases had defibrillation attempted pre-EMS arrival (n=339/2,885) (Fig. 10)
- Of the 962 patients who had defibrillation attempted:
  - 429 had the pads applied pre-EMS arrival (45%)
  - 339 had the first shock delivered pre-EMS arrival (35%, Figure 11).

Figure 10: 12% of all cases had defibrillation attempted pre-EMS arrival (n=339/2,885)

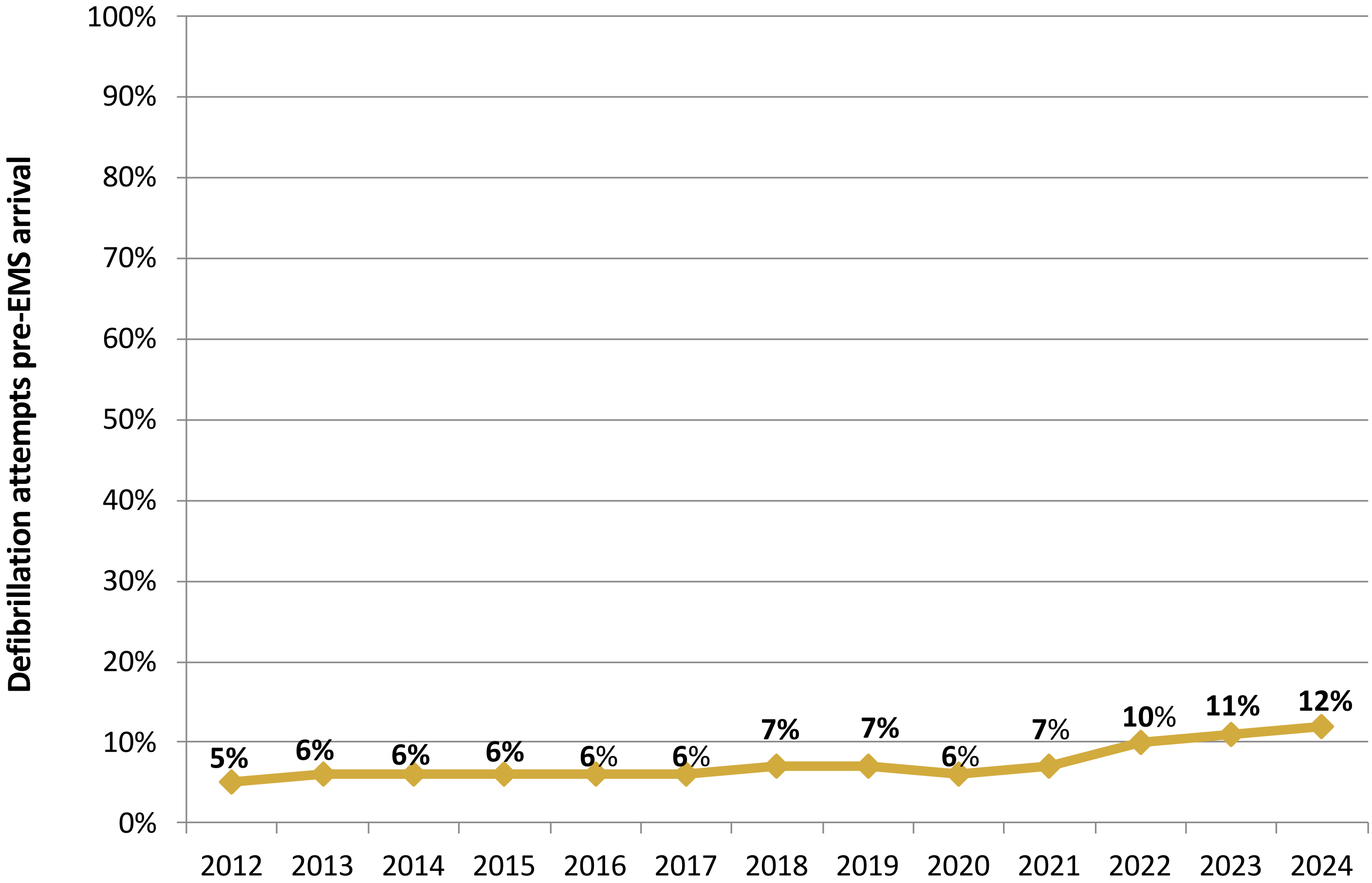
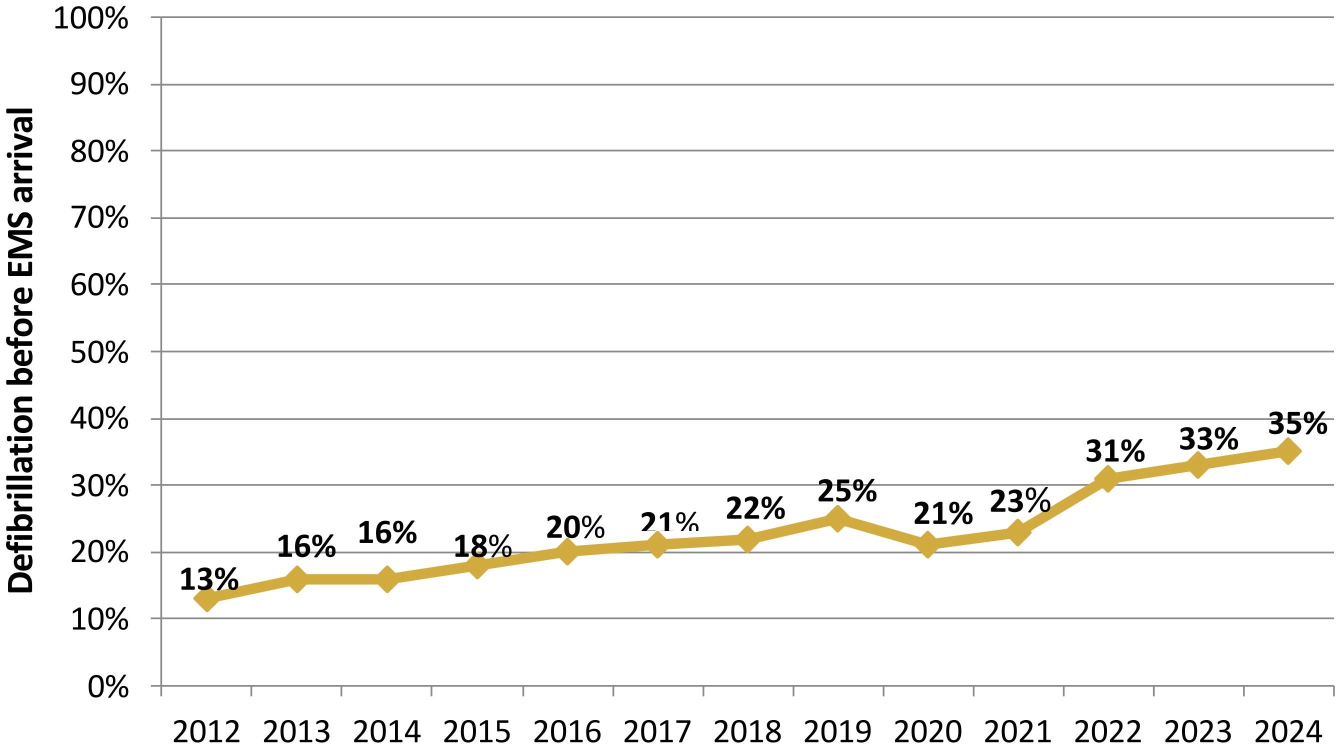


Figure 11: Defibrillation attempted pre-EMS arrival (of those with attempted defibrillation (n=339/962)



First shock delivered before EMS arrival

In the 339 cases where first shock was delivered before EMS arrival, the identity of the person who delivered the first shock was as follows:

- Community First Responder (46%, n=156)
- Members of the general public (24%, n=82)
- Local Fire services (9%, n=29)
- Nurses (9%, n=31)
- Doctors (7%, n=25)
- Voluntary Services (4%, n=14)
- Members of An Garda Síochána (<1%, n=2).

