



OUT-OF-HOSPITAL CARDIAC ARREST REGISTRY

Summary Report
2022/23



**WELLINGTON
FREE AMBULANCE**
kia ora te tangata

Quality Improvement and Innovation

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KARL'S STORY OF SURVIVAL



A sudden cardiac arrest can occur without warning, at any time, which is why it's so important every New Zealander knows how to do cardiopulmonary resuscitation (CPR) and use an Automated External Defibrillator (AED). Knowing how to start CPR quickly and effectively and how to use an AED gives anyone suffering a sudden cardiac arrest the best chance of survival. Giving people like Karl a chance.

This is his story of survival, all made possible by the quick actions of bystanders who knew CPR, the early use of a Wellington Free Ambulance AED, and the lifesaving interventions of Wellington Free Ambulance paramedics.

A happy constant in Karl's life is his love for football. It's a sport he's played since he was just four years old, and this affinity has carried on to this very day. You can often find Karl on Wellington's waterfront, playing indoor football at the Wellington's Indoor Sports Shed 1, or playing outdoor football closer to home in Campbell's Park overlooking Kāpiti Island.

Karl's sudden and severe health event came out of the blue. That day whilst playing football as he had hundreds of times before, everything changed.

"We had just finished a game and I was walking off the field. It was two to three minutes after the game had finished and I felt as though I was getting tired and not recovering," Karl recalls.

"The last thing I remember, was thinking, 'I don't want to fall and hit my head on the

concrete floor'. I got down on my hands and knees and was looking at the floor. It was the last thing I remember seeing."

Karl didn't know it yet, but he was having a sudden cardiac arrest. Each week, an average of four to five people have a sudden cardiac arrest across Greater Wellington and Wairarapa.

The quick actions of bystanders who knew CPR

While his teammates were chatting and reflecting on the game, they turned around and saw Karl lying on his back, gasping for breath, changing colour – they knew they had to act, and fast. Karl's teammate Jo made the emergency call to 111, with Orla looking for the nearest available AED.

Thankfully, a nearby Shed 1 staff member knew how to perform cardiopulmonary resuscitation (CPR), and quickly began chest



compressions while 111 was called, with the support of other bystanders.

“Had it been one of my friends, I wouldn’t have known how to save them. But because they knew what to do, they saved me. That was one thing, I really want to raise awareness on,” Karl explains.

“I’ve been told the thing that saved me was immediate CPR,” Karl says.

Early use of a Wellington Free Ambulance AED

As well as the quick actions of his teammates on the field, an Automated External Defibrillator was used on Karl.

An AED is a completely automated and portable device that can deliver a lifesaving shock to someone’s heart in the case of cardiac arrest. If used immediately, an AED can increase someone’s chance of survival by up to 80%.

This was critical to Karl’s survival.

Wellington Free Ambulance is one of the main providers of AEDs across the region. Businesses, schools, community groups purchase these lifesaving pieces of equipment from Wellington Free Ambulance. Through our Heartbeat Programme we install, register and maintain these essential devices that are located in the community for public use, free of charge, thanks to The Lloyd Morrison Foundation.

It was one of these Wellington Free Ambulance AEDs that was instrumental in saving Karl’s life, having been installed only two days prior to his cardiac arrest on the Wellington waterfront.

“Because of the AED, my friend’s and other bystander’s CPR and the response of the paramedics, I was given the best chance possible,” he says.

Road to Recovery

Calling 111 immediately is also a hugely important part of helping someone in an

emergency cardiac arrest situation. These immediately life-threatening calls are treated with the utmost importance with Wellington Free Ambulance responding under lights and sirens to get there as quickly as possible.

While Karl cannot remember any interactions with paramedics that day, he remains grateful to the combined effort by his peers and paramedics that saw him safely transported to hospital just five days before Christmas 2021.

“We, as a city, are just so lucky to have Wellington Free Ambulance and I’m just so happy to live in Wellington and have Wellington Free Ambulance’s services available for the wider region. It’s both critical, and reassuring,” he says.

