

Out-of-Hospital Cardiac Arrest Registry

Rēhita Mate Manawa mō waho i te Hōhipera

Aotearoa New Zealand, National Report 2021/22



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Introduction

Whakatakinga

Every year in New Zealand over 2,000 people are treated for a cardiac arrest that occurs in the community.

Cardiac arrest is the sudden loss of heart function, where the heart cannot effectively pump blood to vital organs. Without rapid intervention, cardiac arrest will always result in death. For every minute without CPR or defibrillation, a patient's chance of survival falls by 10–15 percent. Every New Zealander can make a difference in the chain of survival.

I ia tau i Aotearoa nei, nui ake i te 2,000 tāngata e haumanu ana i te mate manawa i te hapori.

Ko te mate manawa te ngaro ohore o te mahi manawa, ā, tē taea e te manawa te whakarere toto pai ki ngā whēkau whakahirahira. Nā te korenga o te hāpaiora wawe, ko te otinga nui, ko te mate i ngā wā katoa. I ia miniti me te korenga o te CPR, o te whakahihiko manawa rānei, ka heke iho te āheinga o ngā tūroro ora tonu ai i te 10–15 paihēneti. He mana tō ngā tāngata katoa o Aotearoa i te raupapa whakaora.

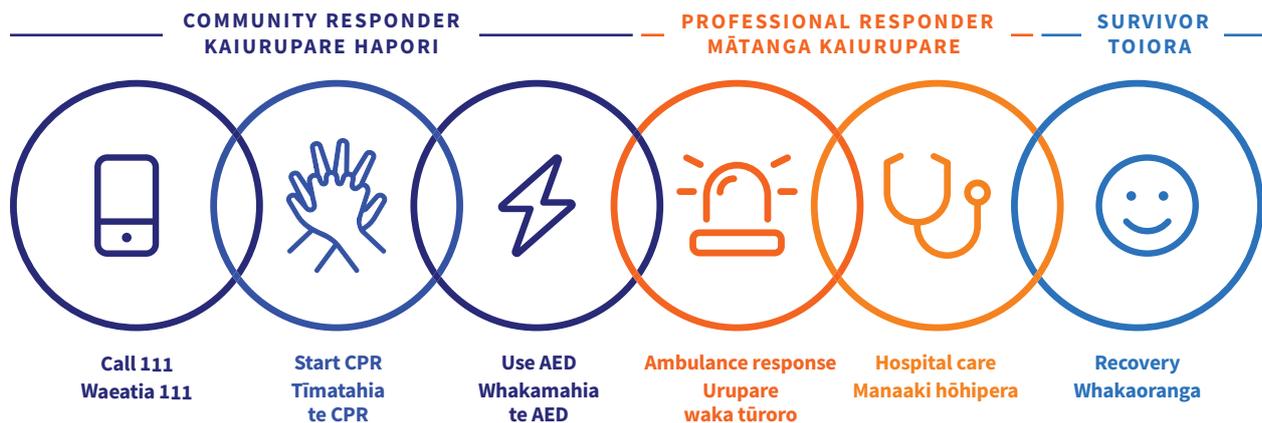


Figure 1: Chain of survival.^A

Survival from out-of-hospital cardiac arrest (OCHA) is largely due to the quick actions of bystanders who initiate CPR and use a defibrillator (or AED). Community initiatives such as free CPR awareness training, Restart A Heart Day, CPR in schools and the GoodSAM smartphone application prepare and enable everyday New Zealanders to respond.

Alongside the community, the ambulance service has a strong influence on outcomes. In this report, we benchmark ourselves internationally on our resuscitation performance, from the community response to advanced life support.

We are very pleased to present the 2021/22 Aotearoa New Zealand, National Out-of-Hospital Cardiac Arrest Registry Annual Report.

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About this report

Mō tēnei pūrongorongo

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 are for all OHCA attended by the Hato Hone St John and Wellington Free Ambulance EAS in the period from 1 July 2021 to 30 June 2022.

The data presented in this report primarily relate 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.

All population figures in this report are derived from either Statistics New Zealand population data or the Manatū Hauora Ministry of Health Primary Health Organisation (PHO) enrolment data¹.

COVID-19

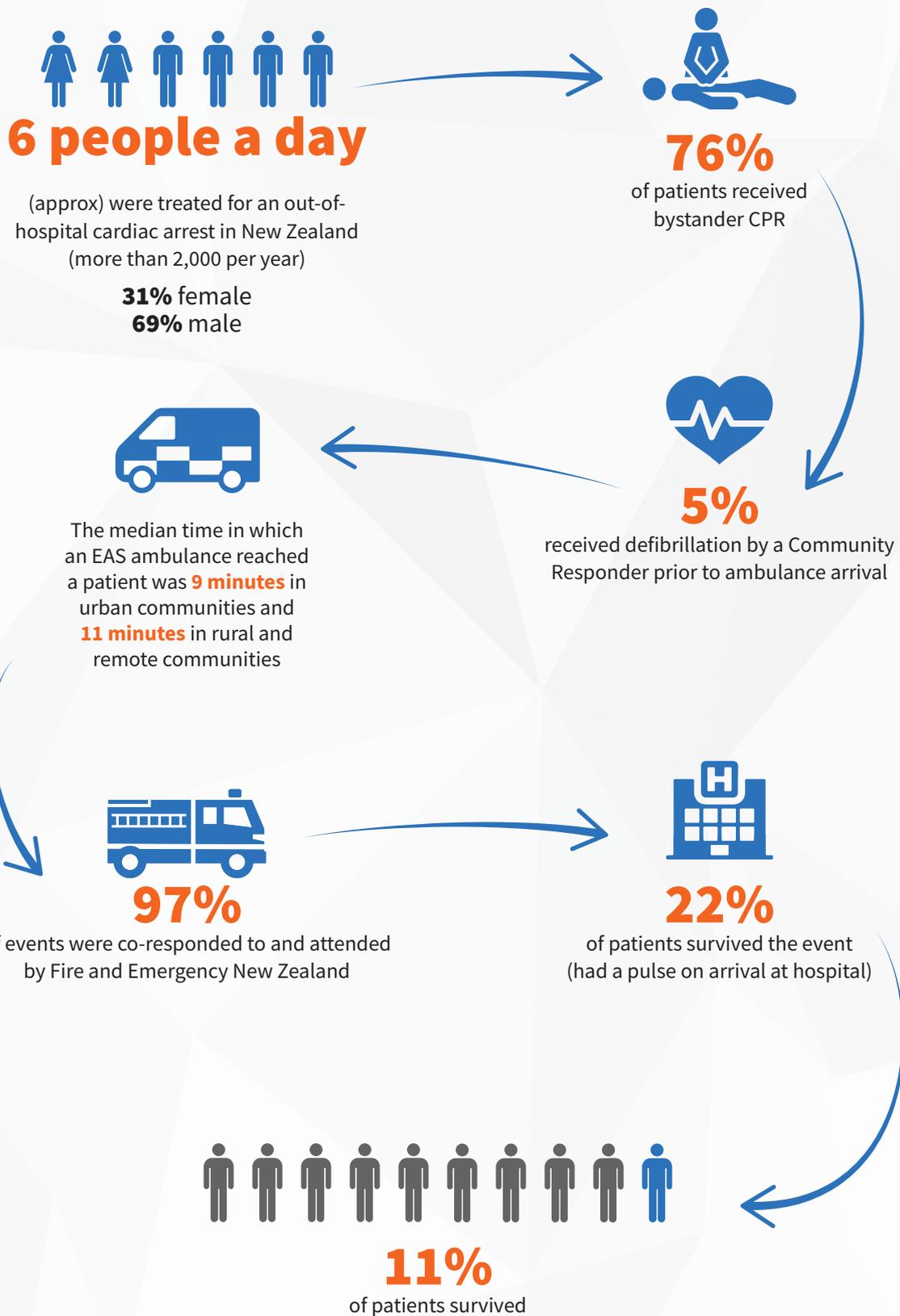
This reporting period encompasses both the longest COVID-19-related lockdown and the highest COVID-19 infection rates New Zealand has recorded to date.