Conversion to shockable rhythm during resuscitation

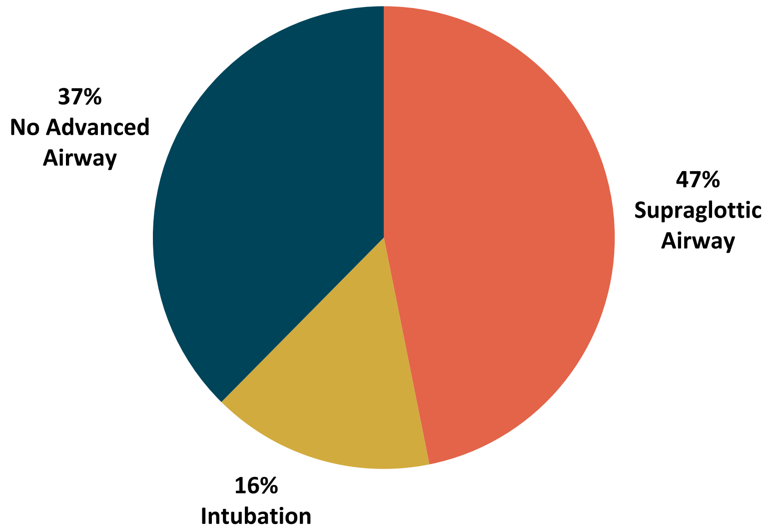
A total of 280 patients converted to a shockable rhythm during resuscitation. Of these:

- 44% were initially in asystole (n=123/280)
- 24% were initially in PEA (n=67/280), rhythm type not specified for the remainder.

3.14 Advanced Airway Adjuncts

- In 62% of cases, advanced airway adjuncts were used, i.e. supra-glottic airway device or intubation (n=1,679/2,690), (Figure 12).

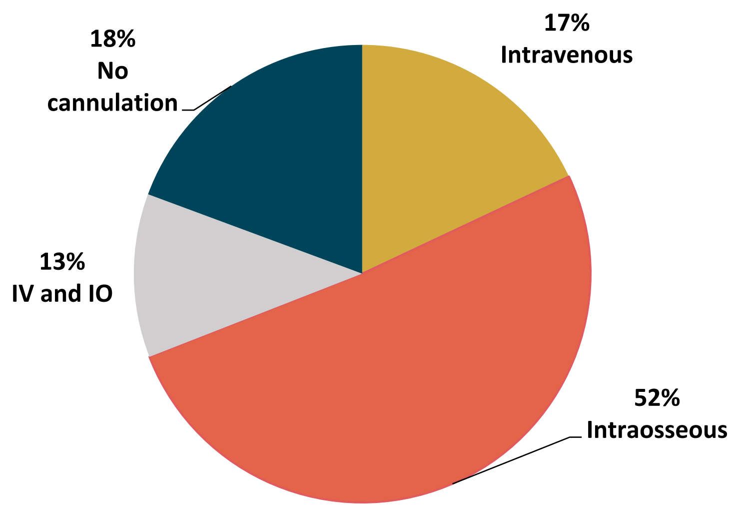
Figure 12: Adjunct airway management (n=2,690)



3.15 Cannulation

- 82% of cases had cannulation performed (n=2,379/2,876)
  - 51% of cases had intraosseous cannulation (n=1,477/2,831)
  - 17% had intravenous only cannulation (n=493/2,831)
  - 12% had a combination of both techniques (n=356/2,831)
  - 8% had no cannulation performed (n=505/2,831) (Figure 13).

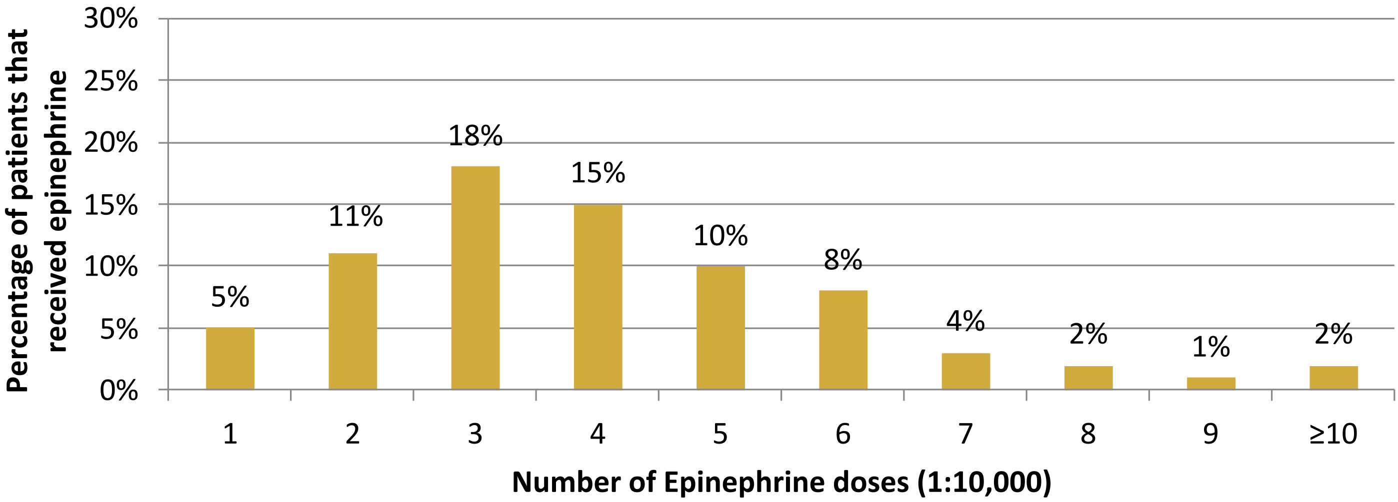
Figure 13: Cannulation (n=2,831)



3.16 Cardiac Arrest Medication

- 76% of cases had epinephrine administered (n=2,195/2,877); the number of doses given ranged from 1 to 17 (Figure 14).