Karl woke up in hospital the following day with no memories – he didn’t know where he worked, what his favourite food was, nor how to write his address.

In his first week, an MRI scan determined that Karl had blocked arteries in his heart. A quadruple bypass surgery was required, taking place on 10 January 2022. Three weeks later he returned home – the start to a long road to recovery.

“The biggest thing, for everything, was fear. For me, I felt like I was a kid again and I had to go through learning the world, learning life and all those experiences again,” Karl explains.

From going to the end of the driveway, walking up the deck stairs, to running around Campbell Park alone again – Karl was determined to conquer the fear and reclaim his life.

Giving back through Forward Hearts

Throughout his recovery, it is also this feeling of helplessness that inspired Karl to fight for other people and consider what he can do to make a change.

“I saw a constant stream of ambulances turning up to the hospital, and the efforts

that Wellington Free Ambulance is doing is just amazing, and I just cannot thank them all enough.”

“As well as seeing all the doctors and nurses, and seeing what everyone is going through, I wanted the opportunity to do something to make a difference,” Karl explains.

As a cardiac arrest survivor who benefited from the use of an AED, Karl was able to participate in the Stryker Forward Hearts Programme. This programme – run by AED supplier Stryker – provides every survivor with the opportunity to place a free AED in a community space.

Karl has chosen to place his AED at the Village Hall in Paekākāriki, ensuring 24/7 access to this life-saving device for anyone in the community and surrounds.

“I feel great driving down the road and it’s right there in front of you. Everybody in the village will know that it is there. We’re the kind of village, that if something happened, someone would be able to grab that and somebody else would be saved,” Karl says.

Karl will also be taking part in one of Wellington Free Ambulance’s Heartbeat CPR Training sessions, provided free of charge, thanks to The Lloyd Morrison Foundation.

Now, Karl will be equipped with the vital skills that helped save his life, so should a sudden cardiac arrest strike, he can be there to help someone else.

Continuing his passions

During his recovery, Karl remained determined to return to the football pitch.

“All the physios, doctors and nurses said, ‘you’re going to be back to playing football, you’re going to be fine’. But whenever I told my family that I’m going to play again, their faces dropped,” Karl recalls.

“By going through that healing process, I realised that playing football is what I do. It’s who I am, it’s my release and how I keep fit.”

Just three months after his surgery, Karl returned to play his first game of indoor football, and three weeks later he played a game of outdoor football.

“In my third game back, I scored four goals. I cried running back to halfway. I was ecstatic and over the moon and it just broke it for me that, ‘yeah, you’re back’.”

For more information about The Lloyd Morrison Foundation Heartbeat programme or to book your free training visit, www.wfa.org.nz/heartbeat



ABOUT THIS REPORT

Cardiac arrest remains a considerable public health issue, with ischaemic heart disease being the second most prevalent cause of death in New Zealand.

Internationally, survival rates following out-of-hospital cardiac arrest (OHCA) are highly variable and can range from less than 6% to greater than 50%. Benchmarking survival from OHCA is a key measure of the clinical quality of an Emergency Ambulance Service (EAS) and is fundamental to making improvements in OHCA survival. Knowledge of New Zealand OHCA outcomes is a key driver to help identify and address areas for improvement in clinical care.

The data presented in this report is for all OHCA attended by Wellington Free Ambulance EAS in the period from 1 July 2022 to 30 June 2023.