Between August and December 2021, Auckland experienced a 107-day lockdown. Although daily infection rates were relatively low during this period, disruption to healthcare access was significant.

In the first half of 2022, New Zealand experienced its highest peak of COVID-19 infections. Daily infections were under 200 until early February 2022 when they increased rapidly to a peak of over 24,000. From mid-March 2022, cases declined and remained under 10,000 per day for all of May and June 2022 (<https://www.rnz.co.nz/news/in-depth/450874/covid-19-data-visualisations-nz-in-numbers>).

Executive summary

Tuhinga whakarāpopoto nui



Benchmarking executive summary

Tuhinga whakarāpopoto Panekiretanga

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	2,010	76%	4%	8	13	92%	27%	14%
2019/20	2,212	75%	5%	8	12	95%	25%	13%
2020/21	2,184	75%	5%	8	12	96%	25%	11%
2021/22	2,348	76%	5%	9	11	97%	22%	11%

Benchmarking (all-cause events)

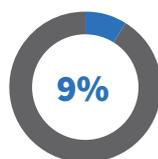
The outcomes of OHCA for international benchmarking compare rates of return of spontaneous circulation (ROSC) sustained to hospital handover and survival. This group requires that the following criteria be met: includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and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

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

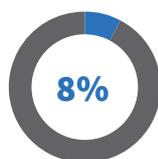
Ambulance Service	Collection period	Total number events	% ROSC on handover	% Survival ^B
New Zealand	1 July 2021 to 30 June 2022	2,348	22%	11%
Ambulance Victoria ²	1 July 2021 to 30 June 2022	2,467	28%	9%
Queensland Ambulance Service ^{3,C}	1 January 2021 to 31 December 2021	2,057	25%	8%
St John Western Australia ⁴	1 July 2021 to 30 June 2022	936	18%	9%
King County EMS ⁵	1 July 2021 to 30 June 2022	971	39%	12%
Ireland National Ambulance Service ^{6,C,D}	1 January 2021 to 31 December 2021	2,906	16%	6%



New Zealand



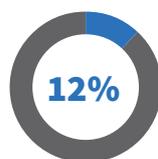
Ambulance Victoria



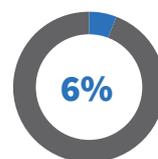
Queensland Ambulance Service



St John Western Australia



King County EMS



Ireland National Ambulance Service

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

B New Zealand, St John Western Australia, and Queensland 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 personnel witnessed events.



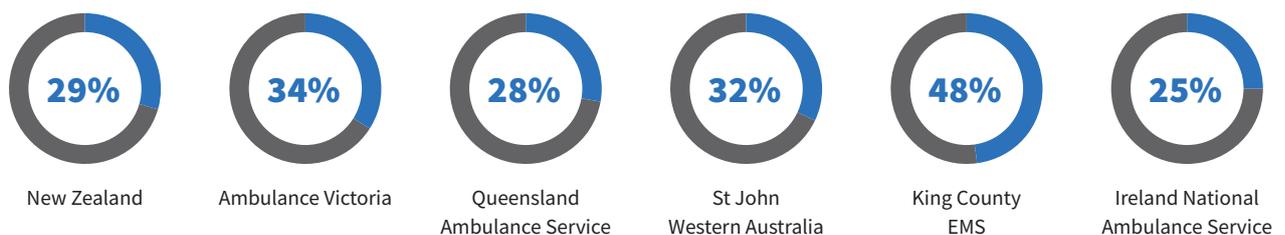
Benchmarking (Utstein Comparator Group)^A

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
New Zealand	1 July 2021 to 30 June 2022	592	44%	29%
Ambulance Victoria²	1 July 2021 to 30 June 2022	461	60%	34%
Queensland Ambulance Service^{3,C}	1 January 2021 to 31 December 2021	338	49%	28%
St John Western Australia⁴	1 July 2021 to 30 June 2022	172	41%	32%
King County EMS⁵	1 July 2021 to 30 June 2022	141	74%	48%
Ireland National Ambulance Service^{6,D}	1 January 2021 to 31 December 2021	365	37%	25%

The Aotearoa New Zealand OHCA registry is overseen by A/Prof Bridget Dicker on behalf of Hato Hone St John and Wellington Free Ambulance. A/Prof Dicker is Head of Clinical Audit and Research at Hato Hone St John and an Associate Professor at Auckland University of Technology (AUT), Department of Paramedicine.



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 New Zealand, St John Western Australia, and Queensland 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 on patients >17 years old.

Improve survival in your community

Community help can double survival

When community defibrillation occurred prior to EAS arrival, both event survival (orange) and 30-day survival (blue) were increased.

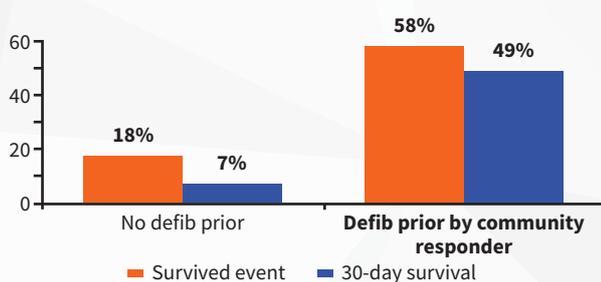


Figure 2: Influence of community defibrillation on outcomes (all events, adult, resuscitation attempted)^A.

When a GoodSAM responder was present, both event survival and 30-day survival were increased compared to events with no GoodSAM responder present.

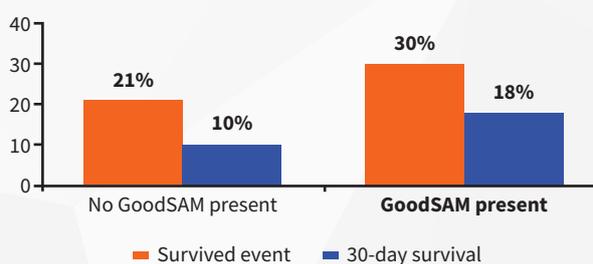


Figure 3: Influence of GoodSAM responder presence on outcomes (all events, adult, resuscitation attempted)^A.

CPR awareness sessions

Knowing CPR means you could save the life of a friend, a colleague, a member of your whānau or someone on the street.

Ngā Tohu Whakaora e 3 – 3 Steps for Life

The mission of 3 Steps for Life is to empower members of the community to step forward when help is needed, and increase out-of-hospital cardiac arrest survival rates. Delivered by volunteer Community Educators, this programme consists of public awareness sessions around basic CPR and AED training. It gives participants the skills and confidence to take action in responding to someone in cardiac arrest by:

- 1 Calling 111
- 2 Starting CPR
- 3 Using an AED

You can find out details about this course and how to attend by visiting stjohn.org.nz/3stepsforlife or email 3stepsforlife@stjohn.org.nz

Lloyd Morrison Foundation Heartbeat Programme

If you are in the Greater Wellington and Wairarapa area, Wellington Free Ambulance provides the Lloyd Morrison Foundation Heartbeat programme interactive training session free of charge. During the session you will learn everything you need to know about CPR and using an AED.

You can find out details about this course and how to attend by visiting wfa.org.nz/heartbeat or email heartbeat@wfa.org.nz



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



Become a GoodSAM responder

If you are confident in CPR and in using an AED, you can be a GoodSAM responder. When there is a cardiac arrest, the GoodSAM app alerts GoodSAM responders nearby that CPR is needed while an ambulance is on the way. Sign up to the GoodSAM app and improve someone's chance of surviving cardiac arrest.