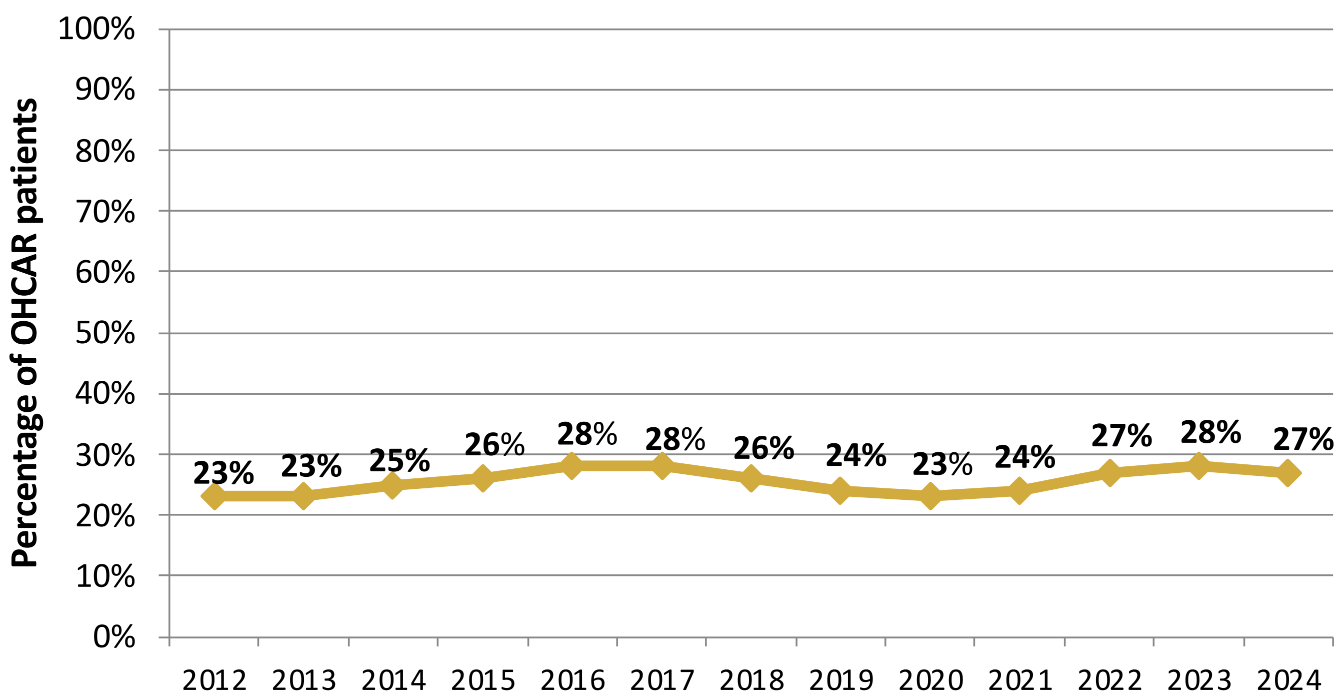
Figure 14: Percentage of Epinephrine doses (1:10,000)



3.17 ROSC at any stage

- 27% of cases had ROSC before Hospital arrival (n=767/2,873) (Figure 15)
- A higher number of patients achieved ROSC in urban compared to rural areas (30% vs. 21%) (n=495/1,669 vs. n=220/1,052), ($p<0.001$).

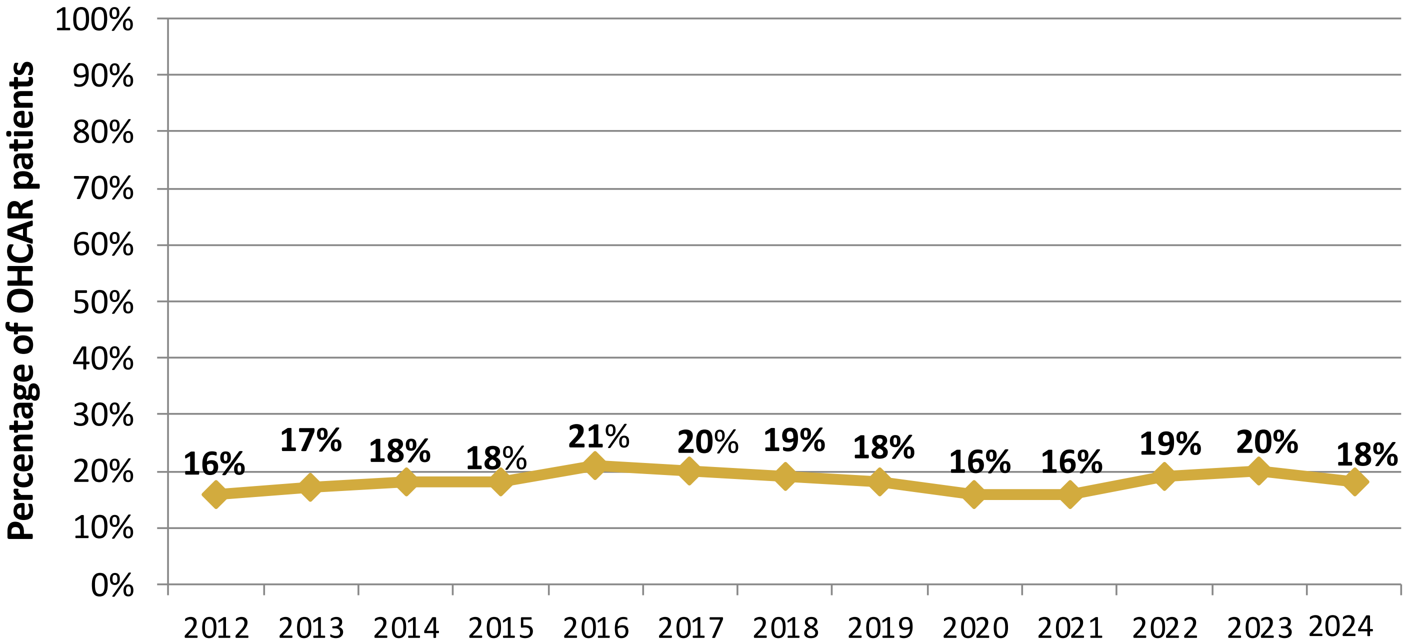
Figure 15: ROSC at any stage pre-hospital, all patients. Years 2012 – 2024



3.18 ROSC on Hospital arrival

- 18% of cases had ROSC on Hospital arrival (n=525/2,867) (Figure 16)
- ROSC on Hospital arrival was higher in urban than rural areas (21% vs. 13%), ($p<0.001$).

