Out-of-Hospital Cardiac Arrest Registry

Rēhita Mate Manawa mō waho i te Hōhipera

Aotearoa New Zealand, National Report 2018/19

St John

WELLINGTON FREE AMBULANCE kia ora te tangata

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Contents

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Publication date: February 2020
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ISSN 2703-4100

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Introduction
Whakatakinga

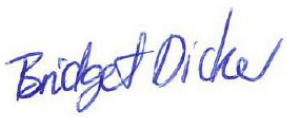
Every year in New Zealand over 2,000 people are treated for a cardiac arrest that occurs in the community. With only one in ten New Zealanders surviving to 30-days, death from cardiac arrest is our 'silent toll'. It can happen to anyone of any age, including children.

We remain focused on reducing this toll through the delivery of quality care, but we can't do it alone. We need all New Zealanders to help by knowing how to perform CPR and use a defibrillator (or AED). Survival is largely due to the quick actions of bystanders who initiate CPR and use an AED within the first few minutes of a cardiac arrest. Outcomes from out-of-hospital cardiac arrest (OHCA) are dramatically improved when a patient receives early CPR and defibrillation. The more people who know how to do CPR and have access to an AED in the community, the greater the chance of patient survival. For every minute without CPR or defibrillation, a patient's chance of survival falls by 10–15 percent. We believe that community initiatives such as free CPR awareness training, Restart A Heart Day, CPR in schools, and the GoodSAM smartphone application will improve survival from OHCA.

Alongside the community, the ambulance service has a strong influence on outcomes. Out-of-hospital cardiac arrest is the most time-critical and time-dependent condition to which the ambulance service responds. We benchmark ourselves internationally on our resuscitation performance as it tests all aspects of our system of care, from the community response to advanced life support. Benchmarking requires measurement and our Aotearoa New Zealand cardiac arrest registry enables this.

This continuous measurement determines whether making changes improves patient outcomes, and identifies further steps for improvement.

We are very pleased to present the 2018 – 2019 Aotearoa New Zealand, National Out-of-Hospital Cardiac Arrest Registry Annual Report.



Dr Bridget Dicker
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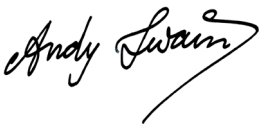

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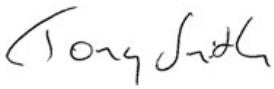

Dr Tony Smith
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About this report
Mō tēnei pūrongorongo

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 is for all OHCA attended by the St John and Wellington Free Ambulance EAS in the period from 1 July 2018 to 30 June 2019.

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.

All population figures in this report are derived from either Statistics New Zealand population data or the Ministry of Health Primary Health Organisation (PHO) enrolment data[1].

Executive summary
Tuhinga whakarāpopoto nui

5 people a day

(approx) were treated for an out-of-hospital cardiac arrest in New Zealand (more than 2,000 per year)

28% female,
72% male

76%
of patients received bystander CPR

4%
received defibrillation by a Community Responder prior to ambulance arrival

The median time in which an EAS ambulance reached a patient was **8 minutes** in urban communities and **13 minutes** in rural and remote communities

92%
of events were co-responded to and attended by Fire and Emergency New Zealand

27%
of patients survived the event (had a pulse on arrival at hospital)

14%
of patients survived

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

Benchmarking executive summary

Tuhinga whakarāpopoto Panekiretanga

Key figures for all-cause events

Table 1: Key figures for all-cause events [A]

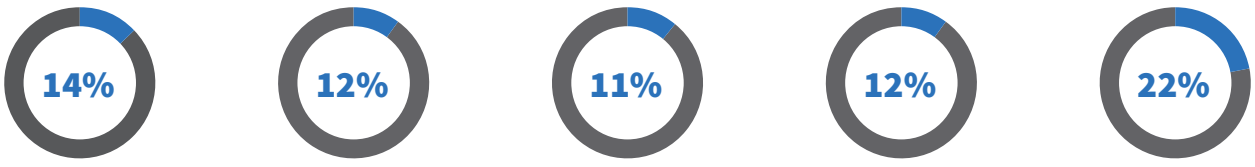
Year	Total number events	% Bystander CPR	% Community Responder AED use	Urban median response time	Rural & remote median response time	% Attended by Fire & Emergency New Zealand	% ROSC on handover	% Survival
2018/19	2,010	76%	4%	8	13	92%	27%	14%

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 [B]	Collection period	Total number events	% ROSC on handover	% Survival [C]
New Zealand	1 July 2018 to 30 June 2019	2,010	27%	14%
Ambulance Victoria[2]	1 July 2018 to 30 June 2019	3,036	29%	12%
London Ambulance Service[3]	1 April 2018 to 31 March 2019	4,004	36%	11%
St John Ambulance Western Australia[4]	1 January 2018 to 31 December 2018	971	22%	12%
King County EMS[5]	1 January 2018 to 31 December 2018	757	51%	22%



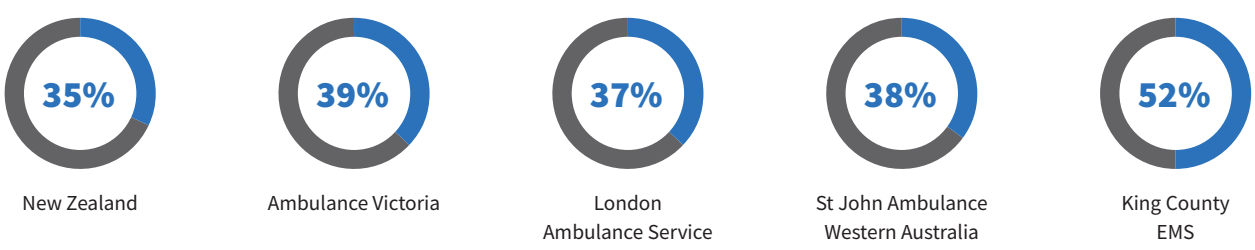
A **All events, adult, resuscitation attempted:** includes adults (≥ 15 years old), all-cause, resuscitation attempted. Excludes children, and EAS personnel witnessed events.
B London Ambulance Service includes only those with a presumed cardiac cause.
C New Zealand reports on survival to 30-days, all other services report survival to hospital discharge.