Get all the info at stjohn.org.nz/goodsam

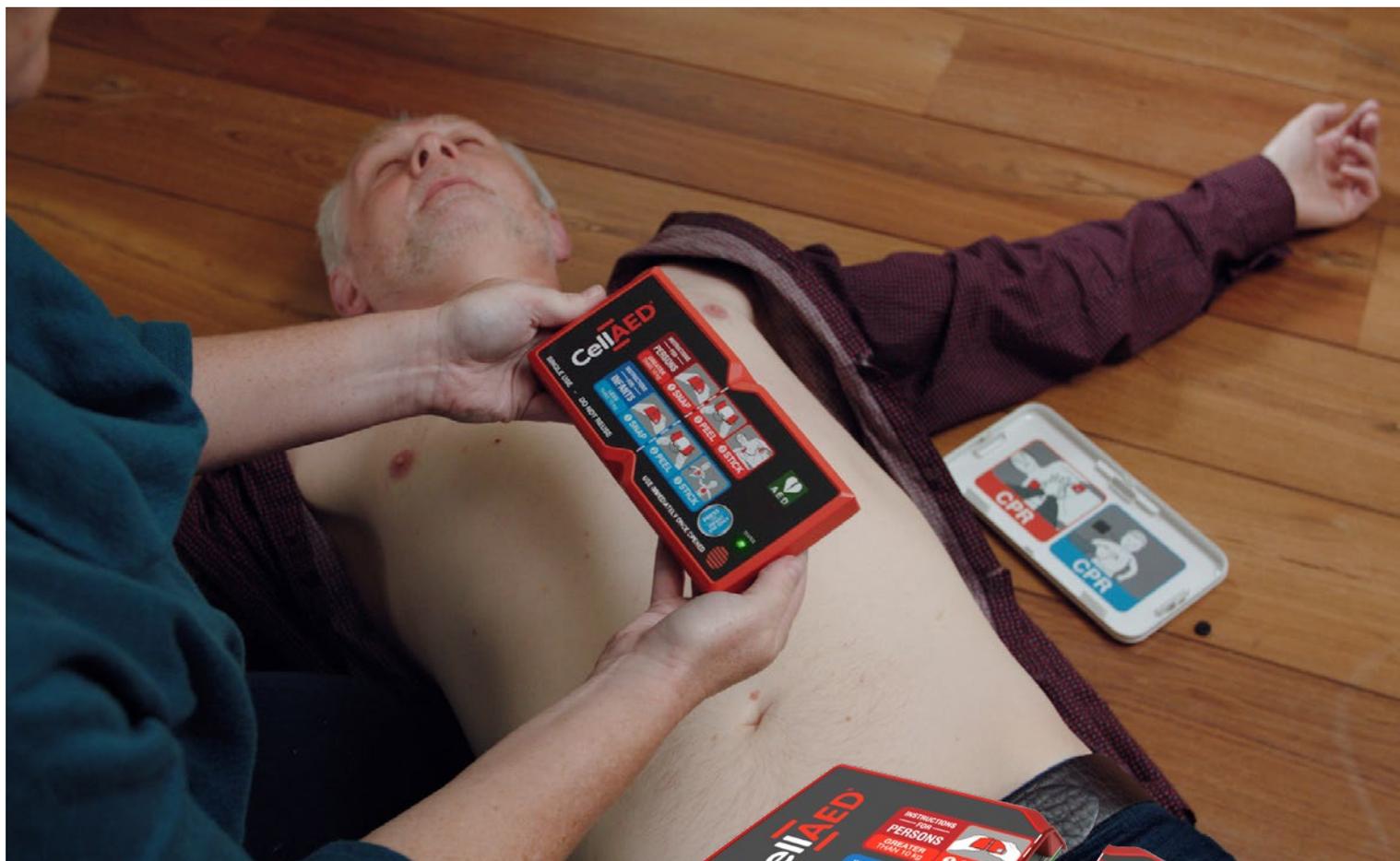


Volunteer as a CPR educator (3 Steps for Life instructor)

Make a difference in your community by volunteering with Hato Hone St John! We're looking for people to run 3 Steps for Life awareness sessions for your local community groups, such as sports clubs, retirement villages, marae communities and more. Full training will be provided!

To register your interest as a volunteer facilitator, please reach out to 3stepsforlife@stjohn.org.nz





FIRST Trial

This year, Hato Hone St John has teamed up with Ambulance Victoria to undergo a world-first clinical trial to improve community defibrillation: the First Responder Shock Trial (FIRST).

Quick defibrillation (delivery of a shock to the heart) significantly improves survival from a cardiac arrest. GoodSAM responders play a critical role in our response to cardiac arrest patients. By equipping GoodSAM responders with an AED, the trial hopes to improve AED accessibility within the first crucial minutes of a cardiac arrest.

The FIRST trial provides an ultraportable, single-use, fully automated AED (CellaAED®) to frequently responding GoodSAM responders. The CellaAED® is a fraction of the size and weight of current AEDs. It is user-friendly and can be deployed by anyone.

In October 2022, GoodSAM responders who frequently accept alerts were invited to join the FIRST trial. An impressive 1,037 GoodSAM responders agreed to take part. Using a computer-generated random selection process, the group of participants were split evenly into the control arm and the intervention arm. Responders in each arm are equally distributed throughout Aotearoa, including rural areas that would otherwise have poor access to AEDs. The intervention arm of this trial received their AEDs in the first week of November and are now ready to deliver a life-saving shock when alerted to a nearby cardiac arrest. Using these devices will provide insight into how improving access to cost-effective, portable AEDs will impact survival from out-of-hospital cardiac arrest.

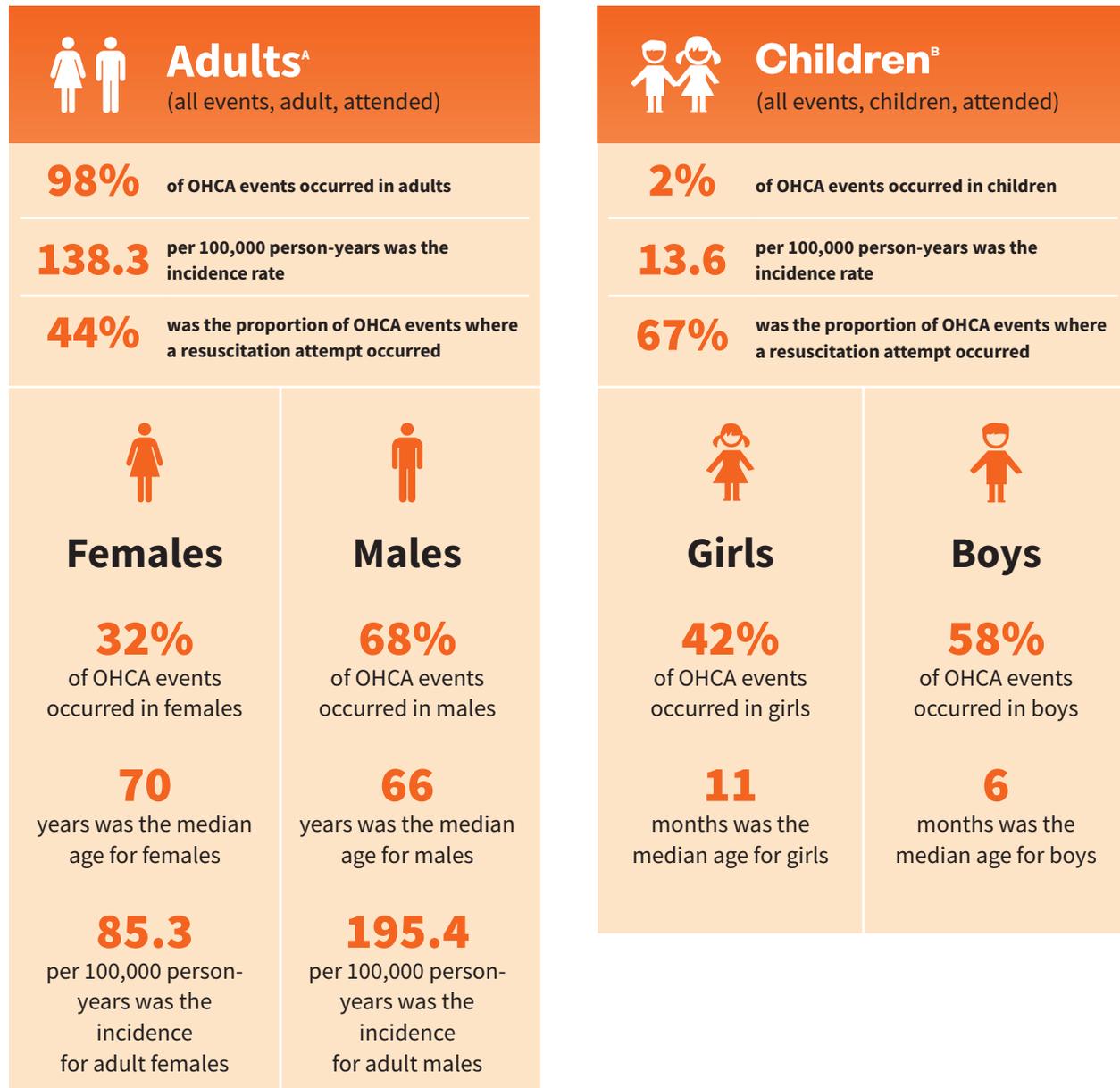
If you would like more information on this trial, visit the FIRST website: <https://www.ambulance.vic.gov.au/first/>



