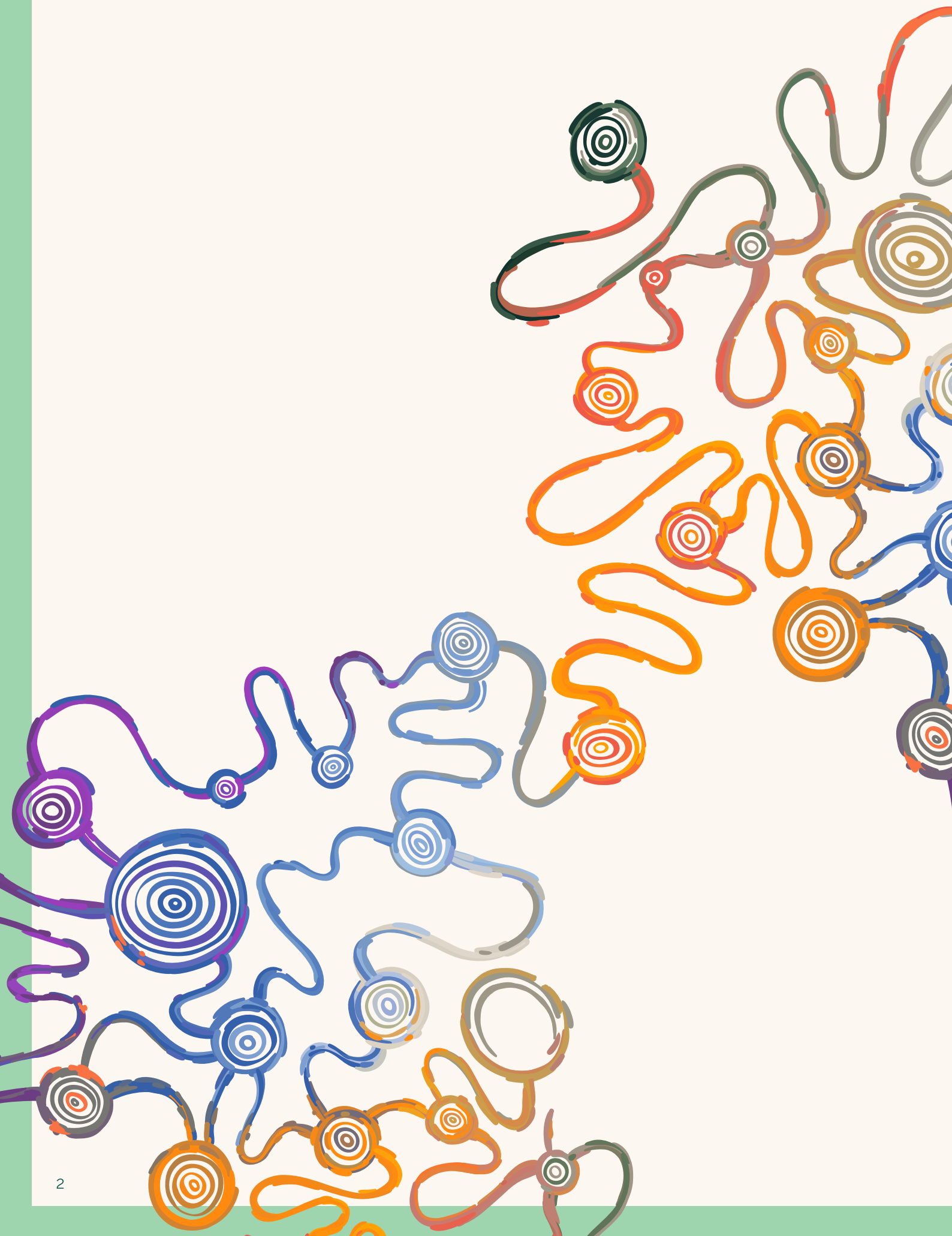


OUT-OF-HOSPITAL CARDIAC ARREST REPORT

2024







ACKNOWLEDGEMENT OF COUNTRY

St John Western Australia acknowledges the First Nations peoples of the many Traditional lands and language groups across Western Australia as the Traditional Custodians of the Country we live and work on. We pay our respects to their Ancestors and Elders, past and present.

St John WA is committed to honouring the unique cultural and spiritual relationships to the land, sea and waterways and the rich continuing contribution Aboriginal and Torres Strait Islander peoples make to our society.

SURVIVOR STORIES

SUDDEN OUT-OF-HOSPITAL CARDIAC ARREST IS A LEADING CAUSE OF DEATH IN AUSTRALIA, WITH ONLY ONE IN 10 PATIENTS SURVIVING.



THE ART OF SAVING A LIFE

Gavin Mippy is lucky to be alive, and he knows it.

The 50-year-old Pilbara man suffered a sudden cardiac arrest while playing football in July, 2024.

Watching from the sidelines was Gavin's wife Cody, who is a registered nurse.

She saw her partner collapse and his team mates began first aid, with one of them giving Cardio-Pulmonary Resuscitation (CPR) while another got a nearby defibrillator, which delivered a shock.

Further rounds of chest compressions led to Gavin regaining consciousness.

"We can't thank any of them enough," Cody said. "[Gavin] had the right team lined up."

Like many who experience a cardiac arrest, Gavin said he had felt no symptoms, even though he had experienced a similar medical incident 11 years earlier.

"This could happen to anyone, any time, anywhere, anyplace," he said. "I want to try to get it out to the community – get trained up on this equipment."

"It's all about giving people a second chance at life."

As a tribute to those who helped save his life, Gavin painted a picture of his chain of survival.



Scan the QR code to read his story.



SINKING FEELING

Allan Duncan was swimming laps at his local pool when he realised he was having a heart attack, having had one before and being first aid qualified.

“My training said ‘something’s not right, get out’, so I did,” Allan said.

Allan alerted the lifeguards at Swan Active Ballajura to call Triple Zero (000), and St John WA paramedics Gareth and Tia arrived in eight minutes.

But Allan’s health deteriorated in the back of the ambulance, and he soon went into cardiac arrest.

“We managed to give a couple of shocks as well as some medication,” Tia said.

“We’ve given him some oxygen and compressions and got him back. It was a full resuscitation.”

Allan wants everyone to learn first aid after it saved his life twice.

“I was dead,” he said. “Tia saved my life. It’s as simple as that.

“I found out just how much work she put in to bringing me back. She didn’t let go.”

Allan has made a full recovery and is back cycling, swimming, and playing with his granddaughter.



Scan the QR code to read Allan’s reunion with Tia.



INSPIRING WORK

A Mount Magnet legend, known as Bull, has been a regular fixture around the Mid West regional town doing IGA supermarket deliveries when he suffered a sudden cardiac arrest at the start of the year.

One of SJWA’s local Emergency Medical Technicians (EMT) Kristine was packing up her car with shopping on New Year’s Eve when an IGA worker ran out to get her help after Bull fell down unconscious and unresponsive.

Bull had no pulse and was not breathing, so Kristine immediately began CPR, while local bystanders called Triple Zero (000) to request more help.

Community Paramedic Alan and the team – EMTs Emma and Nicole – arrived a short time later and worked for 12 minutes on Bull, until his pulse returned

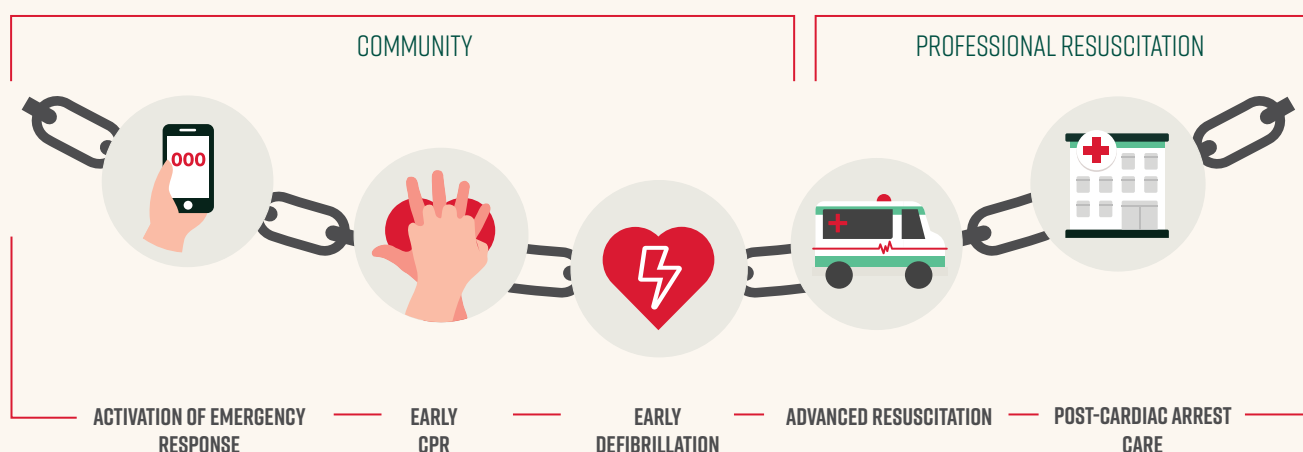
Thanks to the quick actions of the St John team, Bull was able to return to the job three weeks later.

Country Women’s Association (CWA) Kirkalocka has since funded an AED at the IGA and it has been registered on the State Defibrillator Network to help others increase their chance of survival, with another two 24/7 AEDs being installed around town.

“We’re so proud of St John WA’s Mount Magnet team and grateful to the CWA Kirkalocka for helping build a strong and more resilient response to sudden cardiac arrest in the Mid West,” said SJWA Community Response Manager Caitlyn Pavey-Smith

ABOUT ST JOHN WA AND OUR RESPONSE TO CARDIAC ARREST

SJWA provides ambulance services across a vast land mass, about 2.5 million km² in area, the largest area in the world covered by a single jurisdictional ambulance service. Western Australia (WA) has a population of 2.96 million, the majority of whom reside within the Perth metropolitan and south-west areas of the state.⁽¹⁾



SJWA also provides first aid training and AED services to communities across the state to help cardiac arrest patients in the critical minutes before ambulance arrival in the event of sudden out-of-hospital cardiac arrest (OHCA). Research has shown that a patient's OHCA survivability decreases by about 10 per cent with every minute that passes without lifesaving CPR and delivery of an AED shock⁽²⁾.

The Chain of Survival is an internationally accepted series of steps that bystanders and community members at the scene of a cardiac arrest, along with professional Emergency Medical Services (EMS) can take to maximise survival from OHCA. The first three steps – activating an emergency response via a call to Triple Zero (000), initiating CPR, and providing defibrillation

with a community AED – can be performed by bystanders prior to ambulance arrival and are associated with the largest benefit for survival⁽³⁾.

SJWA, like other jurisdictional ambulance services, attempt to optimise the Chain of Survival to give OHCA patients the best possible chance of survival. Upon recognition of cardiac arrest on a Triple Zero (000) call, SJWA Emergency Medical Dispatchers (EMDs) will provide the caller with instructions in performing CPR and using a defibrillator if one is available. To strengthen WA's response to OHCA events, members of the community may also be alerted via SJWA's Community First Responder program.



COMMUNITY FIRST RESPONDER PROGRAM

SJWA operates a Community First Responder (CFR) program with two key pillars that empower community members to act as spontaneous first responders during an OHCA. The goal is for responders to provide CPR and, where available, use a community AED before an ambulance arrives.

A statewide network

The State Defibrillator Network encourages AED owners to register their devices with SJWA. Once registered, these individuals, businesses, and/or organisations may be contacted in the event of OHCA nearby, to bring their AED to the scene and assist with lifesaving efforts.

In addition, AEDs stored in external locked cabinets can be accessed by bystanders via a code provided by SJWA's State Control Centre (SCC) when they call Triple Zero (000).

Activation of a registered AED increases the chances of defibrillation being administered in the critical first minutes following an OHCA.