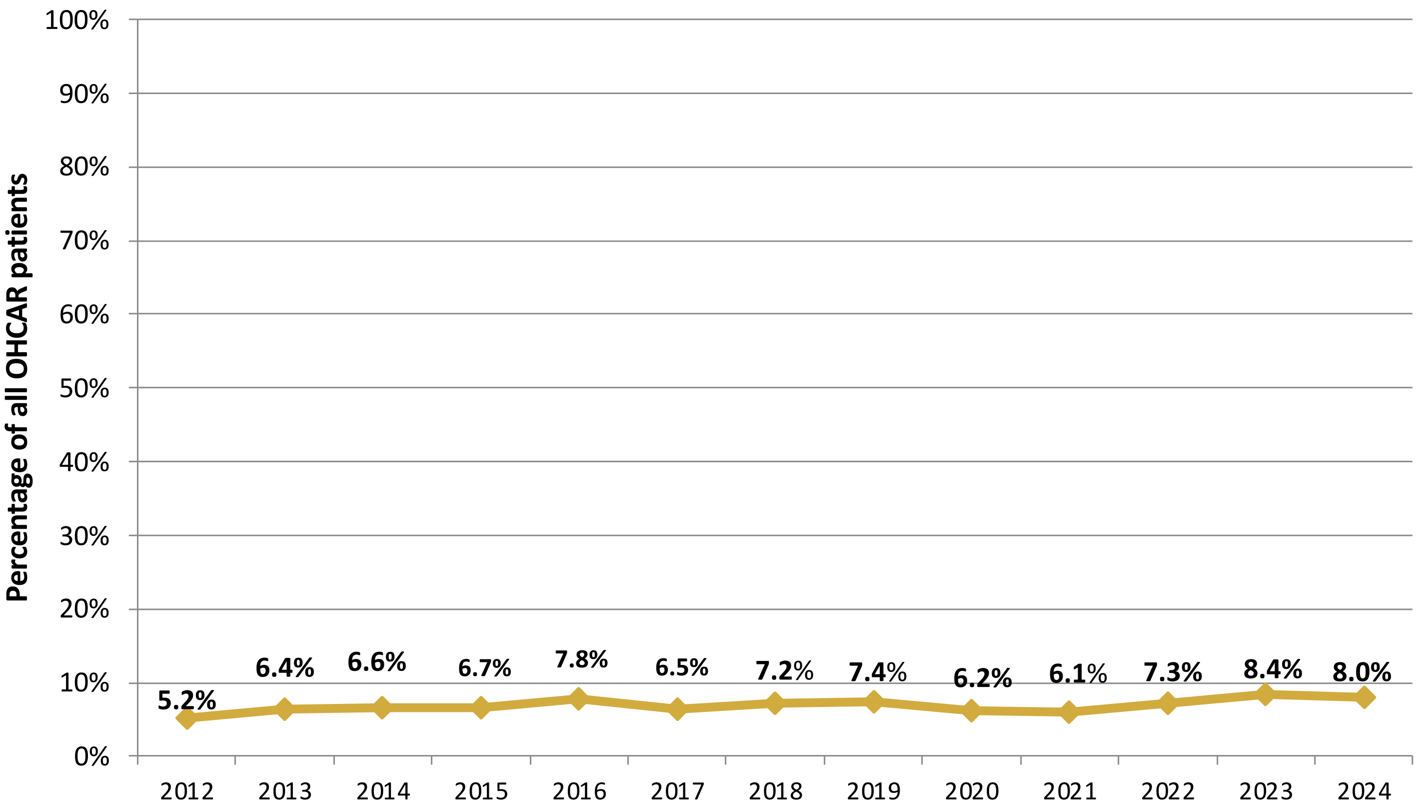
Figure 16: ROSC at Hospital arrival, all patients. Years 2012 – 2024



3.19 Discharged alive from Hospital

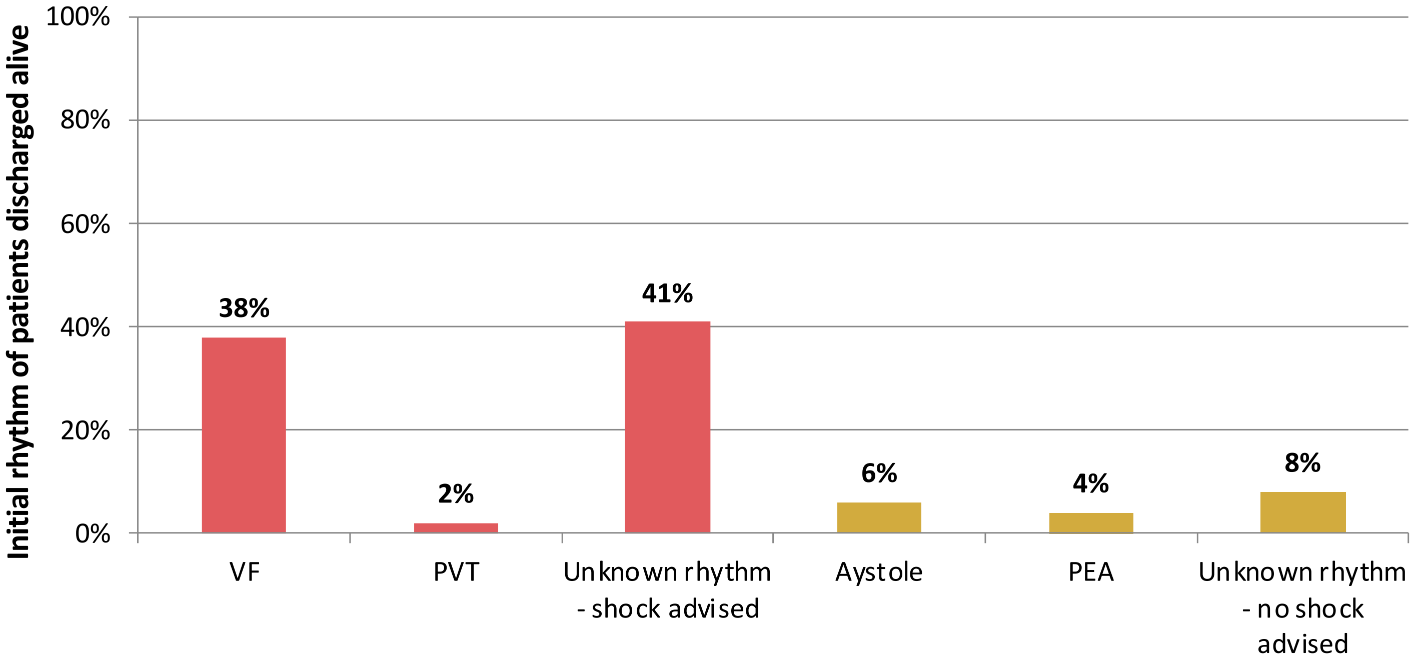
- A total of 232 patients were discharged alive from hospital (8.0%) (Figure 17). Data on 10 patients who were transported to hospital could not be obtained.