Incidence and demographics

Taupori pāpātanga me Taupori āhuatanga

Key figures for adults (≥ 15yrs) and children



Overall age-adjusted incidence^C 2021/22

89.3 per 100,000 person-years

A All events, adult, attended: includes adults (≥ 15 years old), all-cause, resuscitation attempted and no resuscitation attempted. Excludes children, EAS personnel witnessed events.

B All events, children, attended: includes children (< 15 years old), all-cause, resuscitation attempted and no resuscitation attempted. Excludes adults, EAS personnel witnessed events. Includes events from 1 July 2018 through 30 June 2022.

C The age-adjusted rate is a process of adjusting for a population's rate of OHCA to account for changes in the age structure of the population overtime. Age-adjusted incidence was calculated using the New Zealand PHO enrolment data for quarter 3, 2013 (July to September 2013)¹.

Age distribution of OHCA according to sex for adults

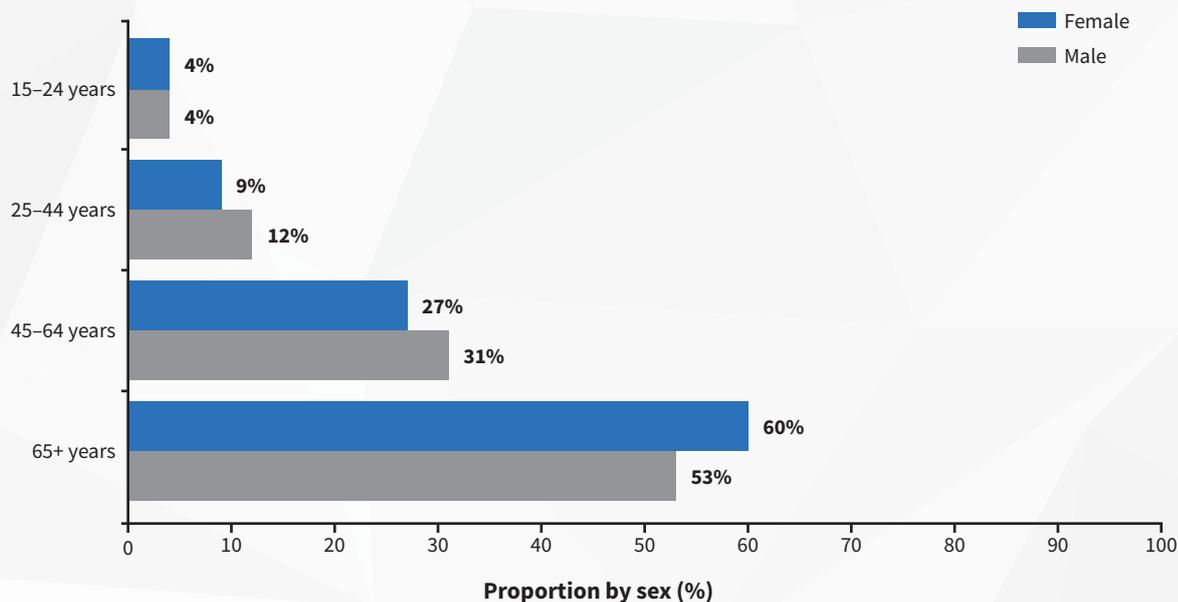


Figure 4: Age distribution of OHCA (all events, attended)^A.

Age-specific incidence of OHCA for adults

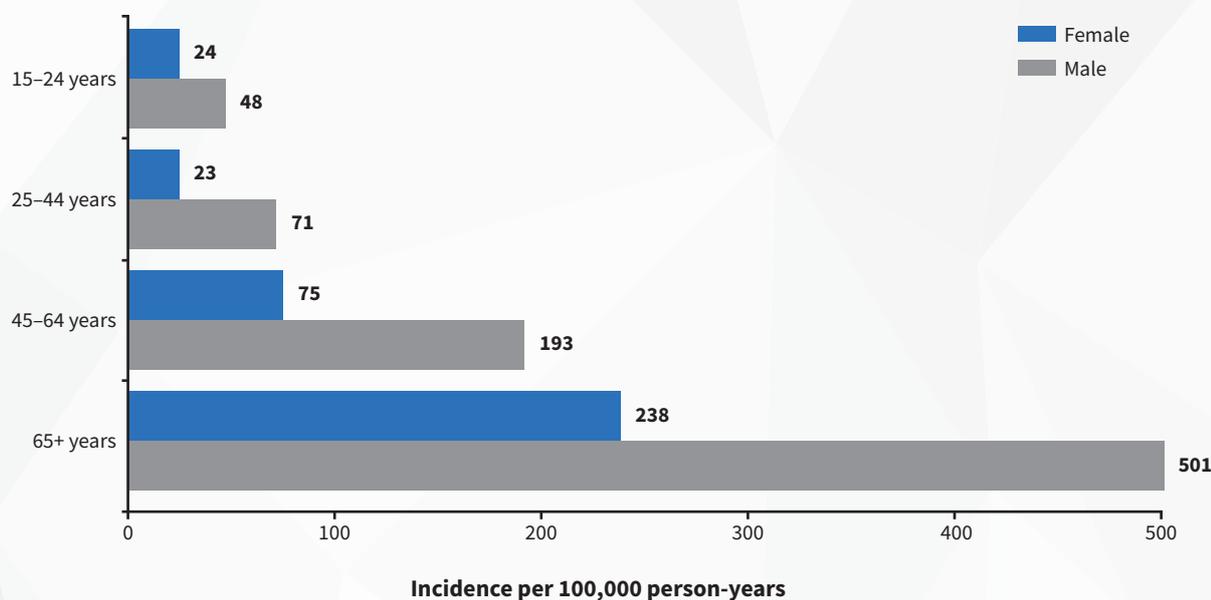


Figure 5: Age-specific rate of OHCA (all events, attended)^{A,B}.