SJWA strongly advocates for the widespread installation and ownership of AEDs, investing in this program for over a decade to improve survival rates following OHCA.

Enabled by technology

The First Responder App invites health professionals and members of the public with a First Aid certification to make themselves available to be notified when an OHCA occurs within 500 metres of their location. This means bystanders can

offer crucial care, such as CPR, and relay vital information to the SCC while the ambulance crew is enroute.

The app also provides users with access to nearby AED locations, further enhancing the chances of timely defibrillation through the State Defibrillator Network.

AMBULANCE RESPONSE

Triple Zero (000) calls for cardiac arrest generate a multiple-vehicle response, typically comprising of two ambulances, each with two clinicians. Where possible a Clinical Lead will be tasked in metropolitan areas to provide overview, leadership and additional decision-making support. An operational manager may be deployed as an alternative. These responders also carry mechanical CPR devices to be used if transport to an Emergency Department (ED) is undertaken.

In larger regional centres where the organisation is funded to provide a career paramedic response, a multiple-vehicle response of two ambulances will routinely be dispatched to cases of cardiac arrest. In other rural areas, cases may be attended by volunteer Emergency Medical Technician or Emergency Medical Assistant crews, with a Community Paramedic deployed to provide paramedic assistance where practical.

SJWA clinicians provide cardiac arrest care in accordance with the Australian and New Zealand Committee on Resuscitation (ANZCOR) Basic Life Support (BLS) and Advanced Life Support (ALS) algorithms⁽⁴⁾ and are trained in a team approach to high-performance CPR.



See the Chain of Survival
and CFR program in action.



Register your AED or sign up as a CFR
– download the First Responder app

2024 OHCA KEY STATISTICS

1240

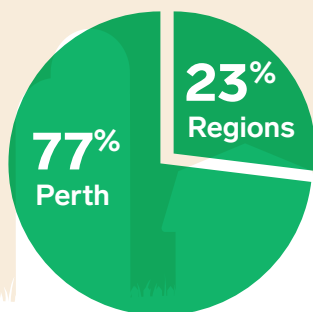
patients treated by St John WA for OHCA in 2024 (3.4 per day)

1193 were adults 47 were children
151 already being treated by ambulance crew (EMS-witnessed)



93%

of OHCA recognised on Triple Zero (000) call

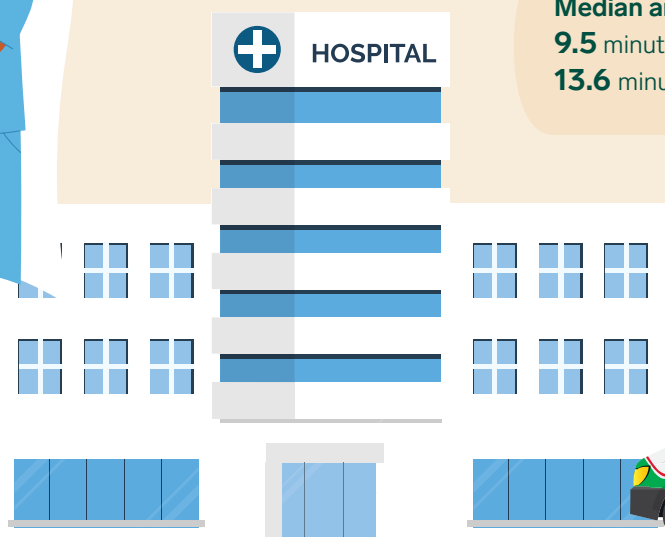


70% of cardiac arrests occur in private residences
21% occur in public places
9% other locations



133

people survived



Median ambulance response times:
9.5 minutes in Perth metropolitan area
13.6 minutes in regions



23% of patients had a pulse on arrival at hospital

11% survived

36% of patients in the Utstein comparator group survived*

91% of survivors discharged from hospital with a good neurological outcome

Notes: All data for cases where SJWA attempted resuscitation.

Data for type of location, recognition, bystander CPR, AED use, community response and response times exclude EMS-witnessed arrests.

Survival refers to 30-day survival.

81% of patients received bystander CPR

9% of patients survived when they received bystander CPR

6% survived with no bystander CPR

52,996

registered Community First Responders on St John First Responder app



66 patients had a shock from a community AED prior to ambulance arrival

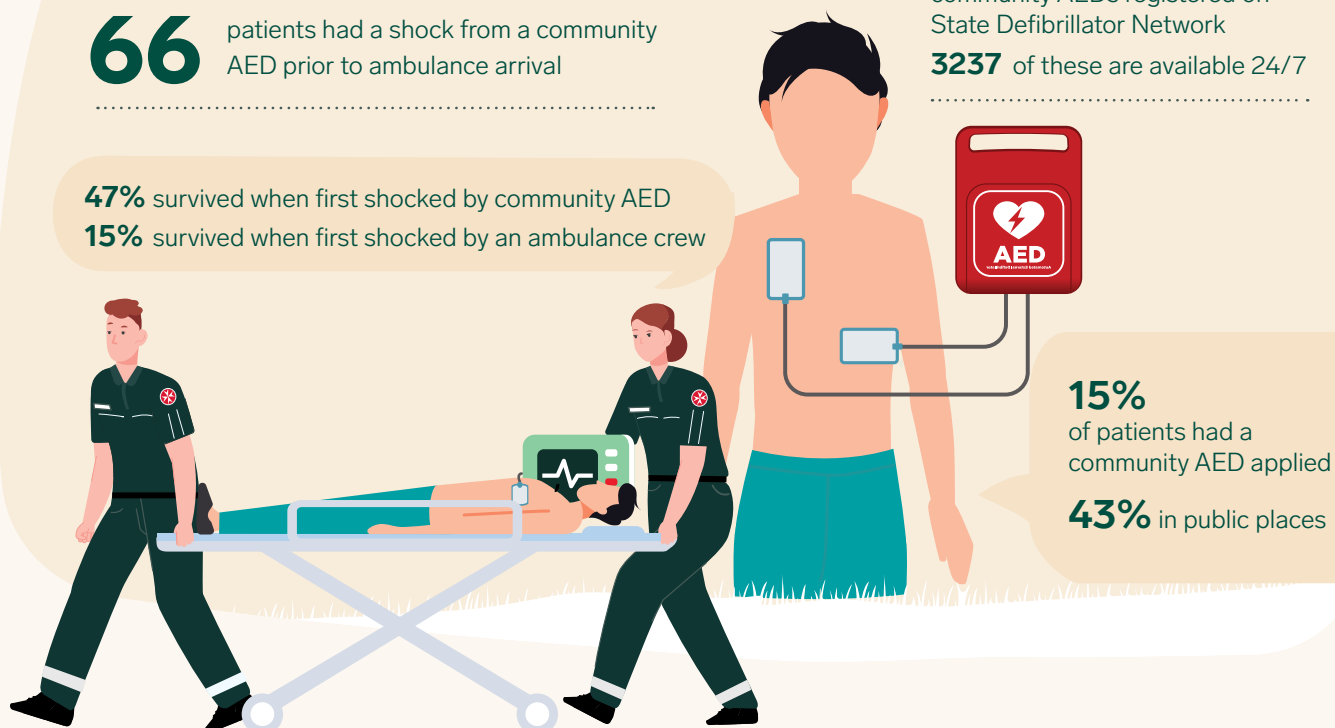
47% survived when first shocked by community AED

15% survived when first shocked by an ambulance crew

11,282

community AEDs registered on State Defibrillator Network

3237 of these are available 24/7



15% of patients had a community AED applied

43% in public places

Registration data for First Responder app and State Defibrillator Network as at 31 December 2024.

Utstein Comparator Group refers to patients who experience OHCA witnessed by a bystander, present in a shockable rhythm, and EMS attempted resuscitation. See page 29 or more information on the Utstein comparator group.

WORK WITH COMMUNITY TO SUPPORT RESPONSE TO OHCA



St John Ambulance Australia and Western Australia are calling for Automated External Defibrillators (AEDs) to become as common place as fire extinguishers in communities, workplaces and homes.

Almost all Australian adults believe AEDs are important to have in public locations, according to a survey commissioned by St John Ambulance Australia.⁽⁵⁾

St John collectively continues to actively advocate with governments, workplaces and communities, to improve public access defibrillators, but there is still a long way to go.

St John WA's Community First Responder program enables first responders to take registered AEDs to a cardiac arrest and continues to grow, with more than 11,000 defibrillators registered and almost 53,000 first responders across WA.

The support of corporate partners and generous donors makes possible investment in publicly accessible AEDs, while local councils and community organisations collaborate with St John to establish the legacy of those community defibrillators and where need is being best met. Strengthening the Chain of Survival in the community through grassroots support – including small businesses – is vital to saving lives. It takes a system to save a life.

STEPPING FORWARD – VICTORIA PARK

Stepping forward and becoming leaders in responding to sudden cardiac arrest was the key message small businesses in Victoria Park took away at an event in September 2024.

Ahead of Restart a Heart Day (October 16), St John WA Resuscitation Improvement Specialist Jason Belcher spoke on the importance of Community First Responders and AEDs in shifting the dial on 1 in 10 survivors.

Supported by the Town of Victoria Park, Jason presented on SJWA's First Responder App where first aid-qualified responders can register their details to assist in a nearby emergency before an ambulance arrives.

NO HARM – MANNING MEN'S SHED

Thanks to funding from Member for South Perth Geoff Baker MLA, the Manning Men's Shed received a St John WA Defibrillator Demonstration during the month of October – or Shocktober, as SJWA calls it - which is dedicated to promoting the importance of AED use in the event of sudden cardiac arrest.

Manning Men's Shed president Graham Rennie had a cardiac scare on a warm day in May when he repeatedly fainted, much to the shock of the men around him.

"One of the guys went and grabbed a defib but they were not sure whether to use it, which they were talking through to Triple Zero (000)," Mr Rennie said.

Mr Belcher said AEDs were designed to not deliver a shock to anyone with a regular pulse, so there was no harm in attaching the pads of an AED to the chest of a suspected cardiac arrest patient.

"It simply will not deliver a shock if it's not needed," he said.

STRENGTHENING SURVIVAL – KPMG PERTH

Paramedics Jason Belcher and Matt Didcoe delivered key messages about the cardiac arrest Chain of Survival and the vital importance of community response for the first time at KPMG.

Applying CPR and using community AEDs can improve the chance of a Western Australian surviving cardiac arrest three-fold and "it takes a system to save a life", KPMG's Perth workforce learned.

THANK YOU

Special thanks to KPMG Senior Consultant Emily Pereira and Director Aresh Anwar for inviting St John WA to speak at Education Session: Strengthening Survival in the Community, and National Sector Leader Evan Rawstron for supporting the important initiative.

Thanks also to the continued support of South Perth Geoff Baker MLA and corporate donors such as CBH, which has donated 245 AEDs to the network across the grain growing region through its Harvest Mass Management Scheme, and new partners Beach Energy, which came on board in 2023, regional defibrillators per head of population is a leading example of SJWA's statewide aim for improving community cardiac arrest response.

INTRODUCTION

St John WA presents its out-of-hospital cardiac arrest (OHCA) report for the calendar year 2024 which is made possible by the close collaboration and partnership with the researchers at the Prehospital, Resuscitation and Emergency Care Research Unit (PRECRU) based at Curtin University, Perth. The Western Australian Cardiac Arrest Database is managed and maintained at PRECRU and continues to inform and influence practice.

Every cardiac arrest survivor story starts long before an ambulance arrives. It begins when someone recognises an emergency, calls Triple Zero (000), starts CPR, and uses a community defibrillator if possible. In Western Australia, that first chapter is strong – with a study published during 2024 by the Australasian Resuscitation Outcomes Consortium (Aus-ROC) showing our state leads Australia and New Zealand in bystander CPR rates⁽⁶⁾. In 2024, more than four in five patients where St John WA attempted resuscitation received bystander CPR from a member of the public, and 15 per cent had a community AED applied before the ambulance arrived. These consistently high levels of early action are critical, with international research demonstrating that bystander CPR and defibrillation are among the strongest determinants of survival from out-of-hospital cardiac arrest. We thank every member of the community who has stepped forward to help somebody in need.