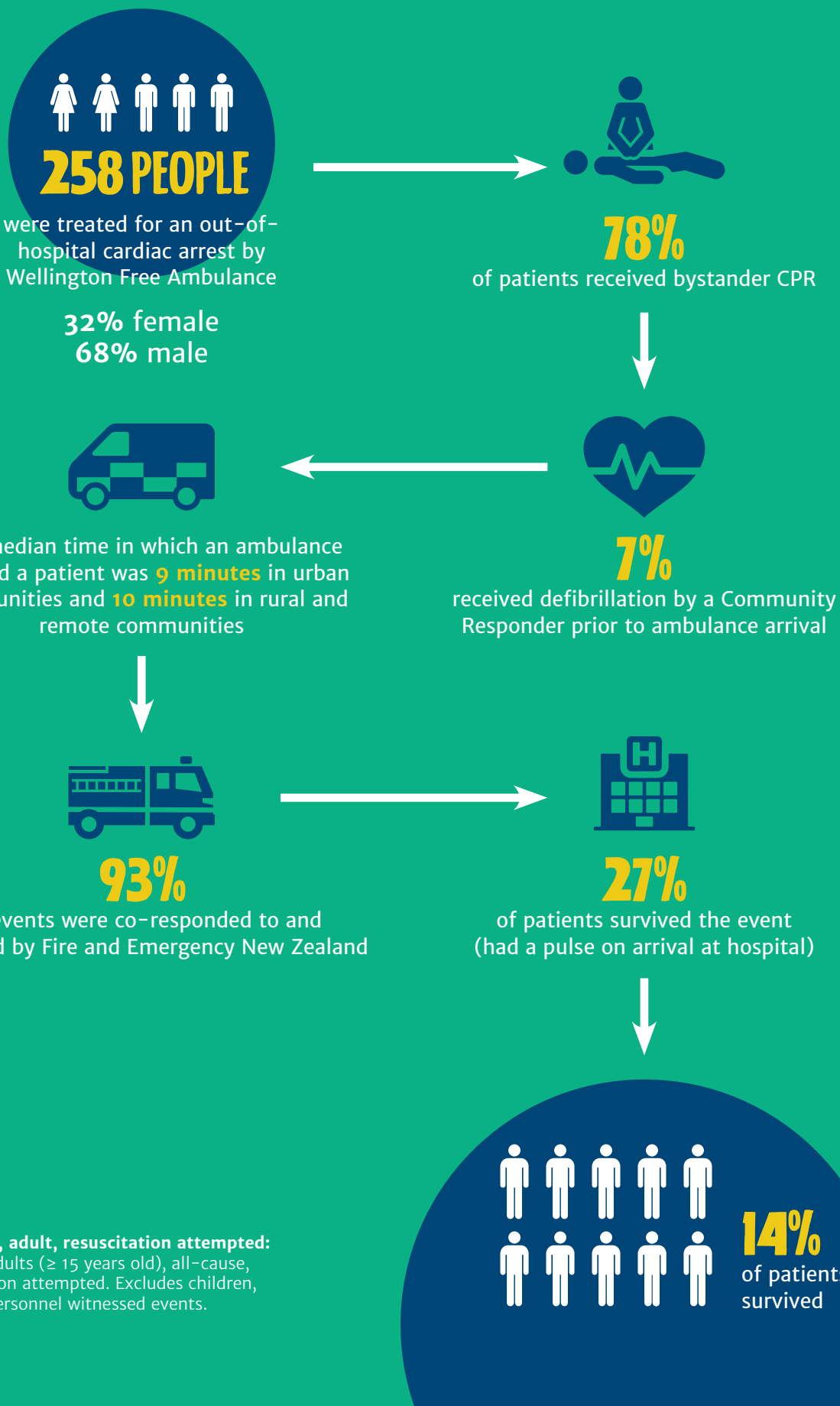
The data presented in this report primarily relates to events that were either 'attended' or where there was a 'resuscitation attempted' by EAS personnel. 'Attended' refers to all OHCA where EAS personnel arrived at the scene regardless of whether or not a resuscitation attempt was made. 'Resuscitation attempted' refers only to those events where an attempt at resuscitation was made by EAS personnel.

Unless otherwise stated, all analyses exclude cardiac arrests witnessed by EAS personnel. In cases where it was not recorded whether the patient was an adult or a child, the patient was assumed to be an adult and was included in that category.