Figure 17: Percentage survival to discharge, all patients. Years 2012 – 2024 (n=2,213/31,719)



- Surviving patients were younger (median age 59 years, IQR 48 – 68) than non-surviving patients (median age 69 years, IQR 54 – 79 years, $p \leq 0.001$)
- The presumed aetiology was medical for 91% of survivors
- Survival in the presumed medical aetiology group was 9% (n=211/2,396) compared with 4% (n=21/489) in the non-medical group ($p=0.002$)
- 18% of patients who collapsed in a public location survived (n=127/706), compared to 5% of patients that collapsed in a private location (n=105/2,179), ($p \leq 0.001$)
- 8.4% of patients who collapsed in an urban area survived (n=141/1,679), compared to 6.9% of patients that collapsed in a rural area (n=73/1,054), ($p \leq 0.154$)
- 80% of survivors had an initial shockable rhythm (n=186/232, Figure 18)
- 20% of survivors had an initial non-shockable rhythm (n=46/232).

Figure 18: Percentage of survivors categorised by first analysed rhythm



- In the non-EMS witnessed group of survivors (n=152)
  - 89% had a witnessed arrest
  - 94% received bystander CPR
  - 66% (n=100), had defibrillator pads applied prior to EMS arrival
  - 57% (n=87) were shocked before EMS arrival
- In the EMS-witnessed group, 18% of patients survived (n=52/292)
- In the subgroup of EMS-witnessed patients that were adults, with presumed medical aetiology, with an initial shockable rhythm, 49% of patients survived (n=32/65).

3.20 Neurological function at discharge

The CPC[12] Score is an instrument developed to assess both traumatic and anoxic cerebral injuries. It is classified as a core Utstein data element for recording of cardiac arrest patients. The CPC score has five categories:

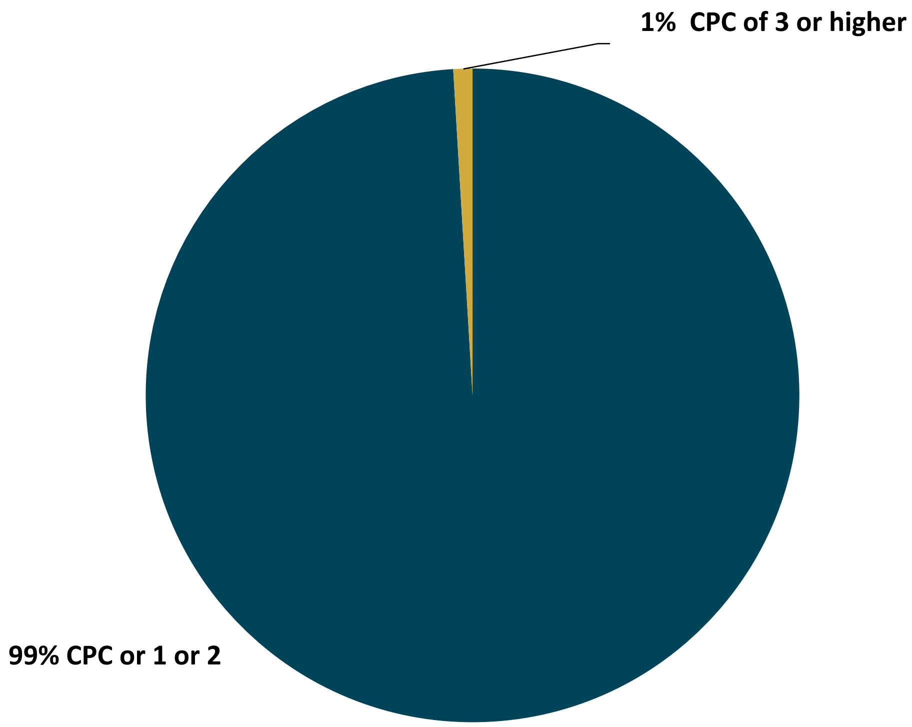
1. Good cerebral performance
2. Moderate disability: conscious, sufficient cerebral function for independent living
3. Severe disability: dependent on others for daily support
4. Coma or vegetative state
5. Brain death.

CPC score data was available for 212 surviving patients (Figure 19):

- 99% (n=210) had a score of 1 or 2
- 1% (n=2) had a score of 3 or higher

N.B. Data on CPC score was missing for 20 surviving patients.

Figure 19: CPC score at discharge



3.21 OHCA in the under 35 age group

- 8% of all cases were recorded as being <35 years of age (n=230/2,873)
  - 47% were of a presumed medical aetiology (n=109/230)
  - 17% were caused by trauma (road traffic accident, gunshot, stabbing, crush injuries or fall) (n=38/230)
  - 15% of cases resulted from a drug overdose (n=34/230)
  - 54% of cases were unwitnessed (n=122/227)
  - 13% were initially shockable (n=30/230)
  - 7.4% survived to Hospital discharge (n=17/230)

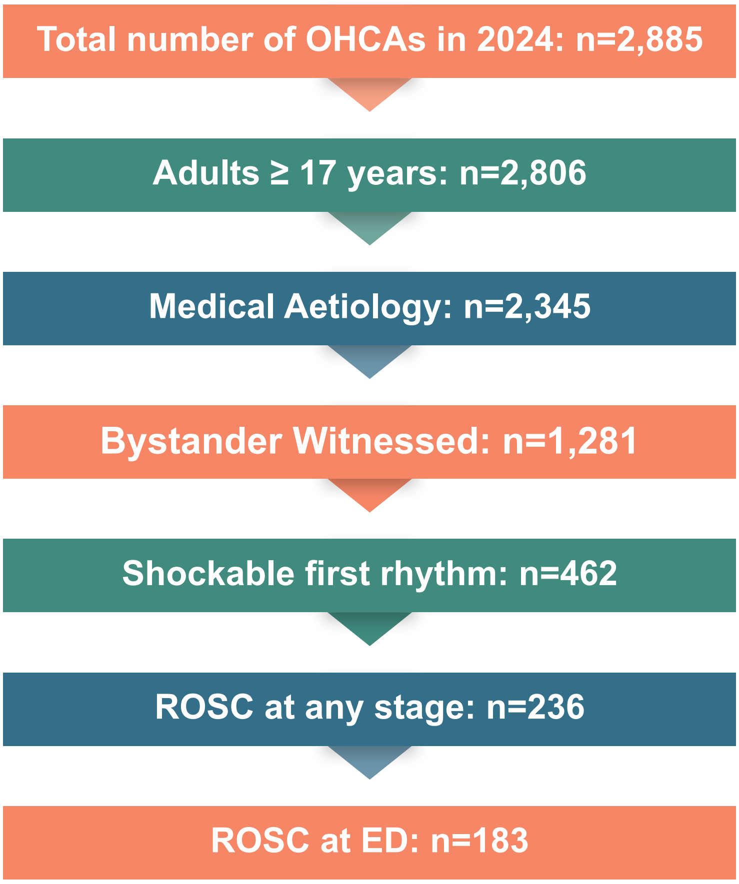
3.22 Utstein Comparator Subset

The Utstein comparator subset includes the following subgroup of patients

- Adult (i.e. older than seventeen years)
- Presumed medical aetiology
- Bystander witnessed arrest
- First monitored rhythm shockable.