We particularly thank members of our rural communities who demonstrate exceptional community resilience, with a study published in 2024 by St John WA paramedic (and recently graduated PhD) Dr Ashlea Smith showing rates of CPR and AED use are even higher in regional areas of Western Australia⁽⁷⁾.

This willingness to act, along with St John WA's integrated systems of care such as the State Defibrillator Network, are what makes WA's Chain of Survival so strong. We thank the businesses, community organisations and individuals who register their AED so that it is visible and can be deployed to a cardiac arrest emergency by our Emergency Medical Dispatchers during the Triple Zero (000) call. We also thank our dedicated Community First Responder team for their tireless work in maintaining readiness of all the registered AEDs so they can be used to potentially save a life.

None of these outcomes would be possible without the work of our Emergency Medical Dispatchers who not only coordinate an ambulance response, but guide callers through CPR, direct them to a nearby registered AED or activate a community first responder to assist at the scene through the State Defibrillator Network or First Responder App. Recognition of cardiac arrest on the emergency call is vital for this, and we are pleased to once again report world class results with 93 per cent of cardiac arrests recognised in 2024.

Our ambulance crews – paramedics, volunteers and other frontline clinicians – continue to deliver high-performance CPR, advanced life support and excellent decision making to build on the community foundations and see patients survive their cardiac arrest. In late 2024, St John WA introduced a new Clinical Lead position as part of transformation of the emergency stream delivering ambulance services to Western Australia. These senior clinicians are driving a culture of excellence, providing clinical leadership, education and coaching to empower crews and continually improve care. While their work spans all areas of patient care, resuscitation is a major focus and their influence is already being felt in culture around resuscitation.

In 2024, 133 patients survived an out-of-hospital cardiac arrest in WA. A total of 36 per cent of patients in the Utstein comparator group – the international benchmark group – survived their cardiac arrest.

For the first time this year we are also reporting on the quality of survival in our annual report. In 2024, more than 90 per cent of patients discharged from hospital after a cardiac arrest had good brain function - consistent with previous WA research⁽⁸⁾. This is a very encouraging sign that patients are



not just surviving but the overwhelming majority are returning to their families and communities in good health.

Everyone at St John WA celebrates the patients who return home to their family and friends after a cardiac arrest. We also honour those who do not survive and extend our respect to their families and communities. We remain committed to continual improvement to see more Western Australians

survive – with this report being one element of how we measure and remain accountable to the community for our progress. We also remain committed to working with the WA community to strengthen the community foundations in cardiac arrest survival – it's by working to strengthen every link of the Chain of Survival that lives are saved.

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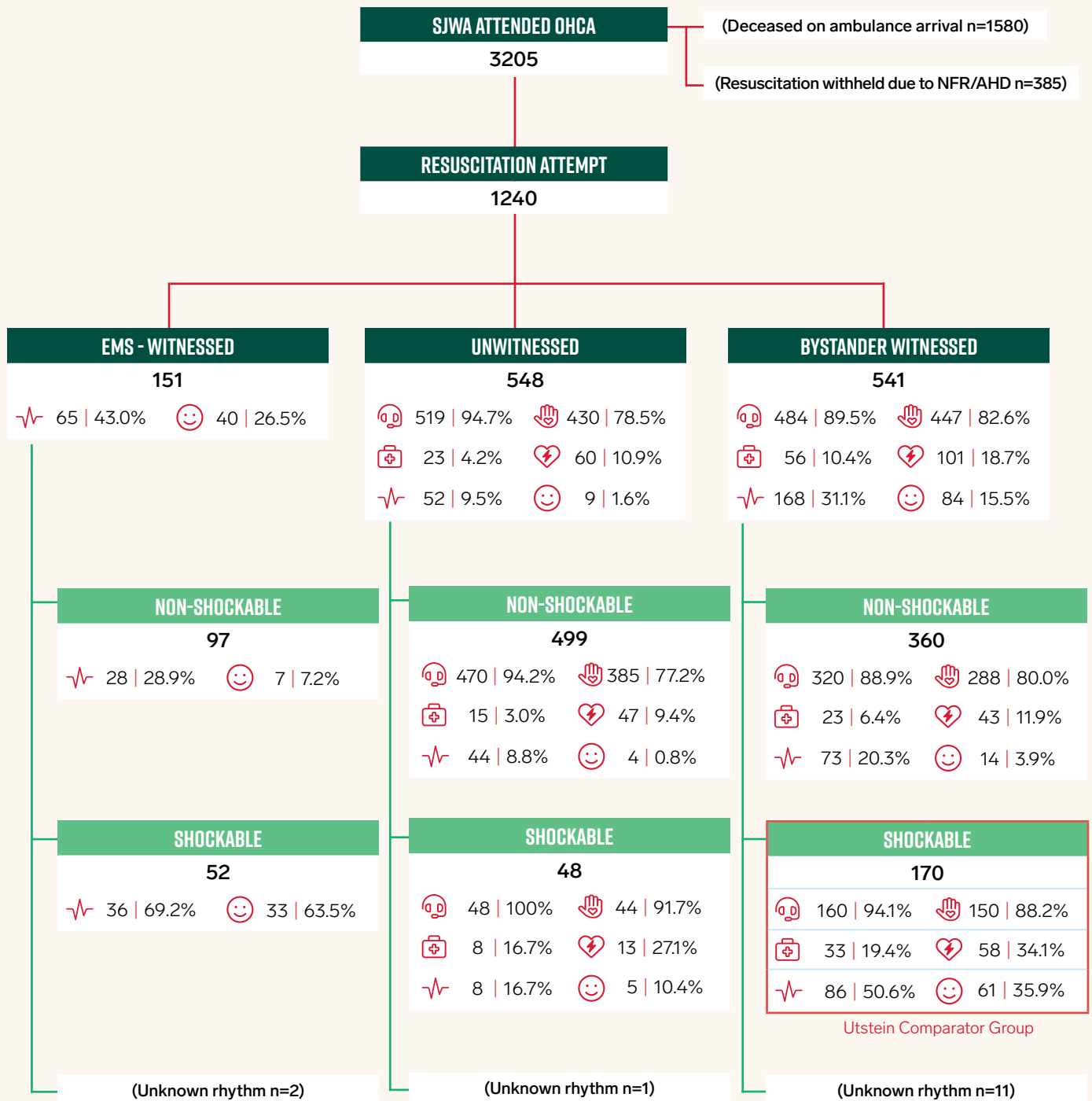
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SUMMARY AND BENCHMARKING

FIGURE I: BREAKDOWN OF ALL OHCA ATTENDED IN 2024



LEGEND:

RECOGNITION ON EMERGENCY CALL

COMMUNITY FIRST RESPONDER ACTIVATION

RETURN OF SPONTANEOUS CIRCULATION (ROSC) AT ED

BYSTANDER CPR

COMMUNITY AED APPLIED

SURVIVED TO 30 DAYS

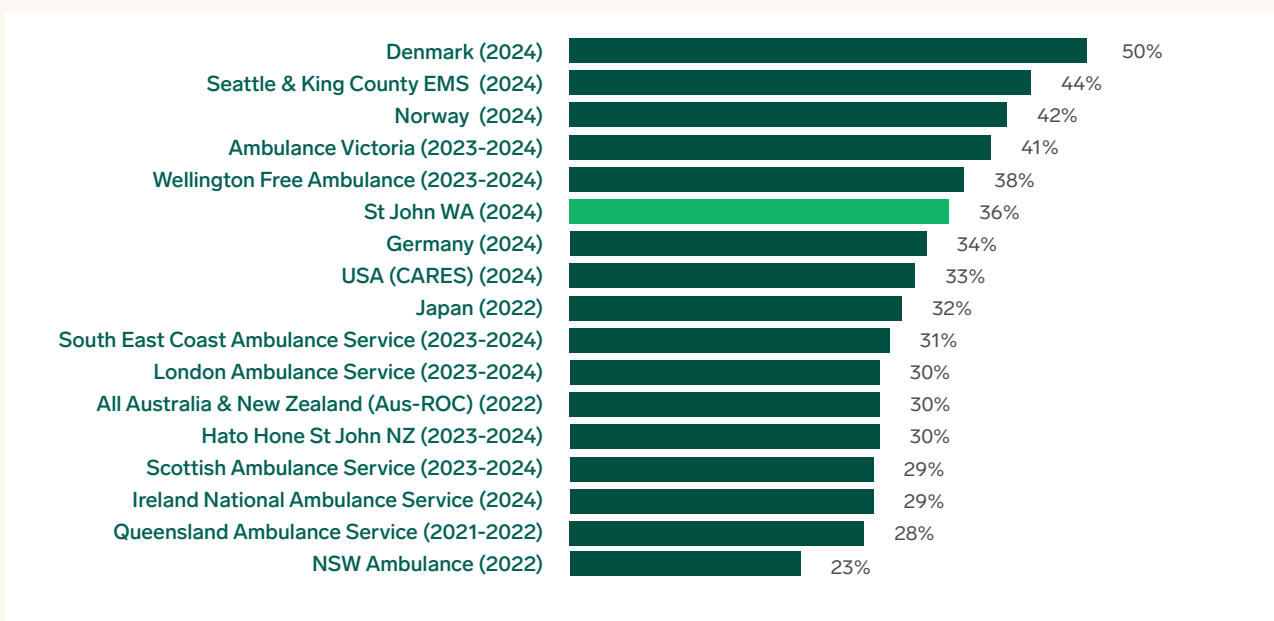
TABLE 1: KEY FIGURES FOR ALL-CAUSE EVENTS WHERE EMS ATTEMPTED RESUSCITATION

Year	Number of cases	Bystander CPR% ^(a)	Bystander AED use % (pads applied) ^(a)	Median metro response time (mins) ^(a)	Median rural response time (mins) ^(a)	% ROSC at ED	% 30-day survival	Utstein % ROSC at ED	Utstein % 30-day survival
2020	1088	79.6	13.8	9.1	13.1	20.8	11.6	44.3	35.7
2021	1116	81.6	15.8	9.4	12.4	20.6	10.5	47.7	33.5
2022	1182	81.5	14.5	9.6	15.0	19.7	10.8	43.0	33.0
2023	1271	81.9	15.6	9.2	12.1	21.8	11.2	47.7	39.6
2024	1240	81.1	14.8	9.5	13.6	23.0	10.7	50.6	35.9

^(a) Excludes EMS-witnessed arrests.

The Utstein Comparator group is an international standard used for benchmarking. It refers to survival among patients who experience OHCA witnessed by a bystander, present in a shockable rhythm, and present in a shockable rhythm, and received a resuscitation attempt. See page 29 for more information on the Utstein comparator group.

FIGURE 2: BENCHMARKING SURVIVAL RATES NATIONALLY AND INTERNATIONALLY (UTSTEIN COMPARATOR GROUP)



NOTES:

See references 9-24 (page 39) for original registry reports.

Seattle & King County EMS, Ambulance Victoria, CARES and Ireland National Ambulance Service report Survival to Hospital Discharge. Aus-ROC and German Resuscitation Register report a mixture of survival to hospital discharge and 30-day survival based on data contributed by participating ambulance services. All others report 30-day survival. The measures are considered equivalent⁽²⁵⁾.

Seattle & King County EMS and CARES exclude arrests with traumatic aetiology.

The Cardiac Arrest Registry to Enhance Survival (CARES) collects data from participating emergency medical services and hospitals covering 56% of the population of the United States.

Ireland National Ambulance Service reports on patients aged ≥17 years.

London Ambulance Service includes arrests of presumed cardiac aetiology only.