Men suffer OHCA at an earlier age than women, and women live longer than men. That is why men have a higher incidence of OHCA at every stage of adult life (Figures 4 and 5).

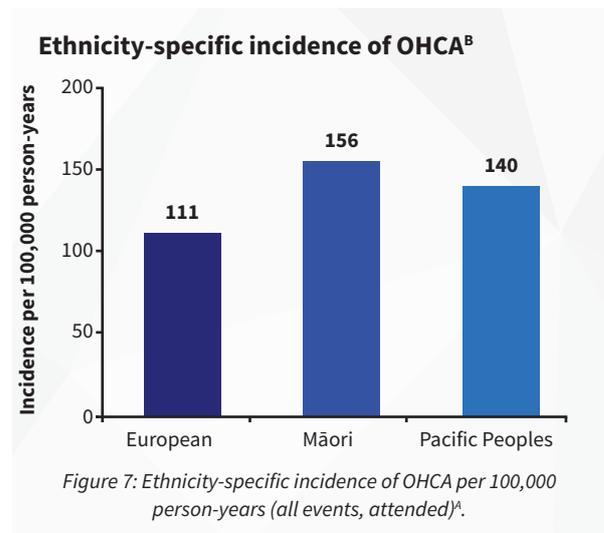
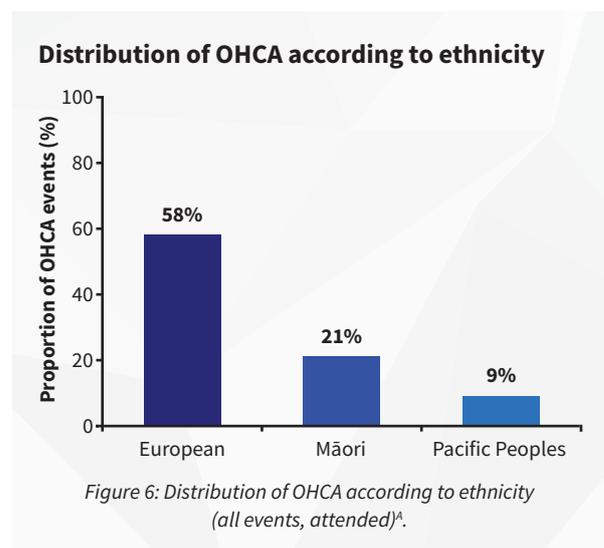
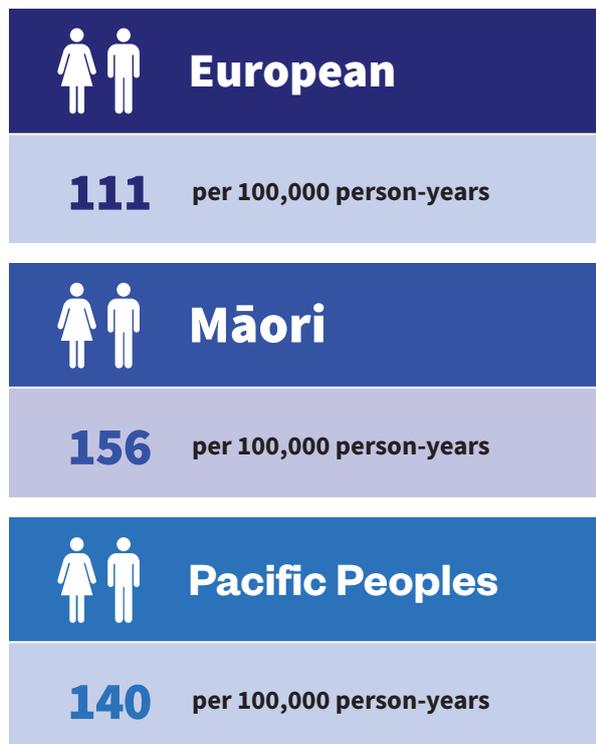
A All events, attended: includes adults, all-cause, resuscitation attempted and no resuscitation attempted. Excludes EAS personnel witnessed events and children.

B Age-specific incidence rates are based on Primary Health Organisation (PHO) Enrolment Demographics as at June 2022.



Ethnicity

The majority of OHCA events attended by EAS were for patients of European ethnicity, which reflects the NZ population demographics (Figure 6). When ethnicity-specific rates were evaluated, Māori and Pacific Peoples had a disproportionately higher incidence of OHCA compared with Europeans. Ethnicity-specific rates were calculated based on the Manatū Hauora Ministry of Health prioritised ethnicity categories⁶. Asian, Middle Eastern/Latin American/ African, and Other Ethnicities combined made up an additional 7% of cardiac arrests attended (data not shown). Data was unknown or missing for the remaining 5% of records.



A All events, attended: includes adults and children, all-cause, resuscitation attempted and no resuscitation attempted. Excludes EAS personnel witnessed events.
B Ethnicity-specific incidence rates are based on Primary Health Organisation (PHO) Enrolment Demographics June 2022.

Deprivation-specific rates^{A,B}

The NZDep2018 is a measure of socioeconomic deprivation calculated using census data⁷. Some of the factors included in this measurement of deprivation are: no access to the internet, receiving a means tested benefit, household income below a certain threshold, being 18–64 years old and unemployed, being 18–64 years old with no qualifications, not living in own home, a single parent family, household bedrooms less than occupancy threshold and no access to a car. The NZDep2018 quintiles range from Q1–5, where the 20% least deprived areas are scored as Q1, and the 20% most deprived are scored as Q5. The incidence of OHCA increases as deprivation increases (Figure 8).

Incidence across urban and rural/remote areas^C

A larger proportion of the New Zealand population is based within metropolitan centres and consequently a greater portion of OHCA events occurred within metropolitan localities (75%). However, the incidence rate for the urban population was lower (98 per 100,000 person-years) than the rural/remote population (127 per 100,000 person-years).

Precipitating events for adults

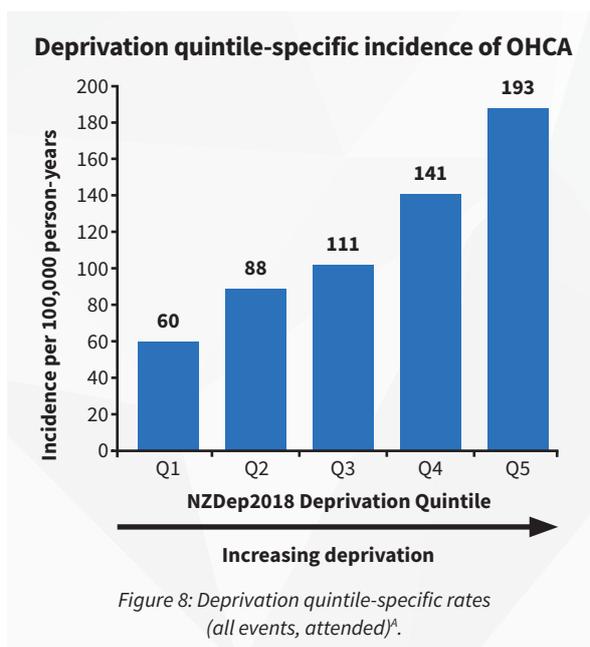
EAS personnel presume an OHCA to be of cardiac cause unless it is known or likely to have been caused by trauma, drowning, poisoning or any other non-cardiac cause. The most common aetiology of OHCA in adults where resuscitation was attempted was that of a presumed cardiac cause (Figure 9).

Precipitating causes for children

The occurrence of OHCA in children is significantly less than in adults. The leading cause of OHCA in children was respiratory arrest followed by Sudden Unexpected Death in Infancy (SUDI) (Figure 10).

OHCA location

The most common place for an OHCA to occur is in a person's home. The second most common place for an OHCA to occur is in a public area, which includes the workplace, the street, a shopping centre or similar (Figure 11).