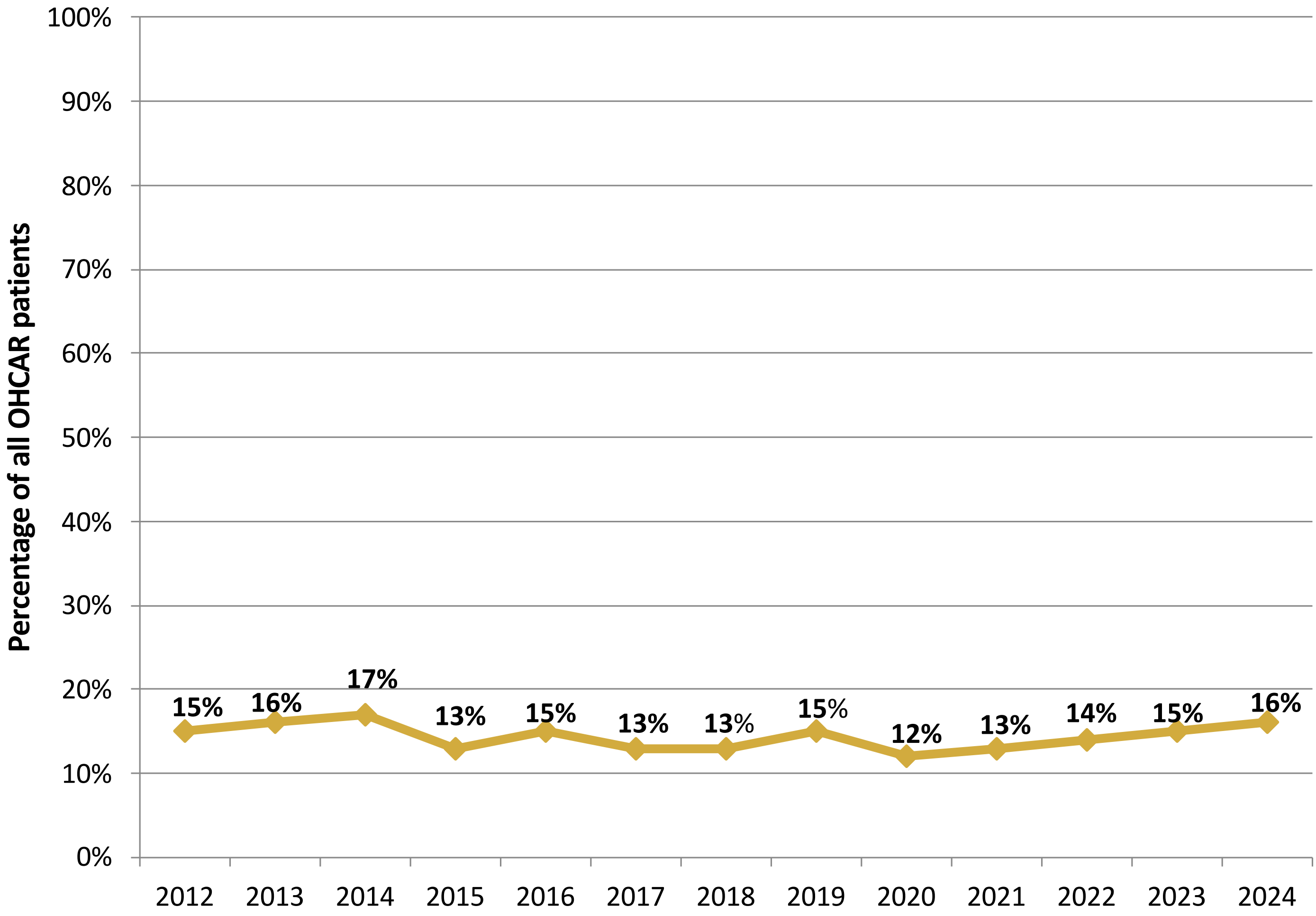
There is wide variation of circumstances around a cardiac arrest and patient characteristics. Using the Utstein comparator subset allows for a more standardised comparison of patient outcomes between systems and time periods (Figure 20).

Figure 20: Flowchart of the 2024 Utstein comparator subset and ROSC outcomes



In 2024, the Utstein comparator subset included 462 patients and accounted for 16% of all OHCAR cases (462/2,885, Figure 21).