INCIDENCE AND CASE CHARACTERISTICS

SJWA attended 3205 OHCA cases in the calendar year 2024 (1 January – 31 December), a 2% increase on 2023 (n=3133). The majority of cases (n=3148) were classified as adults (16 years and above) compared to those aged under 16 years of age (n=57).

Of all OHCA cases, 68.1% were recorded as male and 31.9% as female by SJWA clinicians.

The crude incidence of OHCA decreased slightly from 2023 to 2024, from 108.7 to 108.1 per 100,000 population. In 2024 for adults, crude incidence was 132.0 per 100,000 population, and for children was 9.8 per 100,000. By comparison, in 2023 OHCA incidence was 133.5 per 100,000 population, and for children was 9.4 per 100,000.

In 2024, SJWA attempted resuscitation on 38.7% (n=1240) of OHCA patients.

TABLE 2: OVERVIEW OF OHCA CASES ATTENDED BY ST JOHN WA

	No. of Cases	% of all cases	Incidence rate ^(a)	No. of resuscitation attempted	% resuscitation attempted
Adult	3148	98.2%	132.0	1193	37.9%
Children	57	1.8%	9.8	47	82.5%
TOTAL	3205	100%	108.1	1240	38.7%

^(a)per 100,000 population

All ambulance-attended OHCA cases in WA are recorded in the SJWA OHCA registry maintained by PRECRU. Detail about the registry is included at page 32. The utility of the SJWA OHCA registry relies on completeness of data capture. Missing data are relatively rare for all core variables (see Table 3).

TABLE 3: MISSING DATA

Variable	No. of Cases
Sex	0
Age	1
Aetiology	0
Witness Status	0
Location Type	0
Response Time	3
Initial Arrest Rhythm	29
Bystander CPR	2
Bystander shock given	1
30-day survival	0
Neurological outcome	6

Number of records with missing data for select SJWA OHCA database variables in 2024 (from total of 3205 cases)

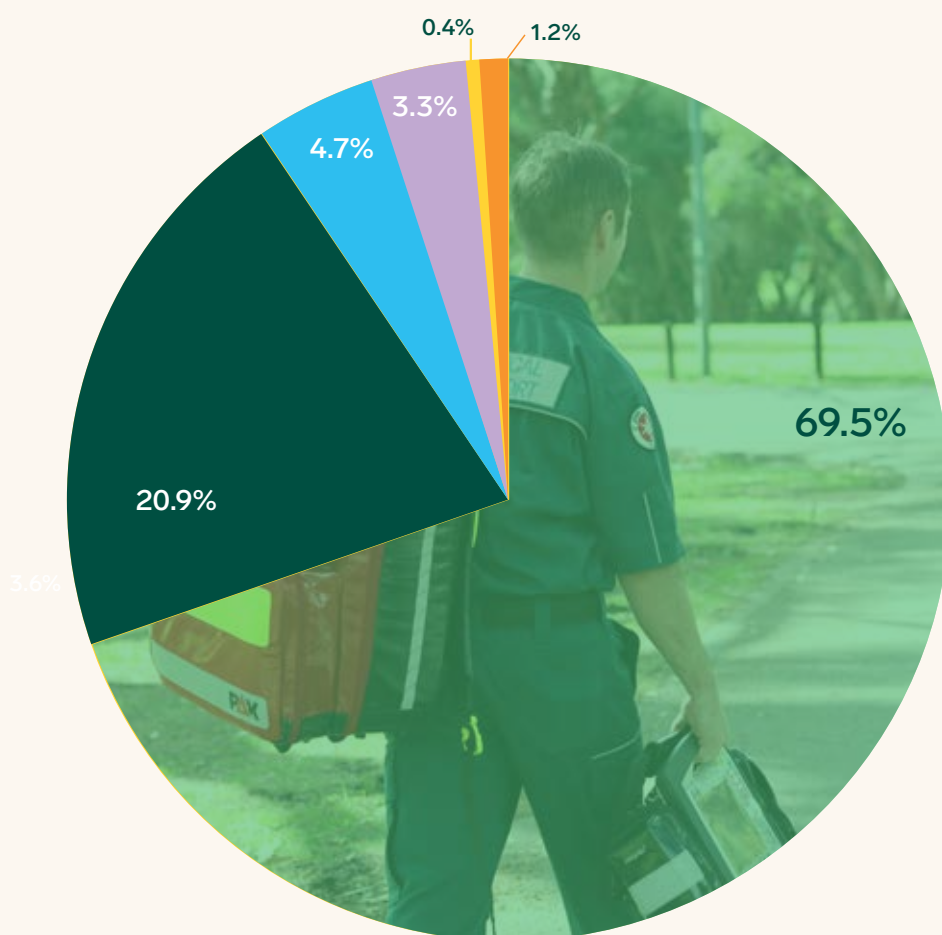
LOCATION OF ARREST

Similar to previous years, the majority of patients (69.5%) suffered a cardiac arrest at a private residential address, which is similarly observed in other systems.

If the cardiac arrest occurs in a public place, the likelihood of a bystander witnessing the collapse is greater and is associated with improved outcomes as the chain of survival is activated sooner. In 2024, 20.9% of patients suffered a cardiac arrest in a public place, compared to 23.3% in 2023.

These figures exclude cases where the cardiac arrest occurred whilst the patient was already in the care of SJWA ambulance personnel (EMS-witnessed arrests) as well as cases where resuscitation was not attempted.

FIGURE 3: LOCATION OF ARREST



Legend

 Private residence (757)	 Public place (228)
 Residential aged care (51)	 Medical centre (4)
 Other accommodation (e.g. hotel, caravan park) (36)	 Other (e.g. prison, farmland, mine site) (13)

Total = 1089

Criteria: Excludes EMS-witnessed arrests, and cases where resuscitation was not attempted.

PRECIPITATING CAUSES – ADULTS (16+ YRS)

Of adult OHCA cases in 2024 where SJWA attempted resuscitation, 75.9% had a presumed cardiac cause (n=905), with the next most common causes being trauma (8.0%, n=95), hanging (6.7%, n=80), drug overdose (4.3%, n=51), respiratory pathology (2.8%, n=33) and drowning (1.8%, n=22).

TABLE 4: AETIOLOGY – ADULTS

	2020	2021	2022	2023	2024	TOTAL
Presumed cardiac	811	851	898	945	905	4411
Respiratory	23	19	34	25	33	134
Drowning	21	17	16	22	22	98
Trauma	67	73	78	83	95	396
Hanging	68	74	56	85	80	363
Drug overdose	58	43	53	63	51	268
Electrocution	≤4	≤4	≤4	≤4	0	6
Malignancy/Palliative	8	10	11	6	7	42
TOTAL	1059	1089	1147	1230	1193	5718

Criteria: Excludes cases where resuscitation was not attempted.

PRECIPITATING CAUSES – CHILDREN (<16 YRS)

Among the 47 paediatric OHCA cases where SJWA attempted resuscitation in 2024, a presumed cardiac aetiology was recorded in 23 cases. For reporting on other aetiologies, results are now presented as a five-year aggregate (2020-2024) rather than by individual year. This approach was chosen because of the small number of paediatric cases, which can lead to considerable year-to-year variation and make annual figures difficult to interpret. It also aligns with best practice from the Australian Bureau of Statistics for data with very small cell counts⁽²⁶⁾.

TABLE 5: AETIOLOGY – CHILDREN

	2020 - 2024
Presumed cardiac	68
Respiratory	11
Drowning	20
Trauma	22
Drug overdose	≤4
Hanging	13
SUDI*	42
Malignancy/Palliative	≤4
TOTAL	179

Criteria: Excludes cases where resuscitation was not attempted.

*SUDI: Sudden Unexpected Death in Infancy.

PRESENTING RHYTHMS

Of the 1193 adult OHCA cases receiving a resuscitation attempt, 266 (22.3%) presented in a shockable rhythm – Ventricular Fibrillation (VF) or Ventricular Tachycardia (VT).

A total of 915 cases presented in non-shockable rhythms, the most common was asystole, which recorded 609 cases (51.0%). Pulseless electrical activity (PEA) featured in 185 cases (15.5%). Of note, 121 cases (10.1%) had an unspecified non-shockable rhythm, where a SJWA cardiac monitor-defibrillator in AED mode has performed a rhythm analysis with no shock advised. Data on presenting rhythm was missing for 12 cases.

FIGURE 4: FREQUENCY OF ADULT INITIAL ARREST RHYTHMS 2024

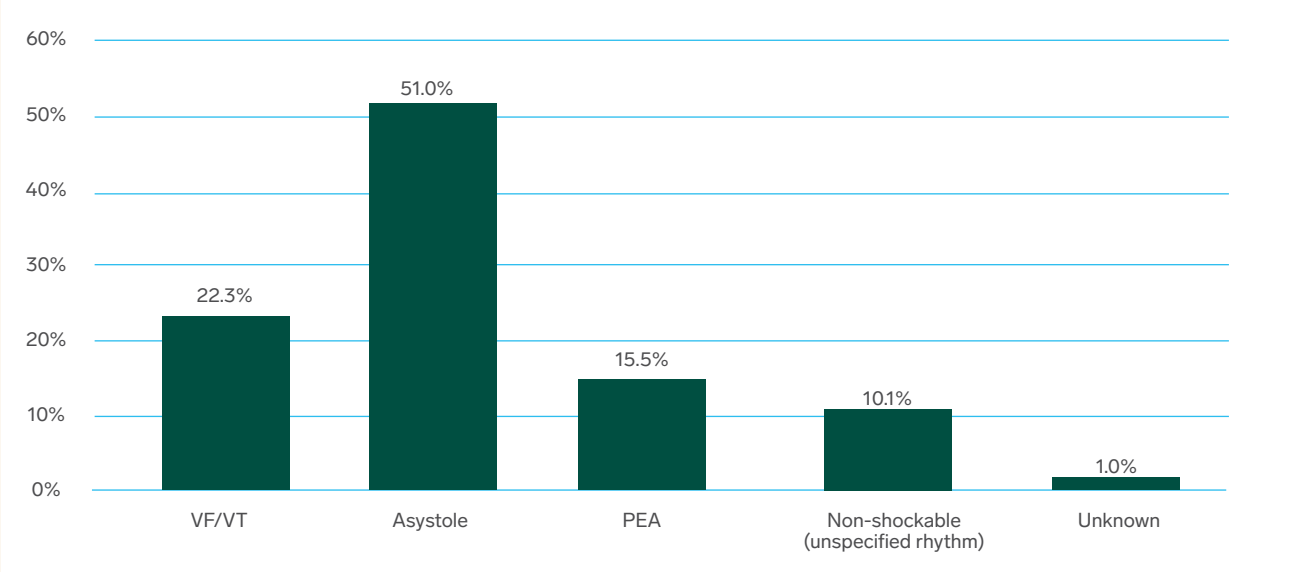


TABLE 6: INITIAL ARREST RHYTHM FOR ADULTS 2020 - 2024

Rhythm	2020	2021	2022	2023	2024	TOTAL
Shockable	281	258	285	289	266	1379
Non-shockable	760	819	855	931	915	4280
Unknown	18	12	7	10	12	59
TOTAL	1059	1089	1147	1230	1193	5718

Criteria: Excludes cases where resuscitation was not attempted, and cases where the patient was <16 years old.

RECOGNITION OF OHCA DURING TRIPLE ZERO (000) CALL



All incoming Triple Zero (000) emergency calls to St John WA are handled and triaged through the Medical Priority Dispatch System (MPDS)⁽²⁷⁾ by specialist EMDs. Calls to Triple Zero (000) handled by the State Control Centre (SCC) totalled 308,447 in 2024.

Calls for suspected cardiac arrest are treated as the highest priority response above other Priority 1 cases. These cases generate a multiple-asset response. Other community responses may also be activated to cardiac arrest cases if available through the Community First Responder program.