A All events, attended: includes adults and children, all-cause, resuscitation attempted and no resuscitation attempted. Excludes EAS personnel witnessed events.

B Deprivation calculation: The NZDep2018 is a measure of socioeconomic deprivation assigned to a geographic area called a meshblock. The NZDep2018 quintile assigned to an event was derived from the incident location at the time of the event. Rates are based on Primary Health Organisation (PHO) Enrolment Demographics June 2022¹.

C Rural versus Urban (the location of the OHCA): These terms are derived from the Geographical Classification for Health as described in this publication: Whitehead J, Davie G, de Graaf B, Crengle S, Fearnley D, Smith M, Lawrenson R, Nixon G. Defining rural in Aotearoa New Zealand: a novel geographic classification for health purposes. *N Z Med J.* 2022 Aug 5;135(1559):24-40. This is a change from previous years' reporting..

Precipitating causes for adults

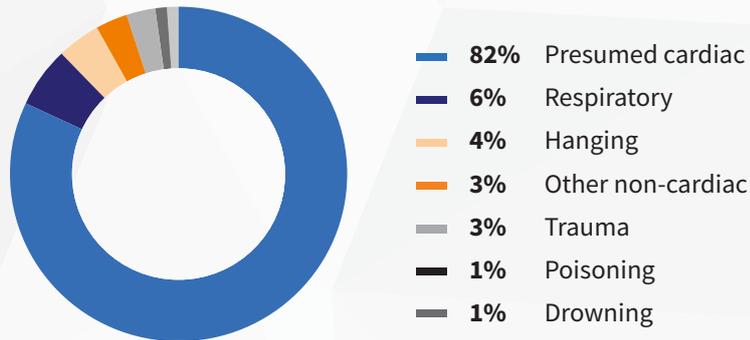


Figure 9: Precipitating causes for adults (all events, adult, resuscitation attempted)^A.

Precipitating causes for children

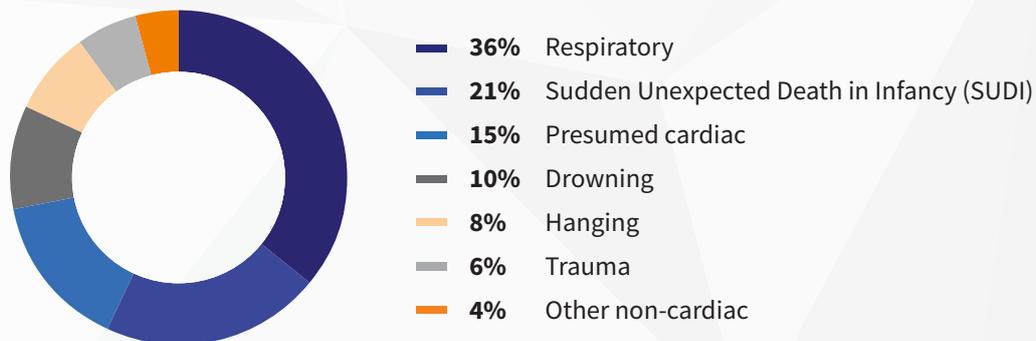


Figure 10: Precipitating causes for children (all events, child, resuscitation attempted)^B.

Location of OHCA

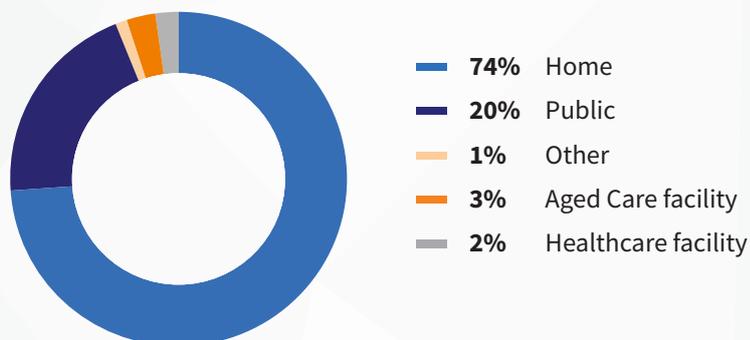
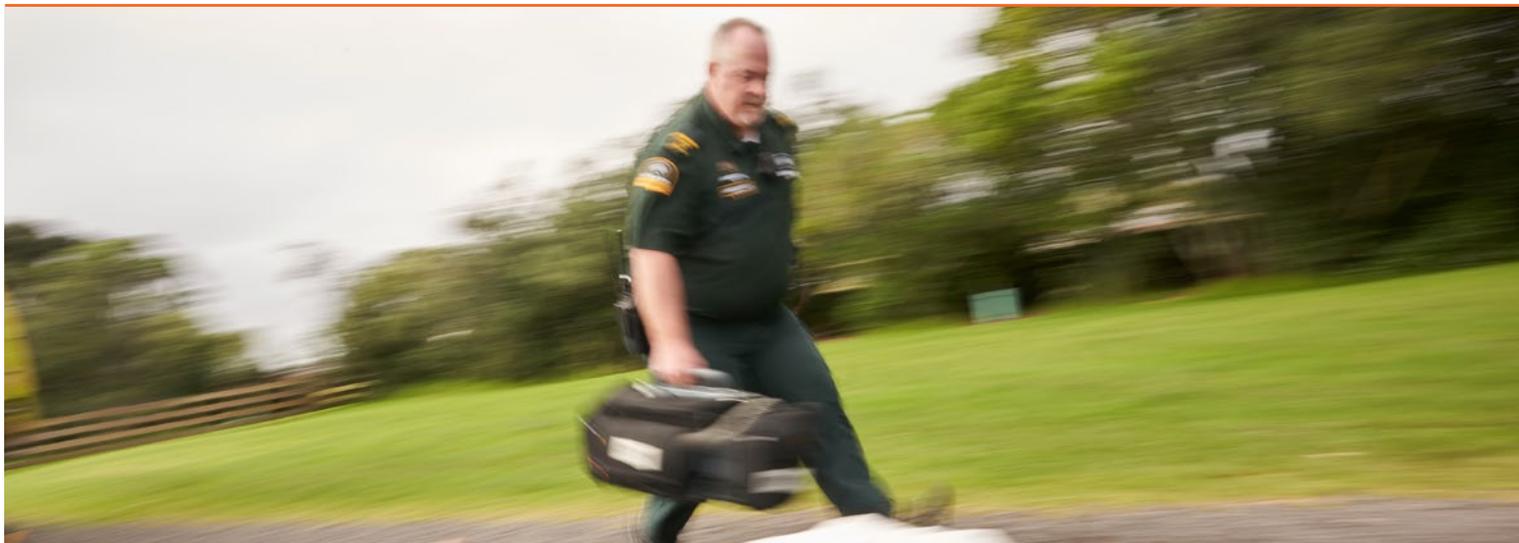


Figure 11: Location of OHCA for adults (all events, adult, resuscitation attempted)^A.

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

B All events, child, resuscitation attempted: includes children (< 15 years old), all-cause, resuscitation attempted. Excludes adults and EAS personnel witnessed events. Includes data from 1 July 2018 to 30 June 2022 combined.



Outcomes

Whakataunga

Adult outcome from all-cause cardiac arrest

The results from the OHCA Registry show an event survival rate (ROSC sustained to hospital handover) of 22%.

The rate of survival to 30 days in adults where resuscitation was attempted was 11%. In the 2021/2022 reporting period, there were 52 OHCA survivors per million population. Figure 12 shows the rolling two year OCHA survival per million population.

Utstein Comparator Group

The international benchmarking of OHCA outcomes also compares survival rates for a specific group of patients. This subgroup is referred to as the Utstein Comparator Group and requires the following criteria to be met: adults (≥ 15 years old), all-cause, resuscitation attempted, shockable presenting rhythm, bystander witnessed and excluding EAS personnel witnessed events.