Figure 21: Utstein comparator subset 2012 – 2024

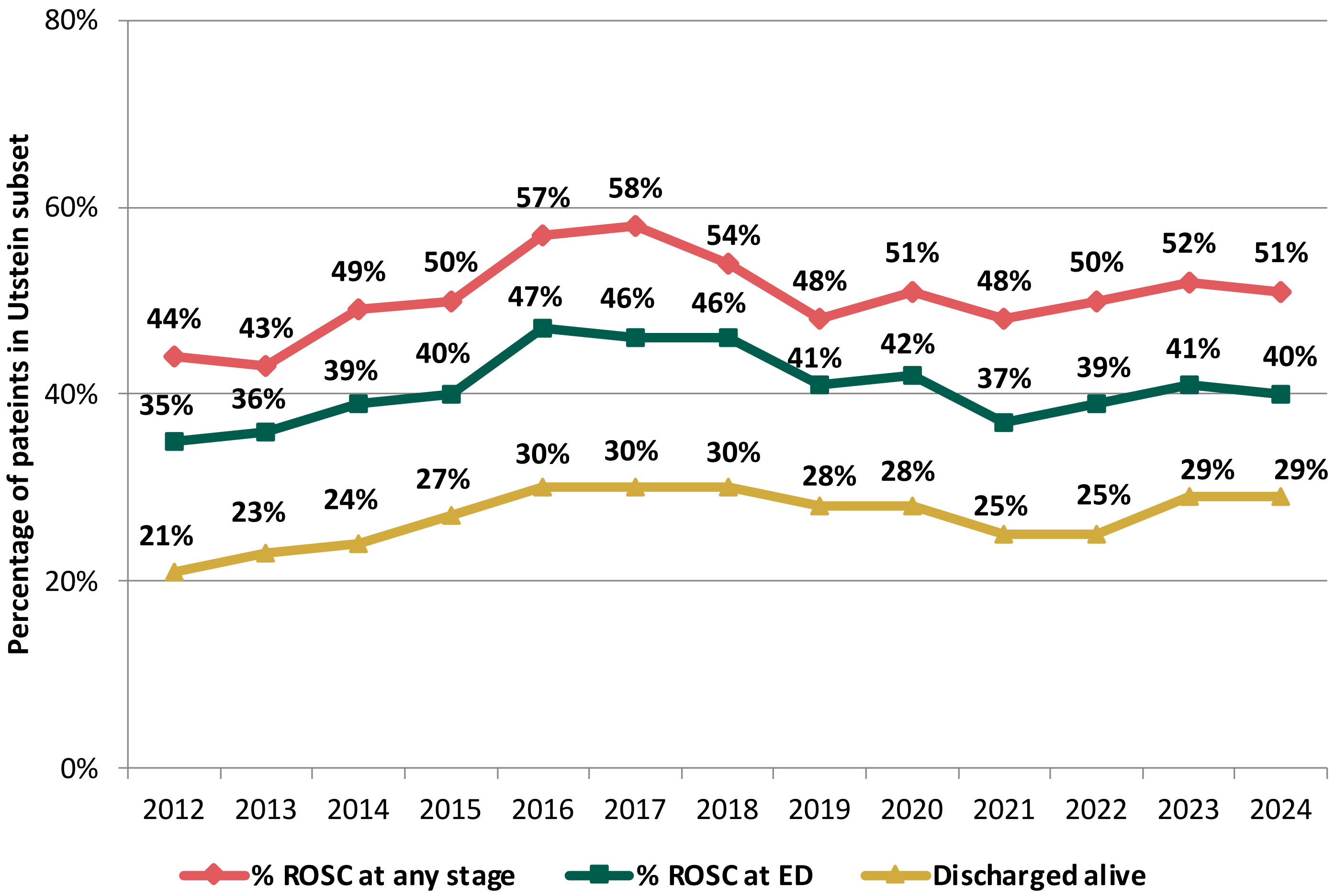


3.23 Utstein Comparator Subset Outcomes

- **51%** of patients (n=236/462) achieved ROSC at some stage before hospital arrival
- **40%** of patients (n=183/462 had ROSC on hospital arrival
- **29%** of patients (n=133/462) were discharged alive from hospital (Figure 22)
- Of the survivors for whom CPC was available, 97% had a CPC score of one or two (n=125/133).

N.B. Data on CPC score was missing for 8 surviving Utstein patients.

Figure 22: Outcomes in the Utstein comparator subset, years 2012 – 2024



Case Characteristics

- Of those patients who collapsed in a public location, 40% survived (n=75/188) compared to 21% in a private location (n=58/274) (p=0.001)
- 91% of cases were recognised as cardiac arrest at the time of ambulance dispatch (n=418/460)
- Bystander CPR was performed on 95% of survivors
- 58% of the patients who survived had defibrillation attempted before ambulance service arrival (n=77/133. The estimated median time from 'time of collapse' to 'time of first shock administered' was 4 minutes (n=45/77, IQR 1 – 10).

Chapter 4

Conclusion

Future developments in OHCAR

Chapter 4

4.0 Conclusion

Compared to the 2023 OHCAR Annual Report, Bystander CPR in 2024 has decreased from 85% to 84%. Attempted defibrillation before EMS arrival has increased to 12% of all patients. In the subgroup of patients who had defibrillation attempted (n=962), there has been an increase in attempted defibrillation before EMS arrival, from 33% to 35%. ROSC before hospital arrival was 27%, ROSC on hospital arrival was 18% and the absolute number of patients discharged alive from hospital has decreased from 240 in 2023 to 232.

In the Utstein group the ROSC prior to hospital arrival was 51%, ROSC at Hospital arrival was 40% and discharge alive was 29%. In line with previous years, and international data, surviving patients were more likely to be younger, have a presumed medical aetiology, have collapsed in a public, urban location, have a witnessed arrest, present in a shockable rhythm, and received bystander CPR.

4.2 Future developments in OHCAR

OHCAR is working closely with the HSE Data Protection Officer to ensure that data sharing agreements are aligned with the GDPR. OHCAR is collecting data on D-CPR from NAS only, but is working with the DFB to gain national coverage of the metric. OHCAR has completed a pilot study to determine if Quality of Life (QoL) in OHCA survivors can be measured, using the internationally recognised EQ-5D-5L and Short Form 36 questionnaires. OHCAR is aligned with the Irish Heart Foundation in signposting supports to OHCA survivors that they may benefit from.

OHCAR has partnered with the University of Limerick, in hosting a Public Health student, to undertake studies that may assist in determining ways to explore CFR member's areas of interest in OHCAR data.

Chapter 5

Chapter 5

Acknowledgements

The OHCAR Steering Group wishes to acknowledge the contribution made to the report from the following sources:

- **NAS**
- **DFB**
- **Community First Responders**
- **First Aid Responders, Irish Coast Guard**
- **An Garda Síochána**
- **Order of Malta**
- **St. John Ambulance**
- **Red Cross**
- **Voluntary First responders**
- **bystanders**
- **Doctors**
- **Nurses**
- **local Fire services**
- **Civil Defence**
- **The HSE, including Hospital staff, Section 38 Voluntary Hospital staff.**

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Appendix 1

OHCAR Steering Group

The OHCAR Steering Group is responsible for ensuring that the aims of OHCAR are fulfilled and for advising on its organisation and direction. The Steering Group includes representatives from all four supporting organisations, and met four times from July 2024 to July 2025.

The membership at June 2025 is:

- Professor Conor Deasy, Professor of Emergency Medicine, University College Cork and Consultant in Emergency Medicine, Cork University Hospital (OHCAR Chair)
- Mr. Joe Fahy, Resuscitation Officer, Portiuncula University Hospital
- Professor Joseph Galvin, Consultant Cardiologist, Mater Hospital
- Mr. David Hennelly, Clinical Development Manager, National Ambulance Service, HSE
- Siobhán Masterson PhD, General Manager, Clinical Strategy and Evaluation, National Ambulance Service & Adjunct Senior Lecturer, University College Cork
- Dr David Menzies, Chair, CFR Ireland & Consultant in Emergency Medicine, St Vincent's University Hospital & Clinical Lead, Emergency Medical Science, UCD, Centre for Emergency Medical Science
- Professor Andrew Murphy, Foundation Professor, Discipline of General Practice, University of Galway
- Professor Cathal O'Donnell, Clinical Director, National Ambulance Service
- Mr. Michael O'Reilly, Assistant Chief Fire Officer, Dublin Fire Brigade
- Mr. Martin O'Reilly, District Officer, EMS Support Officer, Dublin Fire Brigade
- Mr. Martin Quinn, OHCAR Manager, National Ambulance Service.

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Appendix 3

OHCAR Utstein Comparator Subset 2024 – Results by Regional Health Area

Figure 1: Number of OHCAR patients in the Utstein group by region (n=462)