Recognition of cardiac arrest during the Triple Zero (000) call is vitally important to ensure that an appropriate ambulance dispatch is allocated to maximise a fast response. Early recognition of OHCA during the emergency call also allows the EMD to initiate telephone CPR instructions and activate Community First Responders or give directions to the nearest publicly accessible defibrillator if another bystander can retrieve it.

In 2024, 92.6% of cardiac arrest cases (excluding EMS-witnessed arrests) were recognised as such during the Triple Zero (000) call-taking process and dispatched accordingly.

TABLE 7: RECOGNITION OF OHCA ON A TRIPLE ZERO (000) CALL

	2022	2023	2024
OHCA recognised on emergency call	956	1057	1003
OHCA not recognised	81	62	80
% recognised	92.2%	94.5%	92.6%

Criteria: Excludes EMS-witnessed arrests, cases where resuscitation was not attempted, and cases where the ambulance response was activated by a method other than a Triple Zero (000) call (such as an ambulance being flagged down).

PRE-AMBULANCE COMMUNITY RESPONSE (BYSTANDER CPR AND AED ACTIVITY)

BYSTANDER CPR

The percentage of all OHCA patients in 2024 (regardless of resuscitation attempt by SJWA) who received bystander CPR prior to the arrival of SJWA was 69.5% among bystander-witnessed arrests, and 31.6% among unwitnessed arrests.

TABLE 8: BYSTANDER CPR WITNESSED/UNWITNESSED

	2020	2021	2022	2023	2024
Among bystander-witnessed arrests	66.8%	69.8%	71.0%	69.0%	69.5%
Among unwitnessed arrests	31.4%	27.4%	29.5%	32.1%	31.6%

Amongst cases where SJWA attempted resuscitation, the percentage of OHCA patients receiving bystander CPR prior to the arrival of SJWA was 80.5%.

TABLE 9: BYSTANDER CPR AMONG CASES WITH AN EMS RESUSCITATION ATTEMPT

	2020	2021	2022	2023	2024
CPR provided	747	785	850	920	877
No evidence of bystander CPR	191	177	193	203	212
TOTAL	938	962	1043	1123	1089
% where CPR provided	79.6%	81.6%	81.5%	81.9%	80.5%

Criteria: Excludes EMS-witnessed arrests, and cases where resuscitation was not attempted.

Patients who received bystander CPR were more than twice as likely to be 30-day survivors than those who did not.

TABLE 10: 30-DAY SURVIVAL IN RELATION TO BYSTANDER CPR

	% 30-day Survival
For all non-EMS witnessed arrests	
Bystander CPR	9.2%
No bystander CPR	5.7%
For bystander-witnessed arrests only	
Bystander CPR	16.3%
No bystander CPR	11.7%

Criteria: Excludes EMS-witnessed arrests, and cases where resuscitation was not attempted.

COMMUNITY AEDS

Community AEDs are strongly associated with improved chances of survival.⁽¹⁹⁾ AEDs were used by bystanders (i.e. AED pads applied) on 161 OHCA patients in 2024, with a defibrillation shock being delivered in 66 cases. Of those 66 patients, 34 (51.5%) had a pulse on arrival at ED and 31 (47.0%) survived to 30 days.

TABLE II: BYSTANDER USE OF AED AND NUMBER OF SURVIVORS (ALL OF WA)

	2020	2021	2022	2023	2024
AED pads applied by bystander	114	131	151	175	161
AED shock delivered by bystander	55	56	75	78	66
ROSC at ED after bystander AED shock	25	30	34	43	34
30-day survivors after bystander AED shock	22	26	29	38	31
% ROSC at ED after bystander AED shock	45.5%	53.6%	45.3%	55.1%	51.5%
% 30-day survival after bystander AED shock	40.0%	46.4%	38.7%	48.7%	47.0%

Criteria: Excludes EMS-witnessed arrests, and cases where resuscitation was not attempted.

For patients in an initial shockable rhythm, when the first defibrillation shock is delivered by a community AED as compared to an EMS (ambulance) response, the patient is 2.6 times more likely to be a 30-day survivor (5-year average).

TABLE I2: SURVIVAL STATISTICS BASED ON WHO DELIVERED FIRST DEFIBRILLATION SHOCK

	2020	2021	2022	2023	2024	TOTAL
% ROSC at ED						
Community AED	45.5%	53.6%	45.3%	55.1%	51.5%	50.3%
EMS	27.1%	28.3%	28.4%	31.4%	30.5%	29.1%
% 30-day survival						
Community AED	40.0%	46.4%	38.7%	48.7%	47.0%	44.2%
EMS	18.9%	15.5%	17.6%	18.8%	14.8%	17.2%

Criteria: Excludes EMS-witnessed arrests and cases where resuscitation was not attempted.



COMMUNITY RESPONSE BY LOCATION

Patients who had an OHCA in a public place were significantly more likely to receive bystander CPR and community AED application. Survival was also higher amongst OHCA in public places.

TABLE 13: COMMUNITY RESPONSE AND OUTCOMES BASED ON LOCATION OF ARREST

Location type	% Bystander witnessed	% Bystander CPR	% Community AED applied	% ROSC to ED	% Survived to 30 days
For all non-EMS witnessed arrests					
Private residence	43.2%	78.5%	3.7%	19.0%	6.1%
Public place	72.4%	83.8%	42.5%	27.6%	17.1%
Other	47.1%	88.5%	34.6%	12.5%	7.7%
Total	49.7%	80.5%	14.8%	20.2%	8.5%
For bystander-witnessed arrests only					
Private residence		82.0%	3.4%	32.4%	13.5%
Public place		83.0%	45.5%	30.9%	20.6%
Other		85.7%	30.6%	22.4%	12.2%
Total		82.6%	18.7%	31.1%	15.5%

COMMUNITY FIRST RESPONDER PROGRAM

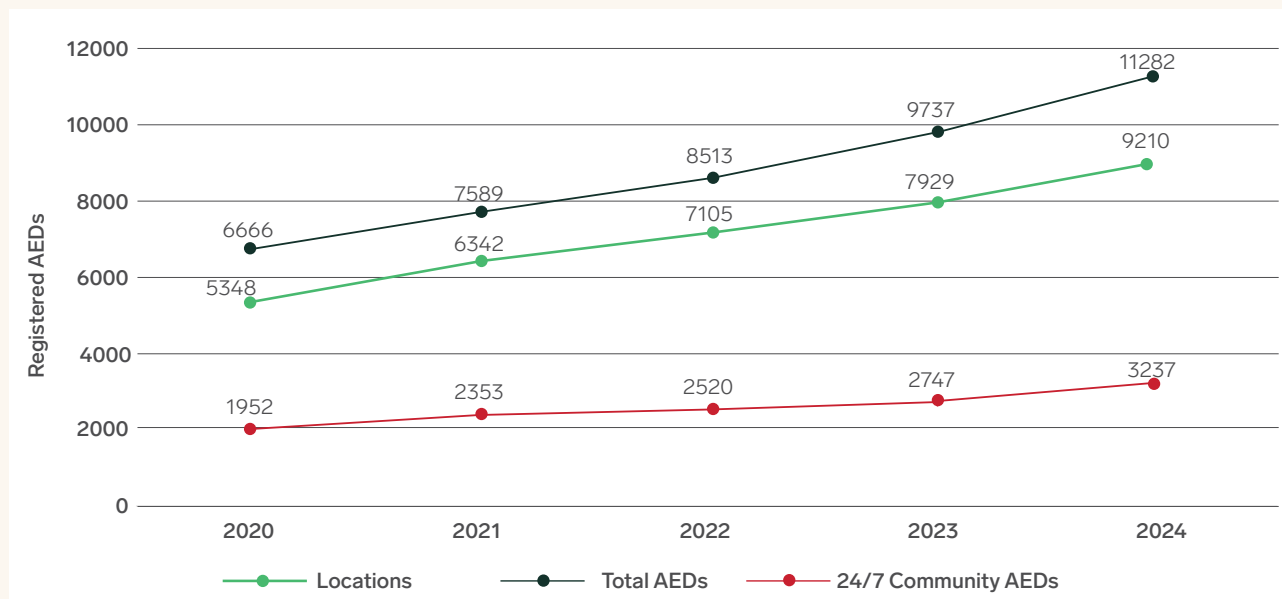
SJWA's Community First Responder (CFR) program, consisting of the State Defibrillator Network and First Responder App, enables members of the community to be spontaneous first responders and help in the vital first minutes in a sudden cardiac arrest. See Page 7 for a description of this program.

As of 31 December 2024, the State Defibrillator Network had 9210 locations across WA where a total of 11,282 AEDs are registered, making it one of the biggest networks of registered AEDs in the country. Of these, 3237 AEDs are available 24/7 to the community.

TABLE 14: GROWTH OF THE STATE DEFIBRILLATOR NETWORK

	2020	2021	2022	2023	2024	% Growth since 2020
Locations	5348	6342	7105	7929	9210	72.2%
Total AEDs	6666	7589	8513	9737	11282	69.2%
24/7 Community AEDs	1952	2353	2520	2747	3237	65.8%

FIGURE 5: GROWTH OF THE STATE DEFIBRILLATOR NETWORK



During 2024, there were 81 State Defibrillator Network activations to a patient in cardiac arrest (i.e. instances where AED pads were applied to a cardiac arrest patient, using an AED registered on the Network). Of those 81 activations, an AED shock was delivered in 37 cases. In relation to the total of 66 OHCA cases to receive a community AED shock, 56.1% of those cases received their shock from a State Defibrillator Network activation.

Out of 1089 non-EMS witnessed OHCA cases that had a resuscitation attempt, 30.9% of patients survived to 30 days where there was a defibrillator network activation, compared to 6.7% of patients where there was no activation.

TABLE 15: STATE DEFIBRILLATOR NETWORK ACTIVATIONS

	2022	2023	2024
Total Defibrillator Network activations	79	92	81
(% of all OHCA)	7.6%	8.4%	7.4%
Activations where AED shock delivered	39	49	37
Outcomes associated with Defibrillator Network activation			
% 30-day survival where activated	22.8%	27.2%	30.9%
% 30-day survival where not activated	7.9%	8.4%	6.7%

Criteria: Excludes EMS-witnessed arrests, and cases where resuscitation was not attempted.

Registered community first responders on St John WA's First Responder app grew to 52,996 by 31 December 2024, a 9.1% increase from 48,562 12 months prior.

SJWA RESPONSE TIMES

In cases where resuscitation was attempted, the median response time in 2024 in metropolitan Perth was 9.5 minutes, compared to 9.2 minutes in 2023. In regional and remote WA, the median response time in 2024 was 13.6 minutes, compared to 12.1 minutes in 2023.

TABLE 16: METROPOLITAN RESPONSE TIMES (IN MINUTES)

	2020	2021	2022	2023	2024
Median	9.1	9.4	9.6	9.2	9.5
10th centile	5.3	5.6	5.6	5.1	5.4
25th centile	6.9	7.2	7.4	6.8	7.2
75th centile	11.4	12.2	12.4	11.8	12.3
90th centile	14.3	16.0	16.7	15.3	15.5

Criteria: Excludes EMS-witnessed arrests and cases where resuscitation was not attempted.

TABLE 17: REGIONAL AND REMOTE RESPONSE TIMES (IN MINUTES)

	2020	2021	2022	2023	2024
Median	13.1	12.4	15.0	12.1	13.6
10th centile	6.3	6.3	6.8	6.3	6.7
25th centile	7.8	8.2	9.3	8.1	8.8
75th centile	19.0	18.1	23.2	20.1	20.8
90th centile	27.8	29.2	33.2	29.7	29.0

Criteria: Excludes EMS-witnessed arrests and cases where resuscitation was not attempted.



OUTCOMES

The total number of patients who survived their OHCA at 30 days in 2024 was 133 (128 adults and 5 children). This represents 10.7% of the 1240 OHCA patients who had resuscitation attempted. Arriving at ED with a pulse (ROSC at ED) is a prognostically favourable indicator and arguably a barometer of pre-hospital performance. As highlighted in Table 18, of the 1240 resuscitation attempted cases, 285 patients had ROSC at ED (23.0%).