In the current reporting period, there were 592 cardiac arrests that met the Utstein criteria. This subgroup of patients represented approximately 25% of all events where resuscitation was attempted.

For this selected subgroup the rate of 30-day survival was 29%. This result is benchmarked against other services within the executive summary (Table 3).

All OHCA survival per million population

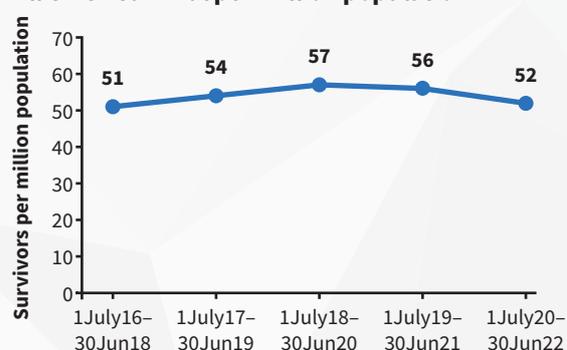


Figure 12: Survival per million outcome for all-cause OHCA (all events, adult, resuscitation)^A

Outcomes for all-cause OHCA in adults^A 2021/22

22%
ROSC

11%
30-day survival

Outcomes for OHCA in the Utstein Comparator Group^B 2021/22

44%
ROSC

29%
30-day survival

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

B 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.

Scene outcome for OHCA in adults

One of the contributing factors to patient survival is good quality chest compressions during CPR. Performing CPR during the transport of a patient following an OHCA may compromise the quality of the CPR being delivered. Therefore, in the majority of OHCA events, it is appropriate to continue resuscitation at the scene until either ROSC occurs or resuscitation is ceased. This is reflected in the scene outcomes observed in adult patients where resuscitation was attempted (Figure 13).

Adult outcomes according to presenting rhythm

Patients who present with a shockable rhythm such as ventricular fibrillation (VF) or ventricular tachycardia (VT) have a greater chance of survival than patients who present with a non-shockable rhythm such as pulseless electrical activity (PEA) or asystole (Figure 14).

EAS personnel witnessed outcomes

If a patient presents with a shockable rhythm and the arrest is witnessed by EAS personnel, the immediate intervention of defibrillation can lead to the best outcomes. Of the adult patients who had a shockable presenting rhythm where the arrest was witnessed by EAS personnel, the rate of event survival was 74% and survival to 30 days was 55% (data not shown).

Outcomes according to age

New Zealand has an aging population. It is important to review whether outcomes vary with age. People aged 80 years and over at the time of their cardiac arrest had the lowest percentage survival compared to younger people (Figure 15).

Scene outcome for all-cause OHCA in adults

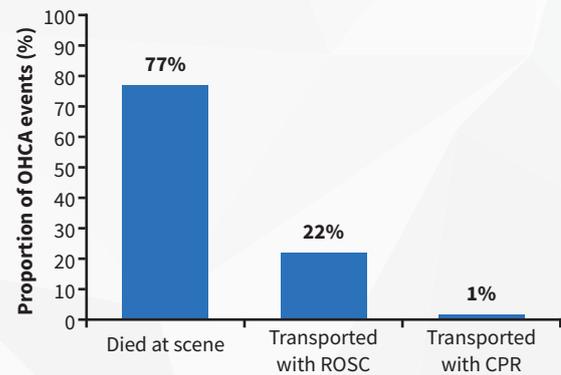


Figure 13: Scene outcome for all-cause OHCA (all events, adult, resuscitation attempted)^A.

Outcomes of OHCA in adults according to presenting rhythm

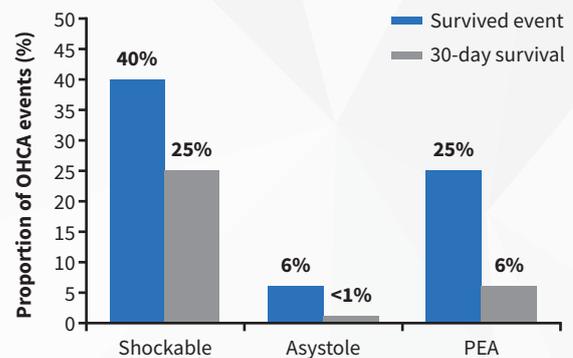


Figure 14: Outcomes for OHCA according to presenting rhythm (all events, adult, resuscitation attempted)^A.

Outcomes of OHCA according to age

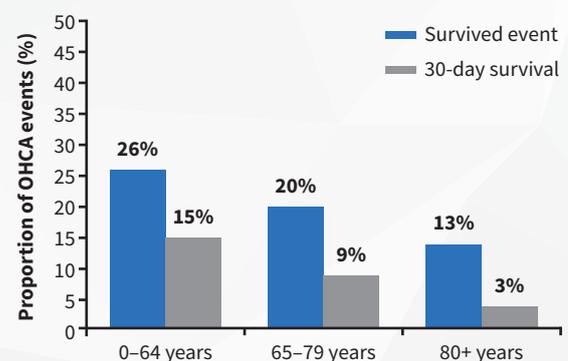
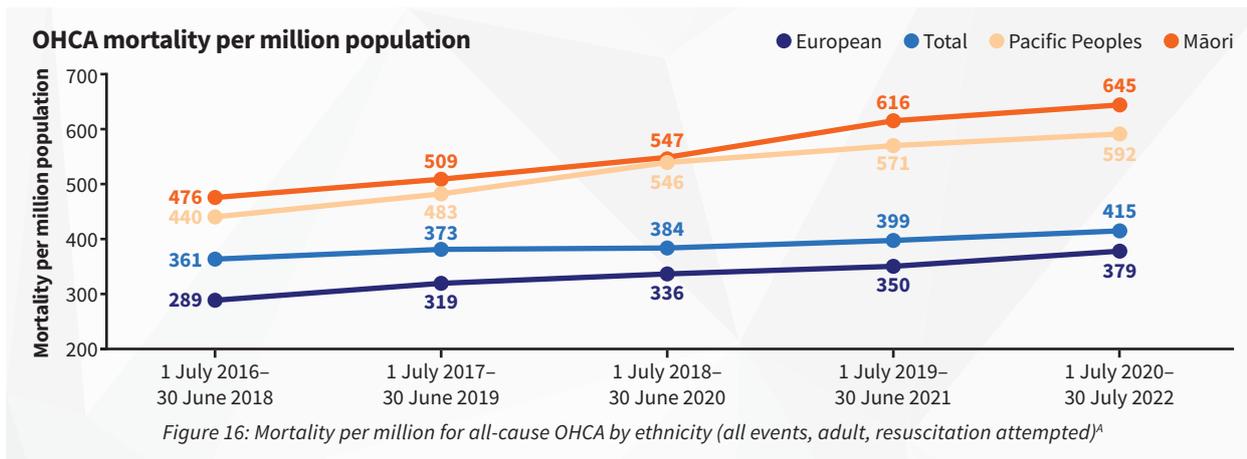


Figure 15: Influence of age on outcomes (all events, adults and children, resuscitation attempted)^B.

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

B All events, adults and children, resuscitation attempted: includes adults and children, all-cause, resuscitation attempted. Excludes EAS personnel witnessed events.