Unless otherwise stated, survival refers to survival to 30 days post cardiac arrest.



EXECUTIVE SUMMARY



BENCHMARKING EXECUTIVE SUMMARY

Key figures for all-cause events

Table 1: Key figures for all-cause events^A

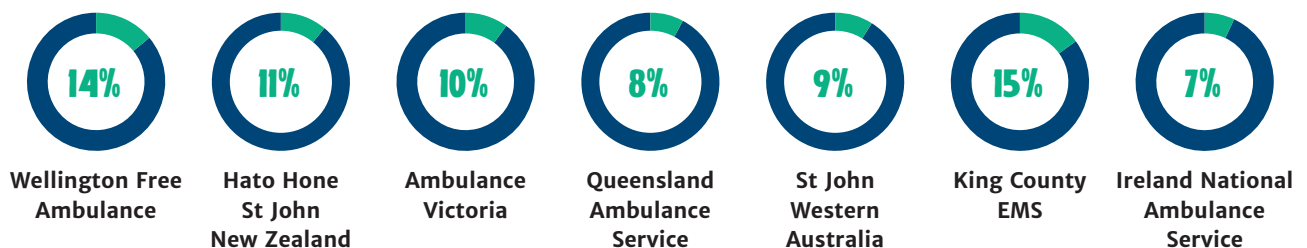
Year	Total number events	% Bystander CPR	% Community Responder AED use	Urban median response time	Rural & remote median response time	% Attended by Fire & Emergency New Zealand	% ROSC on handover	% Survival
2018/19	204	76	6	8	14	93	32	19
2019/20	209	77	6	9	14	94	32	16
2020/21	217	71	4	8	14	97	28	10
2021/22	234	77	7	8	10	97	26	10
2022/23	258	78	7	9	10	93	27	14

Benchmarking (all-cause events)

The outcomes of OHCA for international benchmarking compare rates of ROSC sustained to hospital handover and survival. This group requires that the following criteria be met: includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

Table 2: Benchmarking survival outcomes for all-cause events^A

Ambulance Service	Collection period	Total number events	% ROSC on handover	% Survival ^B
Wellington Free Ambulance	1 July 2022 to 30 June 2023	258	27%	14%
Hato Hone St John New Zealand	1 July 2022 to 30 June 2023	2,200	22%	11%
Ambulance Victoria ¹	1 July 2022 to 30 June 2023	2,601	30%	10%
Queensland Ambulance Service ^{2,C}	1 January 2021 to 31 December 2021	2,057	25%	8%
St John Western Australia ³	1 July 2022 to 30 June 2023	1,058	19%	9%
King County EMS ^{4,E}	1 July 2022 to 30 June 2023	1,019	42%	15%
Ireland National Ambulance Service ^{5,C,D}	1 January 2022 to 31 December 2022	2,802	19%	7%



A All events, adult, resuscitation attempted: includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.

B Wellington Free Ambulance, Hato Hone St John New Zealand, St John Western Australia and Queensland Ambulance Service report on survival to 30-days, all other services report survival to hospital discharge.

C The Queensland Ambulance Service and Ireland National Ambulance Service report on all ages.

D Ireland National Ambulance Service data includes EAS witnessed events.

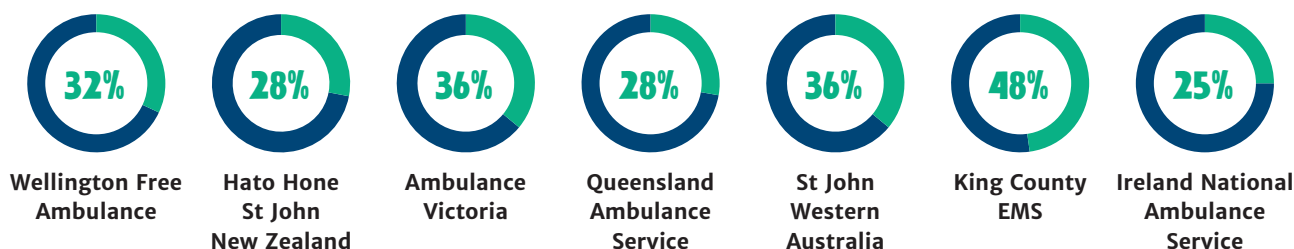
E King County EMS exclude cardiac arrests with penetrating or blunt trauma mechanisms.