Excluding EMS-witnessed cases, survival among resuscitation-attempted cases in 2024 was 20.2% for ROSC at ED, and 8.5% for 30-day survival.

TABLE 18: PERCENTAGE SURVIVAL (OF RESUSCITATION ATTEMPTED CASES)

	2020	2021	2022	2023	2024
% ROSC at ED	20.8	20.6	19.7	21.8	23.0
% 30 Day Survival	11.6	10.5	10.8	11.2	10.7

ADULT OUTCOMES ACCORDING TO INITIAL PRESENTING RHYTHM

Those OHCA patients who presented in shockable rhythms were most likely to have a favourable outcome. Of the adult patients who survived to 30-days, 74.2% were initially in a shockable rhythm (VF/VT) (n=95).

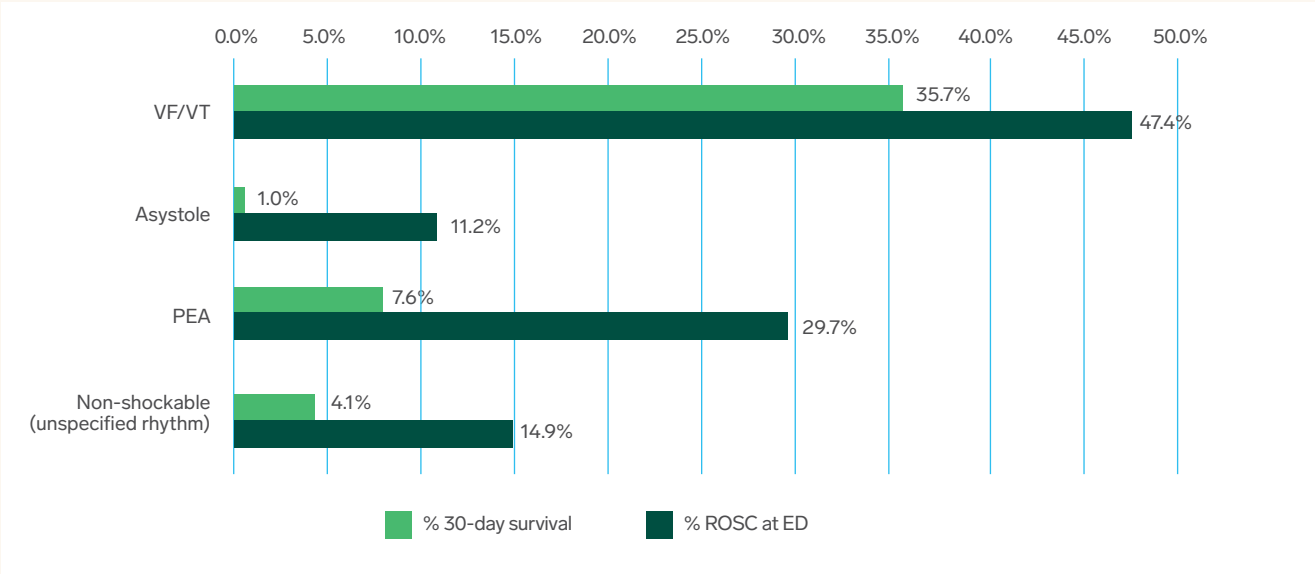
Asystole as a presenting rhythm is associated with poorer outcomes. A total of 68 adult patients in this group were recorded as ROSC at ED, with six survivors to 30 days. Other non-shockable rhythms had higher 30-day survival than asystole, however much lower than survival for shockable (VF/VT) patients. See Table 19 and Figure 6.

TABLE 19: NUMBER OF SURVIVORS BY INITIAL ARREST RHYTHM, FOR ADULTS

	Total number of patients	ROSC at ED	30-day survivors
VF/VT	266	126	95
Asystole	609	68	6
PEA	185	55	14
Non-shockable (unspecified rhythm)	121	18	5
Unknown	12	9	8
TOTAL	1193	276	128

Criteria: Excludes cases where resuscitation was not attempted, and cases where the patient was <16 years old."

FIGURE 6: SURVIVAL BY INITIAL ARREST RHYTHM FOR ADULTS



UTSTEIN COMPARATOR GROUP

The Utstein comparator group is defined as all-cause cardiac arrest in the community where the patient is witnessed to collapse by bystanders, presents with an initial shockable rhythm, and receives an EMS resuscitation attempt. It reflects a cohort who are regarded as most likely to have prognostically favourable survival outcomes. Importantly, the Utstein comparator group in having a defined set of patient characteristics facilitates more meaningful benchmarking against other systems. The Utstein comparator group is defined in the international Utstein reporting standard for OHCA as a measure of system efficacy.⁽²⁹⁾

TABLE 20: UTSTEIN COMPARATOR GROUP SURVIVAL BY YEAR

	2020	2021	2022	2023	2024
All of WA					
% ROSC at ED	44.6%	47.7%	43.0%	47.7%	50.6%
% 30 Day Survival	35.9%	33.5%	33.0%	39.6%	35.9%
Metropolitan Perth					
% ROSC at ED	49.0%	49.3%	45.6%	49.3%	53.8%
% 30 Day Survival	40.6%	34.3%	35.4%	36.6%	37.7%
Regional and Rural WA					
% ROSC at ED	29.3%	42.9%	33.3%	43.6%	40.0%
% 30 Day Survival	19.5%	31.0%	23.8%	47.3%	30.0%

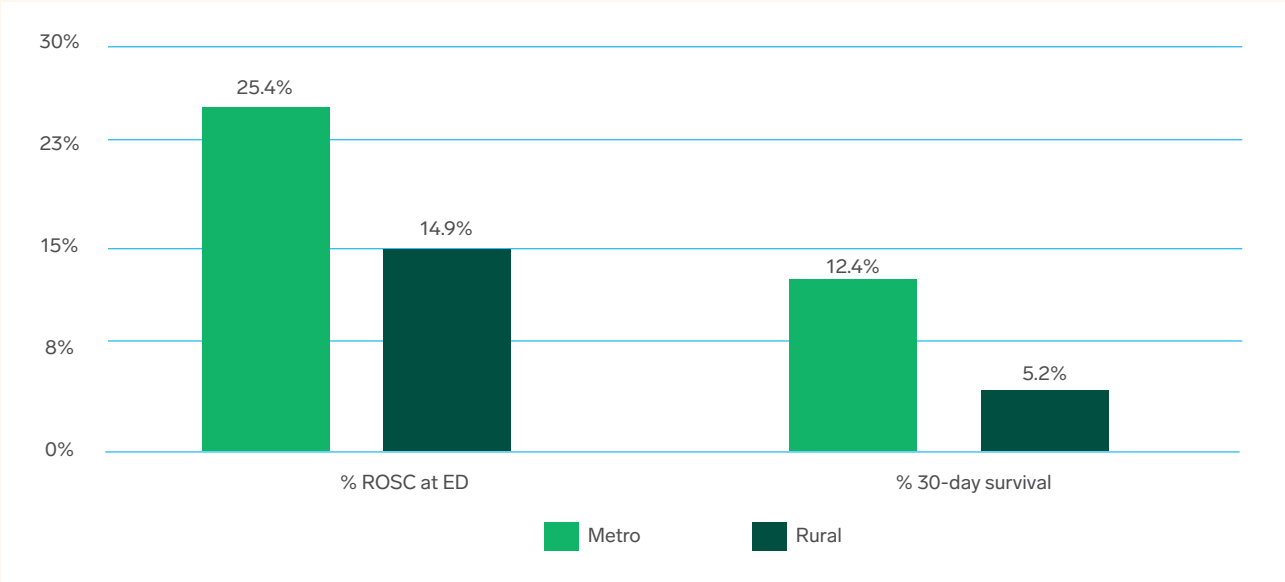
Resuscitation was attempted in 1240 patients, 541 (43.6%) of whom were witnessed (or heard) to collapse by a bystander. A shockable rhythm (VF/VT) was recorded in 170 (31.4%) of those cases. As shown in Figure 1, of the 170 patients who had a “bystander witnessed” arrest with an initial shockable rhythm, 150 (88.2%) received bystander CPR, 86 (50.6%) had ROSC at ED and 61 survived to 30 days (35.9%).

While the Utstein comparator group represented only 13.7% (170/1240) of patients with an EMS resuscitation attempt, they comprised 45.9% of all 30-day survivors (61/133).

OUTCOMES ACCORDING TO RURALITY

As of mid-2024, the Australian Bureau of Statistics recorded 2.97 million people living in WA, with 80.4% (2.38 million) in metropolitan Perth, and approximately 581,000 in regional WA. The majority of OHCA cases with attempted resuscitation occurred in metropolitan Perth (951/1240 = 76.7%).

FIGURE 7: COMPARATIVE OUTCOMES – METROPOLITAN PERTH VS REGIONAL WA

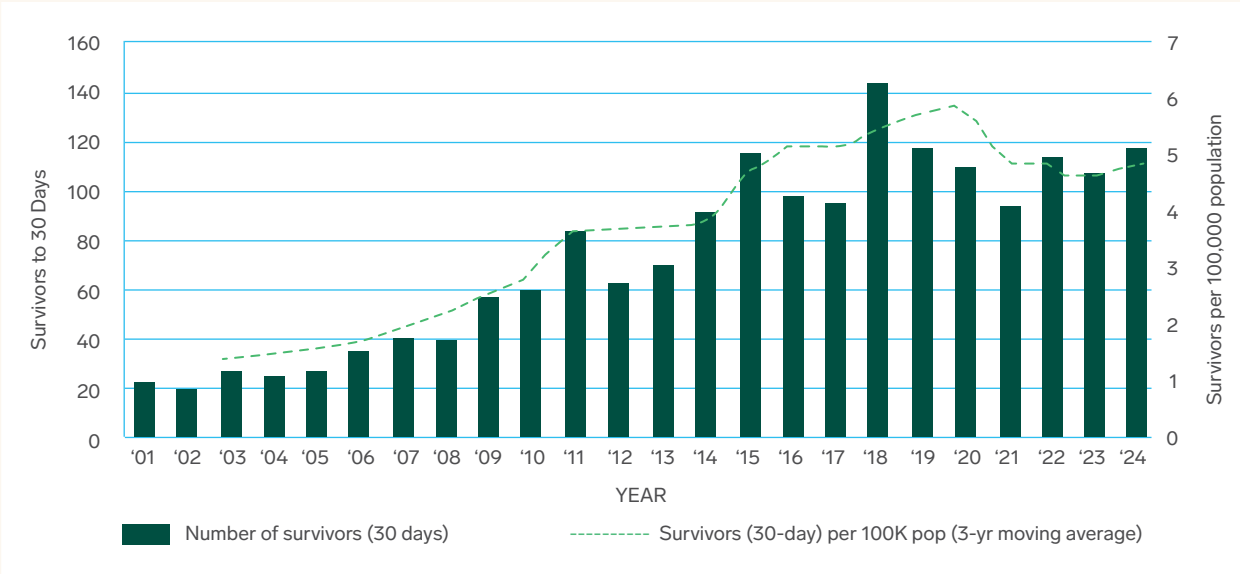


Criteria: Excludes cases where resuscitation was not attempted.

SURVIVAL PER 100,000 POPULATION

From 2022 to 2024 in the Perth metropolitan area, there was an average of 4.83 OHCA survivors (30-day survival) per 100,000 population per year. This metric of the number of survivors per 100,000 population provides a useful measure for comparison with other EMSs, due to its independence from any differences between EMSs (or over time) in the propensity for attempting versus withholding resuscitation.