Adult outcomes according to ethnicity

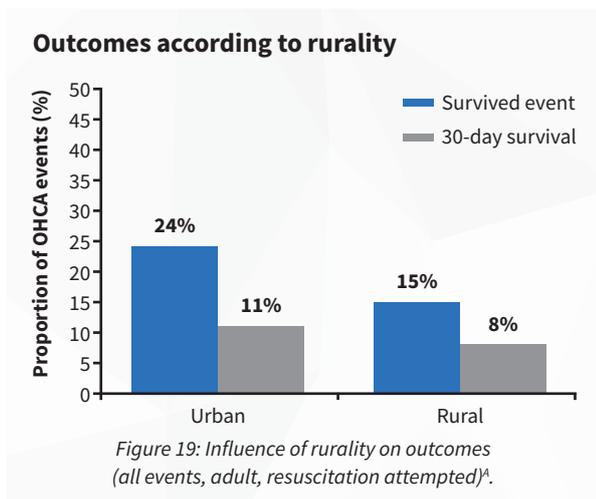
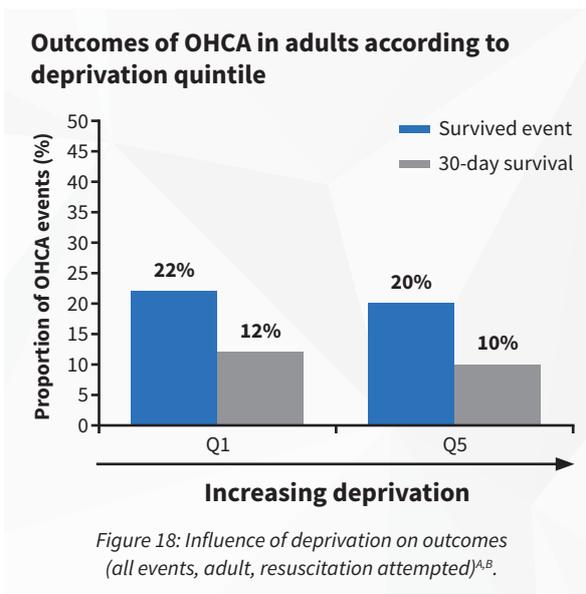
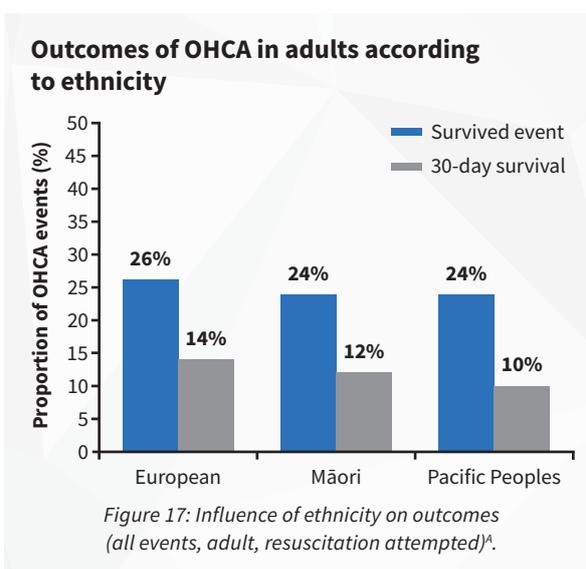
Figure 16 shows the rolling two year OHCA mortality per million population. OHCA mortality per million is higher in Māori and Pacific Peoples (Figure 16). In this reporting period Māori and Pacific Peoples had a lower 30-day survival than Europeans (Figure 17). It is likely that there are greater differences in outcomes according to ethnicity. However, the overall numbers of Māori and Pacific patients are small and thus may not be truly representative.

Adult outcomes according to deprivation

The incidence of OHCA increases with increasing socioeconomic deprivation. Compared to the least deprived quintile (Q1), those in the most deprived quintile (Q5) had lower event and 30-day survivals (Figure 18).

Adult outcomes according to rurality

Incidents that occurred in rural locations also had lower event and 30-day survivals than those that occurred in urban settings (Figure 19).



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

B Deprivation calculation: The NZDep2018 provides a measure of social deprivation for every locality in New Zealand, based on census and other social data. Thus, the outcomes of every OHCA can be looked at in terms of social deprivation, according to the location where they occur. Social deprivation is categorised into five groupings known as quintiles⁷.

The community response is fundamental to improving outcomes from OHCA

Adult outcomes according to GoodSAM responder presence

GoodSAM (Good Smartphone Activated Medics) is a cell phone application that alerts community responders to nearby cardiac arrests (www.goodsamapp.org). Anyone who is trained in CPR and how to use an AED is able to register as a GoodSAM responder (youtu.be/EPwY3yGj8IY). Currently there are 9,961 people registered as GoodSAM responders in New Zealand.

In the 4 year period (1 July 2018 to 30 June 2022), a GoodSAM responder was present at 1 in 10 confirmed cardiac arrests. When a GoodSAM responder was present both event survival and 30-day survival were increased compared to events where there was no GoodSAM responder (Figure 3, page 8).

Adult outcomes according to defibrillation by Fire and Emergency New Zealand

During this reporting period Fire and Emergency New Zealand personnel were present at 97% of adult OHCA events where resuscitation was attempted by EAS. When Fire and Emergency New Zealand or First Response Group defibrillation occurred prior to EAS arrival, both event survival and 30-day survival were increased (Figure 20).

Adult outcomes according to community defibrillation

When community defibrillation occurred prior to EAS arrival both event survival and 30-day survival were increased. Community members were fundamental in the early defibrillation of 112 adult patients in cardiac arrest, 49% of these people survived to 30 days compared with only 7% of people that did not receive community defibrillation prior to EAS arrival (Figure 2, page 7).

Fire and Emergency New Zealand or First Response Group defibrillation prior to EAS arrival

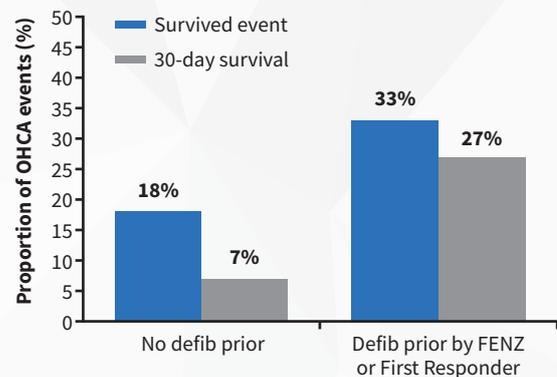


Figure 20: Influence of Fire and Emergency New Zealand or First Response Group defibrillation on outcomes (all events, adult, resuscitation attempted)^A.



Conclusion

Mutunga

The data presented in this report represent the 2021/22 results from the Aotearoa New Zealand National OHCA registry. Year on year, these reports provide an update on how the EAS is performing in the crucial management of OHCA.

Appendices

The Aotearoa New Zealand National Out-of-Hospital Cardiac Arrest Registry

Eligibility

The registry captures data on all OHCA events attended by 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.

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.

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 the ambulance service 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 the 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 the 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

If a patient dies, 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 New Zealand.

Missing data

This current OHCA report is based on full electronic data capture of EMS records. By contrast, in the 2018/19 period Hato Hone St John used paper data capture for a hiatus of 6 months (Dec 2018 to July 2019) due to industrial disruption. This likely affected the quality of data and makes comparisons between 2018/19 and the current period less exact.

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	PEA	Pulseless electrical activity
CAD	Computer aided dispatch	PHO	Primary Health Organisation
CPR	Cardiopulmonary resuscitation	ROSC	Return of spontaneous circulation
EAS	Emergency ambulance service	SUDI	Sudden unexpected death in infancy
EMS	Emergency medical services	VF	Ventricular fibrillation
GoodSAM	Good Smartphone Activated Medics	VT	Ventricular tachycardia
OHCA	Out-of-hospital cardiac arrest		



Glossary of terms

Adjusted rates	Rates are standardised to a control population.
Adult	Patients aged 15 years or older.
Asystole	The absence of any cardiac electrical activity.
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	The performance of CPR by or under the direction of 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. ⁹ 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. ⁹ 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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