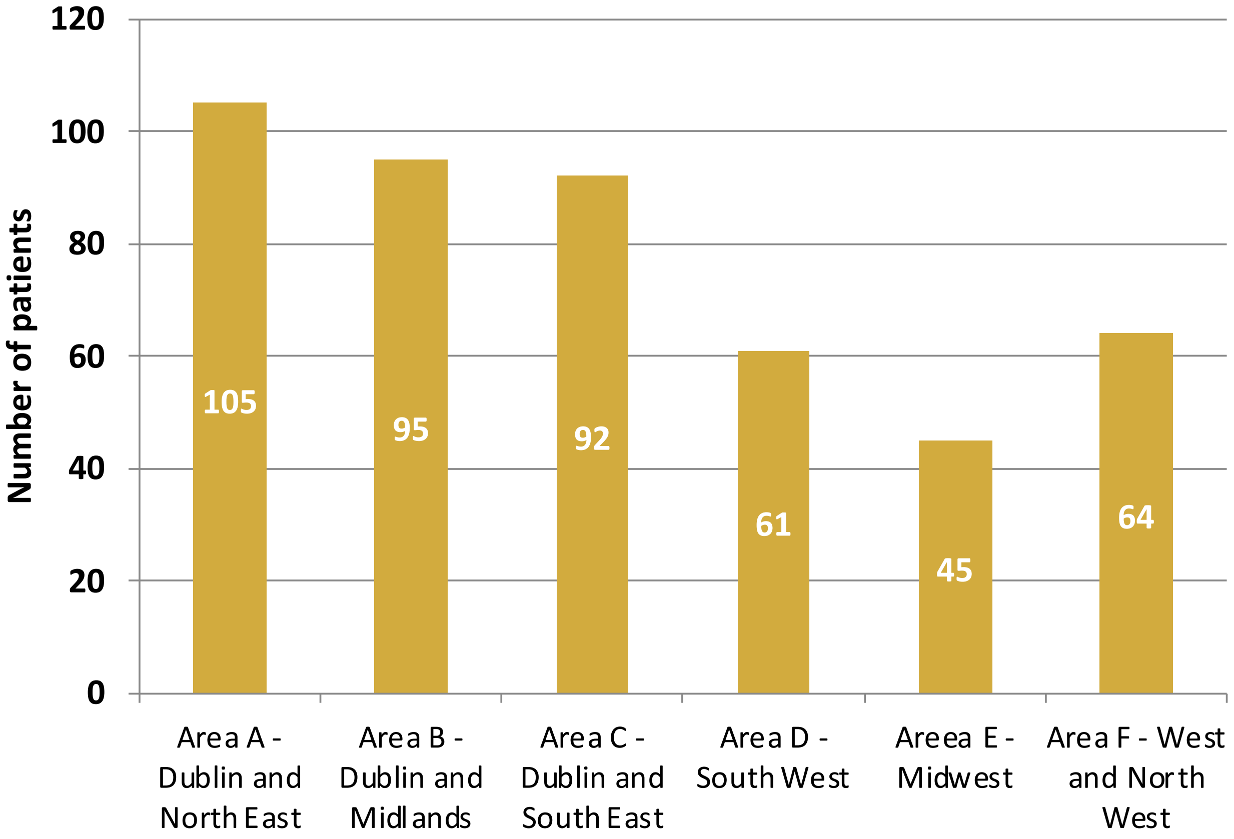


Figure 2: Cardiac arrest recognition at time of ambulance dispatch (Utstein, n=460)

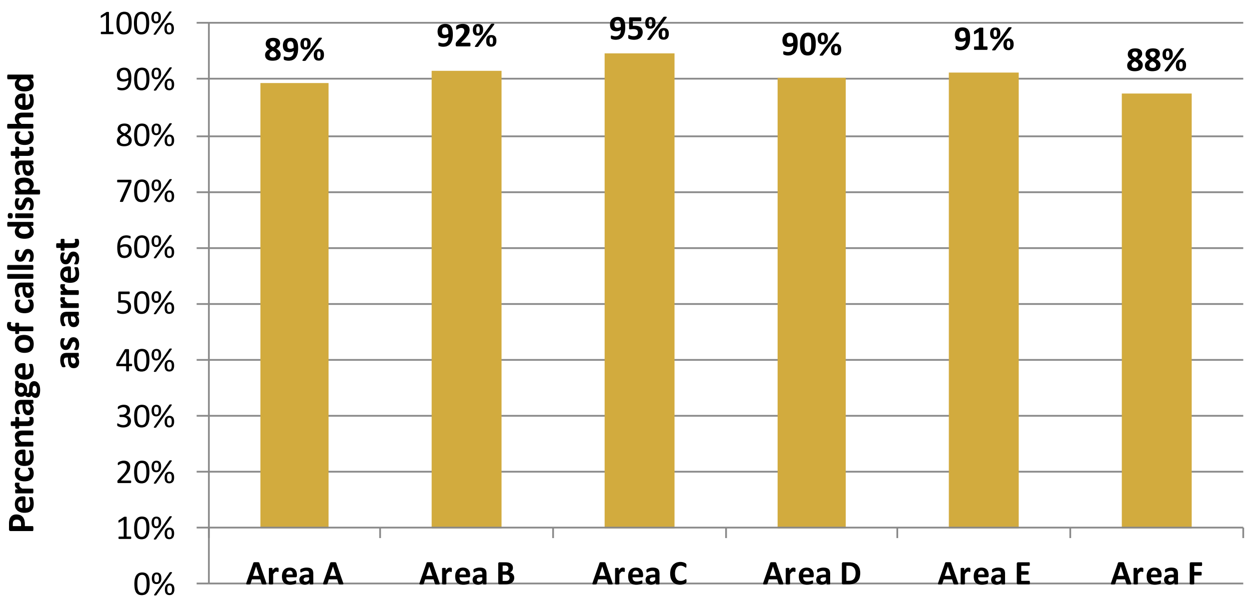
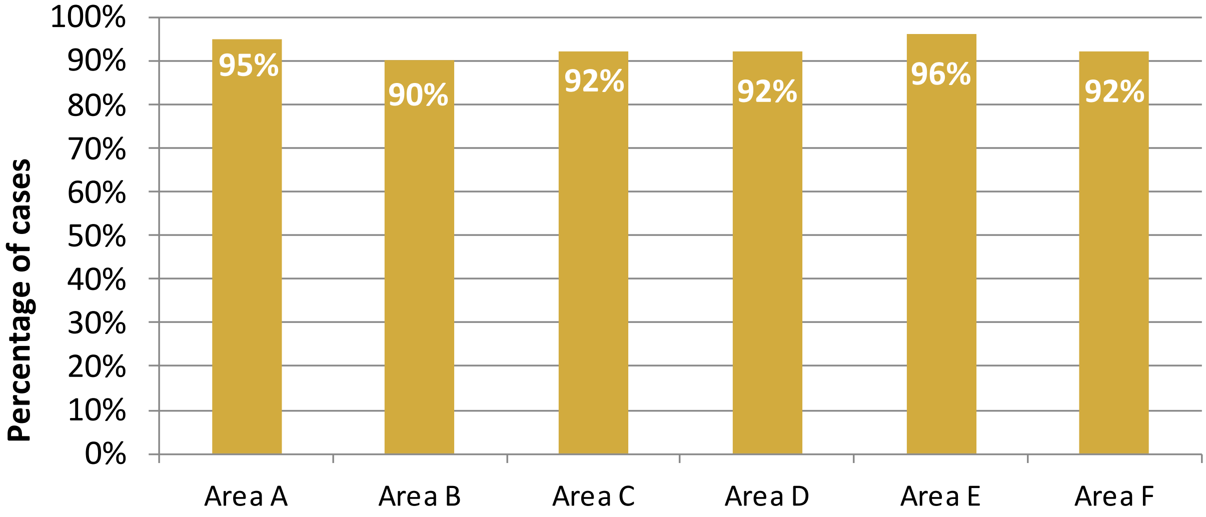


Figure 3: Percentage of Utstein cases with bystander CPR by region



Out-of-Hospital Cardiac Arrest Register

OHCAR Ireland

At the heart of evidence