FIGURE 8: NUMBER OF SURVIVORS, AND SURVIVAL PER 100K POPULATION (METRO PERTH)



OUTCOMES AT SCENE

TABLE 21: OUTCOMES AT SCENE

	Cases	%
Transported from scene with ROSC	294	23.7
Transported from scene without ROSC	280	22.6
Resuscitation efforts ceased at scene	666	53.7
TOTAL	1240	100

Criteria: Excludes cases where resuscitation was not attempted.

Among patients in 2024 where resuscitation was attempted, just under half were transported from the scene, either with or without ROSC. In most cases (53.7%), efforts were ceased on scene following a resuscitation attempt. St John WA's clinical practice is to prioritise high-quality resuscitation at the scene before considering transport.

OUTCOME BY DESTINATION HOSPITAL

All of WA's large tertiary teaching hospitals are located in Perth. Given that a large proportion of OHCA cases have a presumed cardiac cause (see Tables 4 and 5), when patients are transported to a hospital that has an on-site 24-hour primary percutaneous coronary intervention (PCI) service, the odds of 30-day survival are much increased. In 2024, a total of 159 OHCA patients in Perth who had ROSC at the time of scene departure were transported directly to a PCI capable hospital, of which 51.6% survived to 30 days. This contrasts with 29.3% 30-day survival in the 41 OHCA patients in Perth who had ROSC at the time of scene departure and were transported to a non-PCI capable hospital.

TABLE 22: 30-DAY SURVIVAL ACCORDING TO WHETHER THE PATIENT HAD DIRECT TRANSPORT TO A PCI HOSPITAL

	2020	2021	2022	2023	2024	Total
% Survival if PCI	36.8%	50.0%	58.6%	54.4%	51.6%	55.3%
% Survival if not PCI	39.5%	36.4%	39.2%	25.0%	29.3%	34.3%

Criteria: Includes adult OHCA cases of presumed cardiac aetiology in metropolitan Perth, where EMS resuscitation was attempted, and the patient had ROSC at the time of being transported from the scene to hospital.

NEUROLOGICAL OUTCOMES AFTER OHCA

A vast majority of OHCA survivors in Western Australia are discharged with a favourable neurological outcome, defined as Cerebral Performance Category (CPC) 1 or 2. CPC on discharge is collected by research nurses at PRECRU for all patients admitted to a hospital in the Perth metropolitan area.

Most OHCA patients in regional areas who are admitted to hospital will be transferred to a tertiary hospital in Perth. Discharge CPC is unavailable for occasional rural patients who were not admitted to a metropolitan hospital, and/or patients who were transferred to a private hospital where discharge data cannot routinely be made available.

TABLE 23: NEUROLOGICAL OUTCOMES ON HOSPITAL DISCHARGE

	2024
All OHCA survivors	
30-day survivors	133
Favourable neurological outcome	116
Unknown outcome	6
% Favourable neurological outcome	91.3%
Utstein comparator group	
30-day survivors	61
Favourable neurological outcome	57
Unknown outcome	3
% Favourable neurological outcome	98.3%

THE REGISTRY

In 1996, the SJWA out-of-hospital cardiac arrest database was established. It is maintained by the PRECRU team, at Curtin University in Perth, WA, and includes all ambulance-attended OHCA cases in Western Australia.

The data is compiled from:

1. Computer aided dispatch data;
2. Pre-hospital clinical care and management data through ambulance patient records (electronic records became available from around mid-2011); and
3. Date of death, as well as hospital outcome data.

In 2014, a more comprehensive ability to capture state-wide data commenced, with research nurses manually reviewing hospital medical records to determine survival to hospital discharge. In addition, survival to 30 days is confirmed by checking the WA State Registry of Births, Deaths and Marriages.⁽³⁰⁾

The database contains more than 52,000 OHCA records (as of 31 December 2024). De-identified data is shared with the Australasian Resuscitation Outcomes Consortium (AusROC) OHCA Epistry (Epidemiological Registry)⁽³¹⁾, which enables unique insights to be gained regarding OHCA patients across Australia and New Zealand.

All data is subject to ongoing quality improvement; with changes being incorporated and updated, including historical data, as needed.

DEFINITION OF OHCA

The database defines an OHCA patient as someone with no signs of circulation – specifically the absence of a carotid pulse, in combination with unconsciousness, and agonal or absent breathing; with the event occurring outside of hospital.

ELIGIBILITY

TABLE 24: SJWA OHCA DATABASE INCLUSION CRITERIA

SJWA OHCA database inclusion criteria (all of the following):	
1	All patients, of any age who suffer a cardiac arrest in an out-of-hospital setting. This includes residential aged care facilities.
2	Occurred in the state of Western Australia and were attended by SJWA.
3	a. All unconscious patients who are pulseless and not breathing (or have “agonal”, gasping breaths) on arrival of SJWA; OR b. All patients who become unconscious, pulseless and stop breathing (or have initial “agonal”, gasping breaths) in the presence of SJWA (i.e., EMS-witnessed arrests); OR c. Patients who have a pulse on arrival of SJWA having been successfully defibrillated by a bystander prior to the arrival of SJWA.

TABLE 25: SJWA OHCA DATABASE EXCLUSION CRITERIA

SJWA OHCA database exclusion criteria (any of the following):	
1	Any patient who suffers a cardiac arrest in a hospital facility where SJWA may be in attendance but are not the primary care providers.
2	Any patient who suffers a cardiac arrest during an inter-hospital transfer where SJWA may be providing transport but are not the primary care providers.
3	Any patient where the bystander or lay person suspected a cardiac arrest, but the patient is not in cardiac arrest on arrival of SJWA, and no defibrillation has occurred.
4	Patients with brief episodes of pulselessness who DO NOT receive CPR or defibrillation from SJWA.

DATA CAPTURE

The data fields in the SJWA OHCA database are based on the internationally agreed definitions that are outlined in the Utstein template from the International Liaison Committee on Resuscitation (ILCOR).⁽²⁹⁾

Several data sources are used to capture OHCA cases in WA:

1. Computer aided dispatch (CAD) system database

CAD is an organisational database with comprehensive geographical and operational information collected by the SJWA State Operations Centre. Specifically, the database includes date and incident location. The system timestamps key points such as the receipt time of the Triple Zero (000) emergency call, the dispatch time of the first ambulance, as well as the time of arrival at scene of the first ambulance. This data enables response time data to be accurately calculated.

2. Electronic patient care record (ePCR)

The ePCR records multiple data fields, including patient demographics, clinical assessment and management. Importantly, this includes identification of the cardiac arrest heart rhythms, defibrillation delivery (including bystander use of AED), as well as the administration of any cardiac arrest medicines. The ePCR was introduced in SJWA in 2011, with paper-based records used previously.

A sensitive but not specific electronic search strategy is conducted to identify potential cases from the CAD database to ensure the capture of all OHCA cases in WA attended by SJWA. A research nurse carefully scrutinises the results manually, and only those cases meeting the criteria for OHCA (Tables 24 and 25) are included in the SJWA OHCA database.

Presenting arrest rhythms and probable causes of OHCA are determined by manual review of the ePCR records.

Survival outcomes of 'return of spontaneous circulation' (ROSC) and 'ROSC on arrival at hospital' (i.e. event survival) are also obtained from the ePCR records.

3. Survival follow up

The 2020 OHCA report onwards reports the 30-day survival as the primary survival outcome, whereas previous reports outlined survival to hospital discharge. These two measures are almost 100 per cent equivalent in WA, with less than one in every 200 cases being discordant between the two measures among initial survivors to hospital.⁽²⁵⁾

ETHICS APPROVAL

SJWA has given approval for the SJWA OHCA database to be managed at PRECRU (Curtin University) – under strict data access and security protocols. The Human Research Ethics Committee (HREC) at Curtin University has given approval for the SJWA OHCA database to be used for specific research purposes (Curtin HREC approval HRE2025-0301).

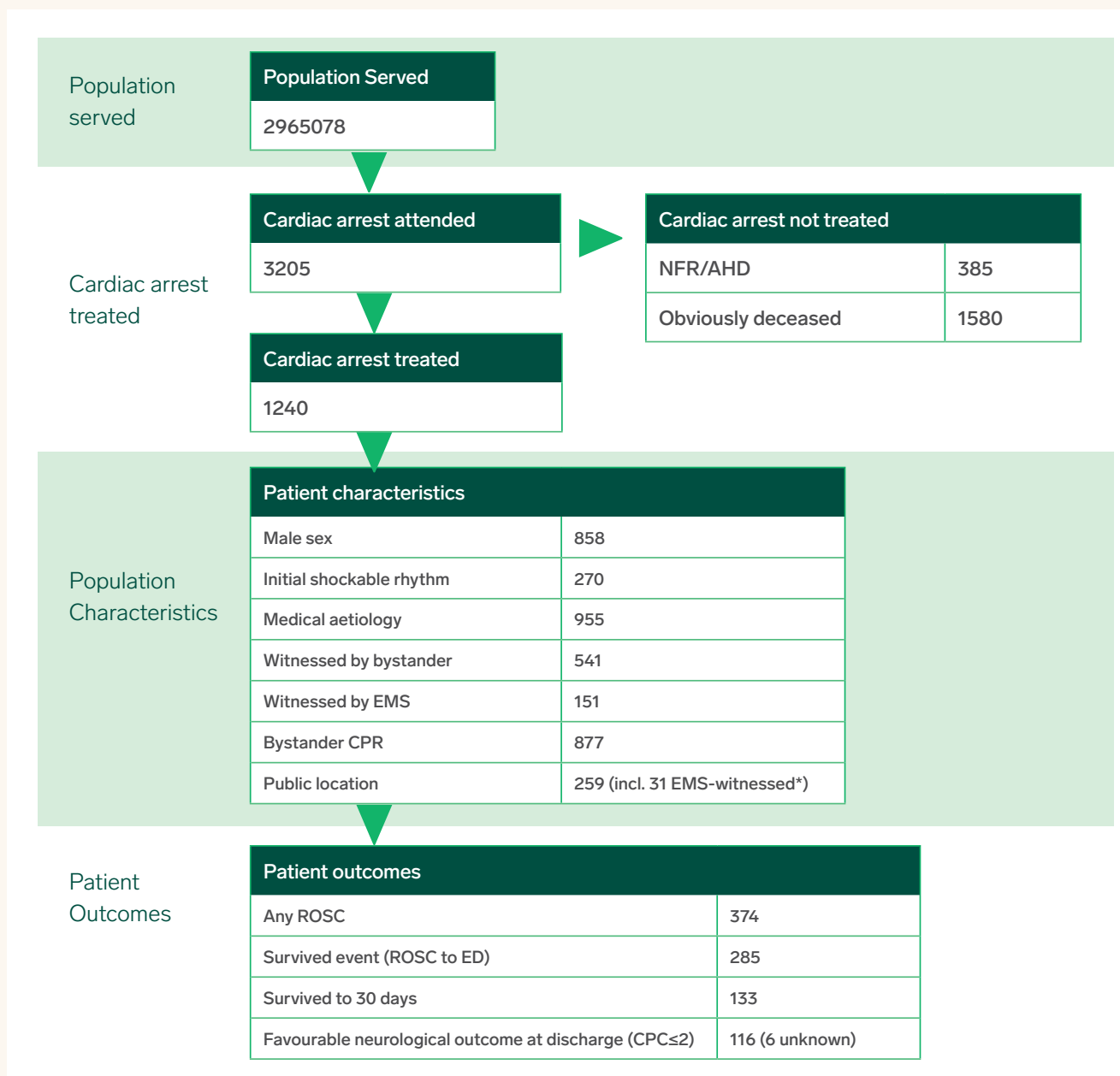
PRECRU has standing ethics approval, granted by individual hospital HRECs, to access relevant hospital medical records for the purposes of determining OHCA patient outcomes. The Registrar of Births, Deaths and Marriages in WA has approved PRECRU researchers to access the WA Death Registry for HREC-approved studies.

All data relating to the SJWA OHCA database is securely stored by PRECRU at Curtin University as per the PRECRU Data Access and Security Policy.