Benchmarking (Utstein Comparator Group)^A

One important international comparison uses a carefully standardised subgroup of patients known as the 'Utstein Comparator Group'. This subgroup requires that the following criteria be met: includes adults (≥ 15 years old), all-cause, resuscitation attempted, shockable presenting rhythm and bystander witnessed. Excludes children, EAS witnessed and no resuscitation attempt.

Table 3: Benchmarking survival outcomes for adults. (Utstein Comparator Group)^A.

Ambulance Service	Collection period	Total number events	% ROSC on handover	% Survival ^B
Wellington Free Ambulance	1 July 2022 to 30 June 2023	75	52%	32%
Hato Hone St John New Zealand	1 July 2022 to 30 June 2023	579	43%	28%
Ambulance Victoria ¹	1 July 2022 to 30 June 2023	545	59%	36%
Queensland Ambulance Service ^{2,C}	1 January 2021 to 31 December 2021	338	49%	28%
St John Western Australia ³	1 July 2022 to 30 June 2023	207	45%	36%
King County EMS ^{4,E}	1 July 2022 to 30 June 2023	152	72%	48%
Ireland National Ambulance Service ^{5,D}	1 January 2022 to 31 December 2022	396	39%	25%



- A Utstein Comparator Group:** includes adults (≥ 15 years old), all-cause, resuscitation attempted, shockable presenting rhythm and bystander witnessed. Excludes children, EAS witnessed and no resuscitation attempt.
- B** Wellington Free Ambulance, Hato Hone St John New Zealand, St John Western Australia, and Queensland Ambulance Service report on survival to 30-days, all other services report survival to hospital discharge.
- C** Queensland Ambulance Service reports on all ages.
- D** Ireland National Ambulance Service reports patients >17 years old.
- E** King County EMS exclude cardiac arrests with penetrating or blunt trauma mechanisms.



APPENDICES

THE WELLINGTON FREE AMBULANCE OUT-OF-HOSPITAL CARDIAC ARREST REGISTRY

Eligibility

Wellington Free Ambulance captures data on all OHCA events attended by the EAS. A cardiac arrest is defined as a patient who is unconscious and pulseless with either agonal breathing or no breathing.

Inclusion and exclusion criteria are described in Table A1 and Table A2.

Data capture

The data is collated in the registry using a reporting template based on international definitions outlined in the Utstein style of reporting and the variables developed by the Australasian Resuscitation Outcomes Consortium (Aus-ROC).

In the data collection process there are three separate points where data is acquired:

- Computer Aided Dispatch (CAD) and supporting systems.
- On scene by the EAS personnel in attendance.
- Mortality data from the New Zealand National Health Index (NHI) records.

Computer aided dispatch

Patient and event details are collected by the Ambulance Communications Centre when a 111 call is received and an ambulance is dispatched, with data being entered into the CAD system. Data specifically related to cardiac arrest is obtained from the CAD system and transferred into the OHCA Registry.

Table A1: Inclusion criteria (all of the following).

1	Patients of all ages who suffer a documented cardiac arrest
2	Occurs in New Zealand where Wellington Free Ambulance or one of its participating co-responders is the primary treatment provider
3	<ul style="list-style-type: none"> • Patients of all ages who on arrival of the EAS are unconscious and pulseless with either agonal breathing or no breathing or • Patients of all ages who become unconscious and pulseless with either agonal breathing or no breathing in the presence of EAS personnel or • Patients who have a pulse on arrival of EAS personnel following successful bystander defibrillation.

Table A2: Exclusion criteria (any of the following).

1	Patients who suffer a cardiac arrest in a hospital facility where EAS may be in attendance but are not the primary treatment providers
2	Patients who suffer a cardiac arrest during an inter-hospital transfer where EAS may be providing transport but are not the primary treatment providers
3	Bystander suspected cardiac arrest where the patient is not in cardiac arrest on arrival of the EAS personnel, and where defibrillation did not occur prior to ambulance arrival or no other evidence verifying a cardiac arrest state is present
4	Patients who suffer a cardiac arrest where Hato Hone St John is the primary treatment provider

On scene collection

Ambulance officers on scene attending a patient in cardiac arrest are required to record specific data. This is recorded on an electronic Patient Report Form (ePRF) and submitted electronically to a secure server.

NHI patient outcome data

The patient's NHI is collected by EAS personnel on scene or at hospital handover. If the NHI was not available at the time of the event then the NHI is determined by cross-reference of the patient's date of birth and name to the NHI database.

The date of death is updated by the Manatū Hauora Ministry of Health identity data management team after matching NHI identity with the official death registrations on a monthly basis.

Data quality

The registry is subject to quality improvement processes which involve continual auditing of existing data and updating of the registry entries as appropriate.

Registry reports are generated on a monthly and quarterly basis and these are analysed for variances in the numbers of cases and patient outcomes. These results are compared with international data from EAS that are similar to Wellington Free Ambulance.

Ethical review

The OHCA Registry has been approved by the New Zealand Health and Disability Ethics Committee (Aotearoa New Zealand Paramedic Care Collection (ANZPaCC), 13415).

The registry is also subject to EAS internal research governance processes that include a locality review and locality authorisation as per the Standard Operating Procedures for Health and Disability Ethics Committees.

The OHCA Registry is held on a secure server which requires active directory permissions. At no stage is data that could identify individual patients or individual hospitals released from this registry.



ABBREVIATIONS

AED	Automated external defibrillator	EMS	Emergency medical services
CAD	Computer aided dispatch	OHCA	Out-of-hospital cardiac arrest
CPR	Cardiopulmonary resuscitation	ROSC	Return of spontaneous circulation
EAS	Emergency ambulance service		

GLOSSARY OF TERMS

Adult	Patients aged 15 years or older.
Children	Patients aged less than 15 years.
Community responder	A member of the community who is not part of the EAS service who provides assistance at an OHCA event. For example, a member of the public, or an off duty ambulance officer or an off duty doctor or nurse.
EAS attended	This is the population of all patients following cardiac arrest where EAS personnel attended regardless of whether emergency treatment was provided.
EAS personnel	Emergency ambulance crews dispatched to a medical emergency.
Presumed cardiac aetiology	An OHCA is presumed to be of cardiac aetiology, unless it is known or likely to have been caused by trauma, drowning, poisoning or any other non-cardiac cause.
Resuscitation attempted	Any resuscitation attempt by responding EAS personnel, or the delivery of a shock at any time (including before ambulance arrival).
Return of spontaneous circulation	The patient shows clear signs of life in the absence of chest compressions for more than 30 seconds. Signs of life include any of the following: normal breathing, palpable pulse, increasing end tidal CO ₂ or active movement.
Rural and remote service area	Assigned according to the Geographic Classification for Health. ⁶ Rural includes: R1, R2 and R3.
Shockable rhythm	Ventricular fibrillation, ventricular tachycardia or unknown shockable (AED).

Specific rates	Rates for specific segments/groups of the population (e.g. sex, age, ethnicity).
Survival to 30-days	The patient is alive at 30-days post-OHCA event.
Survived event	The patient has sustained ROSC to handover at hospital.
Urban area	Assigned according to the Geographic Classification for Health. ⁶ Urban includes: U1 and U2.
Witnessed event	A witnessed cardiac arrest is one that is seen or heard by another person.

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