UTSTEIN OHCA FLOWCHARTS

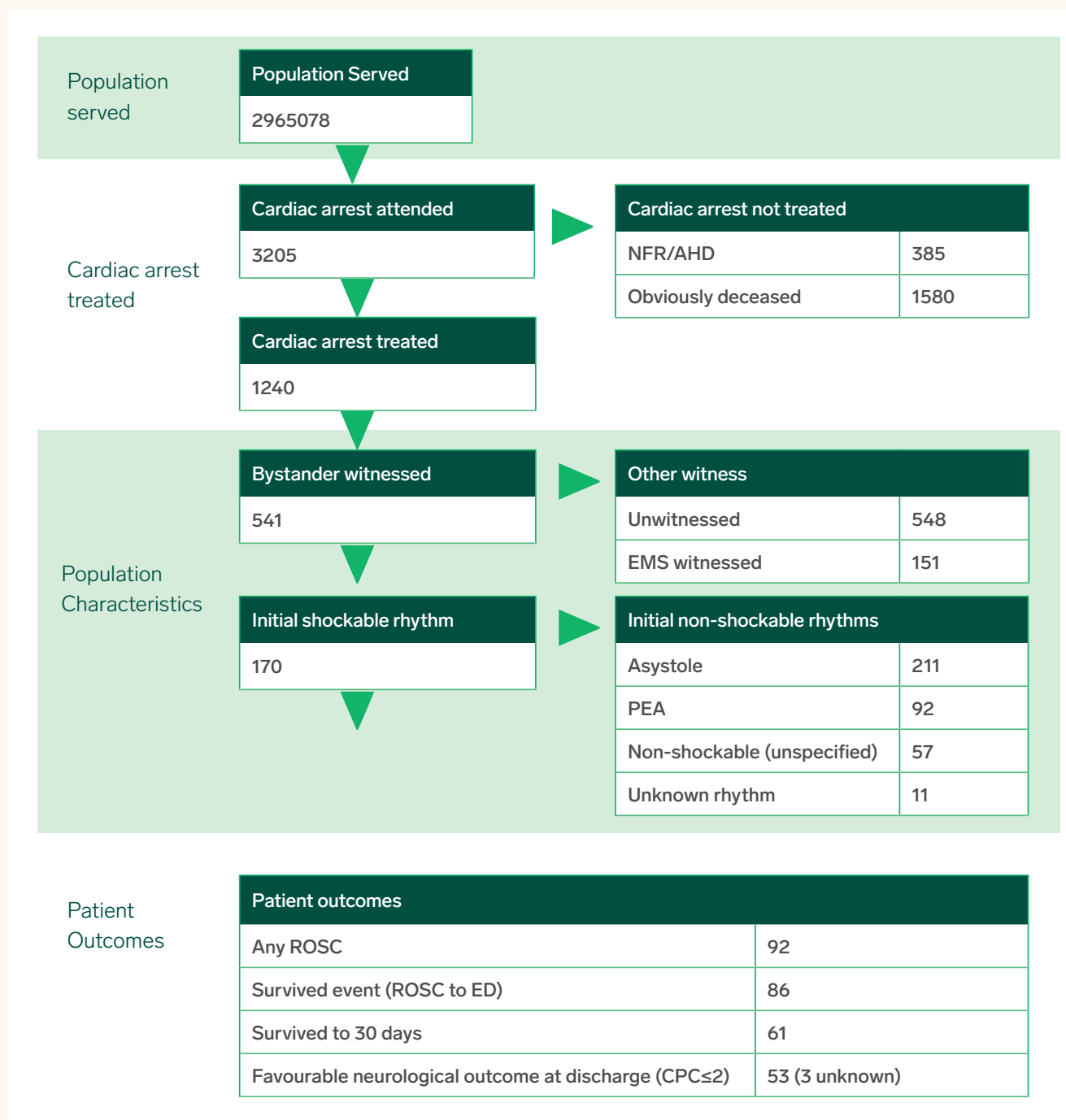
In 2024, a revised Utstein reporting standard for out-of-hospital cardiac arrest (OHCA) was released⁽²⁹⁾. This edition introduced standardised flowcharts designed to present patient and survival data in a consistent way to enable direct comparison between systems worldwide. The following flowcharts present St John WA's 2024 OHCA data in this format.

FIGURE 9: UTSTEIN OHCA FLOWCHART FOR SYSTEM EFFECTIVENESS (ATTEMPTED RESUSCITATION)



* Location for EMS-witnessed arrests based on original location patient found

FIGURE 10: UTSTEIN OHCA FLOWCHART FOR SYSTEM EFFICACY (UTSTEIN COMPARATOR)



* Location for EMS-witnessed arrests based on original location patient found

RESEARCH

SJWA and PRECRU are committed to research to understand and improve outcomes from OHCA. Along with our own internationally recognised research, we contribute data to the Aus-ROC registry⁽³¹⁾ to enable wider epidemiological research. The following OHCA-related research outputs were published in 2024 by SJWA and/or PRECRU, or used SJWA OHCA data.

Aldridge ES, Ball S, Birnie T, Perera N, Whiteside A, Bray J, Finn J. The association of out-of-hospital cardiac arrest barriers to cardiopulmonary resuscitation initiation and continuation during the emergency call: A retrospective cohort study. *Resuscitation Plus*. 2024;19:100702.

Aldridge ES, Ball S, Perera N, Whiteside A, Finn J. Emergency call-takers use of behaviour change techniques to assist callers to perform CPR for out-of-hospital cardiac arrest. *Resuscitation*. 2024;202:110332.

Aldridge ES, Perera N, Ball S, Birnie T, Morgan A, Whiteside A, Bray J, Finn J. Barriers to CPR initiation and continuation during the emergency call relating to out-of-hospital cardiac arrest: A descriptive cohort study. *Resuscitation*. 2024;195:110104.

Didcoe M, Pavey-Smith C, Finn J, Belcher J. Locked vs. unlocked AED cabinets: The Western Australian perspective on improving accessibility and outcomes. *Resusc Plus*. 2024;20:100807.

Doan T, Howell S, Ball S, Finn J, Cameron P, Bosley E, Dicker B, Faddy S, Nehme Z, Heriot N, Swain A, Thorrowgood M, Thomas A, Perillo S, McDermott M, Smith T, Smith K, Belcher J, Bray J, on behalf of the Aus-ROC OHCA Epistery Management Committee. Identifying areas of Australia with high out-of-hospital cardiac arrest incidence and low bystander cardiopulmonary resuscitation rates: A retrospective, observational study. *PLoS One*. 2024;19(4):e0301176.

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ABBREVIATIONS

AED	Automated External Defibrillator	MPDS	Medical Priority Dispatch System
AHD	Advance Health Directive	NFR	Not for Resuscitation
ANZCOR	Australian and New Zealand Committee on Resuscitation	OHCA	Out of Hospital Cardiac Arrest
Aus-ROC	Australasian Resuscitation Outcomes Consortium	PEA	Pulseless Electrical Activity
CAD	Computer Aided Dispatch	PCI	Percutaneous Coronary Intervention
CARES	Cardiac Arrest Registry to Enhance Survival	PRECRU	Pre-hospital, Resuscitation and Emergency Care Research Unit
CFR	Community First Responder	ROSC	Return of Spontaneous Circulation
CPR	Cardio-Pulmonary Resuscitation	SJWA	St John Western Australia
ED	Emergency Department	SOC	State Operations Centre
EMD	Emergency Medical Dispatcher	SUDI	Sudden Unexpected Death in Infancy
EMS	Emergency Medical Service	VF	Ventricular Fibrillation
ePCR	Electronic Patient Care Record	VT	Ventricular Tachycardia
HREC	Human Research Ethics Committee	WA	Western Australia
ILCOR	International Liaison Committee on Resuscitation		

DEFINITIONS

30-day Survival

Where a patient is recorded as being alive 30 days after their out-of-hospital cardiac arrest.

Adults

Patients aged 16 years or greater, or where the age is missing/unknown (in the absence of the patient being described as a child).

Aetiology

The precipitating cause of a cardiac arrest (e.g. trauma, overdose/poisoning, asphyxia, presumed cardiac)

All-cause

Referring to OHCA cases of all aetiologies.

Asystole

Absence of any cardiac electrical activity.

Bystander witnessed

An out-of-hospital cardiac arrest that is witnessed by a bystander (seen or heard).

Community AED

Any AED that is, or has the ability to be, used to defibrillate a patient outside of a hospital setting prior to ambulance arrival.

Defibrillation

Providing an electrical shock to a patient in a shockable heart rhythm.

EMS attempted resuscitation

Cases where trained ambulance clinicians attempted to revive a patient in cardiac arrest using CPR and/or defibrillation, as well as any patients who received a defibrillator shock from bystanders.

EMS attended

Cardiac arrest events attended by trained ambulance personnel regardless of whether treatment was provided.

EMS response time

The time from the start of the emergency call to arrival of an ambulance crew on scene.

EMS witnessed

An out-of-hospital cardiac arrest that occurs in the presence of on-duty Emergency Medical Service personnel (paramedics and/or volunteer ambulance officers)

Event survival

Patients who have ROSC (a palpable pulse) on arrival at hospital as documented on the ePCR.

Metropolitan/Metro

Denotes the Perth metropolitan area (based on the Australian Bureau of Statistics classification for Greater Capital City Statistical Areas, 2016).

Non-shockable rhythm

Cardiac electrical rhythms which are not appropriate to receive a defibrillation shock. These rhythms include asystole and PEA.

Out of Hospital Cardiac Arrest

Where the patient has no signs of circulation. Specifically, when there is an absence of a detectable carotid pulse, the patient is unconscious/unresponsive, and has agonal/ absent breathing; with the event occurring outside of hospital.

Paediatrics/Children

Patients aged less than 16 years.

Paramedic

A healthcare professional registered with the Paramedicine Board of Australia as per the Health Practitioner National Law Act (WA) 2010. In the Western Australian ambulance service context, career ambulance crews consist of registered paramedics who provide cardiac arrest care consistent with the ANZCOR Advanced Life Support algorithm.

Presumed cardiac

Cases where the cause of arrest is not due to a known precipitator (e.g., trauma, overdose/poisoning, asphyxial), as determined from the ePCR.

Priority 1

High priority emergency ambulance response, with immediate vehicle dispatch responding with lights-and-sirens to the scene.

Pulseless Electrical Activity

The absence of a palpable pulse, with organised electrical activity on an electrocardiogram (other than ventricular tachycardia).

Regional/Rural WA

Denotes areas outside the Perth metropolitan area.

Resuscitation attempted

See *EMS attempted resuscitation*.

Return of Spontaneous Circulation (ROSC)

Return of circulation to the body with a detectable pulse.

State Defibrillator Network activation

An event where an AED registered on the State Defibrillator Network is applied to a patient prior to ambulance arrival.

State Operations Centre (SOC)

St John WA call centre for emergency ambulance Triple Zero (000) and non-urgent calls.

Shockable Rhythm

Cardiac electrical rhythms which are appropriate to receive defibrillation by St John WA ambulance clinicians, or from a bystander with a public AED. These rhythms include ventricular fibrillation and pulseless ventricular tachycardia.

Survival

May refer to Event Survival (ROSC on arrival at hospital) or 30-day Survival.

Triple Zero (000)

The Australian emergency telephone number used by the public to activate EMS (or other emergency services). In Western Australia, Triple Zero (000) callers who request ambulance are connected to SJWA SOC.

Utstein comparator group

Patients who are witnessed to arrest by a bystander, present in a shockable rhythm, and receive EMS attempted resuscitation. This includes any patient who receives a bystander AED shock, as these patients are known to have a shockable initial rhythm.

Volunteer Ambulance Officer

Unpaid ambulance officer with relevant training and skill, volunteering ambulance services to their community. Volunteers provide cardiac arrest resuscitation consistent with the ANZCOR Basic Life Support standard.

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