Benchmarking (Utstein Comparator Group)[A]

The outcomes of OHCA for international benchmarking compare rates of ROSC sustained to hospital handover and survival for a specifically selected subgroup of patients. This subgroup is referred to as the Utstein Comparator Group and 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[B]	Collection period	Total number events	% ROSC on handover	% Survival[C]
New Zealand	1 July 2018 to 30 June 2019	588	52%	35%
Ambulance Victoria[2]	1 July 2018 to 30 June 2019	504	57%	39%
London Ambulance Service[3]	1 April 2018 to 31 March 2019	533	63%	37%
St John Ambulance Western Australia[4]	1 January 2018 to 31 December 2018	215	46%	38%
King County EMS[3]	1 January 2018 to 31 December 2018	182	74%	52%



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 London Ambulance Service includes only those with a presumed cardiac cause.

C New Zealand reports on survival to 30-days, all other services report survival to hospital discharge.

Incidence and demographics
Taupori pāpātanga me Taupori āhuatanga

Key figures for adults (≥ 15yrs) and children

Adults[A]
(all events, adult, attended)

98% of OHCA events occurred in adults

119.6 per 100,000 person-years was the incidence rate

45% was the proportion of OHCA events where a resuscitation attempt occurred

Children[B]
(all events, children, attended)

2% of OHCA events occurred in children

11.2 per 100,000 person-years was the incidence rate

65% was the proportion of OHCA events where a resuscitation attempt occurred

Females

31% of OHCA events occurred in females

69 years was the median age for females

71.9 per 100,000 person-years was the incidence for adult females

Males

69% of OHCA events occurred in males

65 years was the median age for males

171.3 per 100,000 person-years was the incidence for adult males

Girls

47% of OHCA events occurred in girls

12 months was the median age for girls

Boys

52% of OHCA events occurred in boys

12 months was the median age for boys

The age-adjusted incidence[C] 2018/19

92.6 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.

C 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

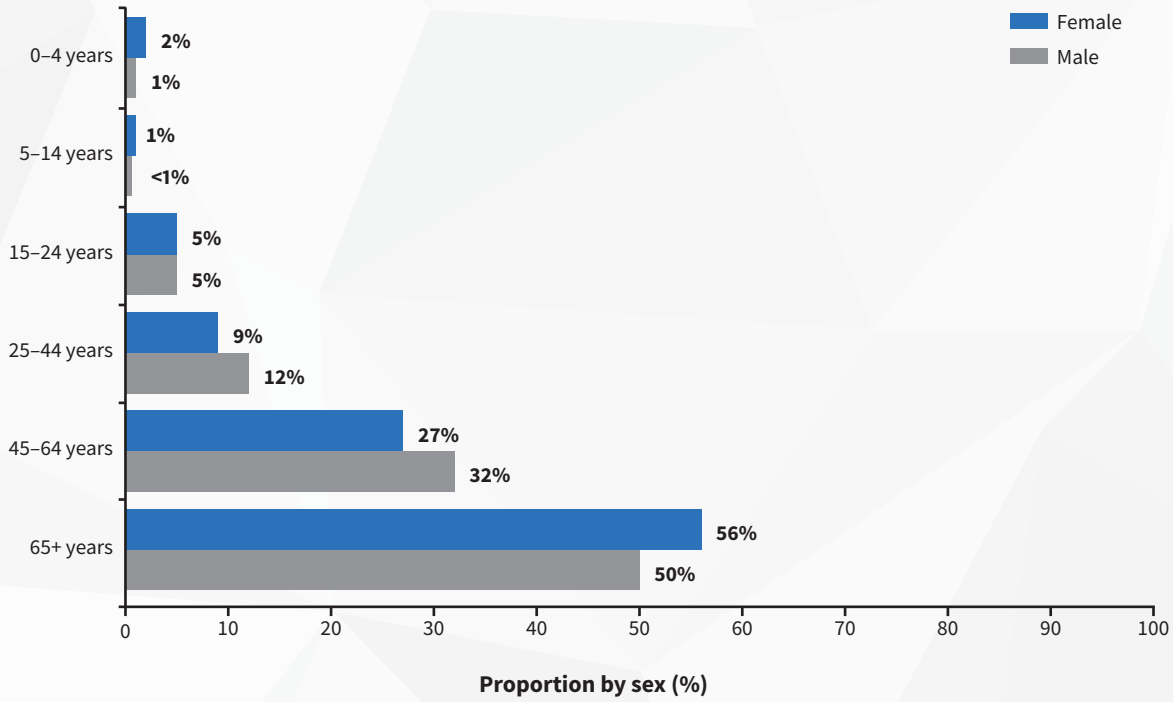


Figure 1: Age distribution of OHCA (all events, attended)[A].

Age-specific incidence of OHCA

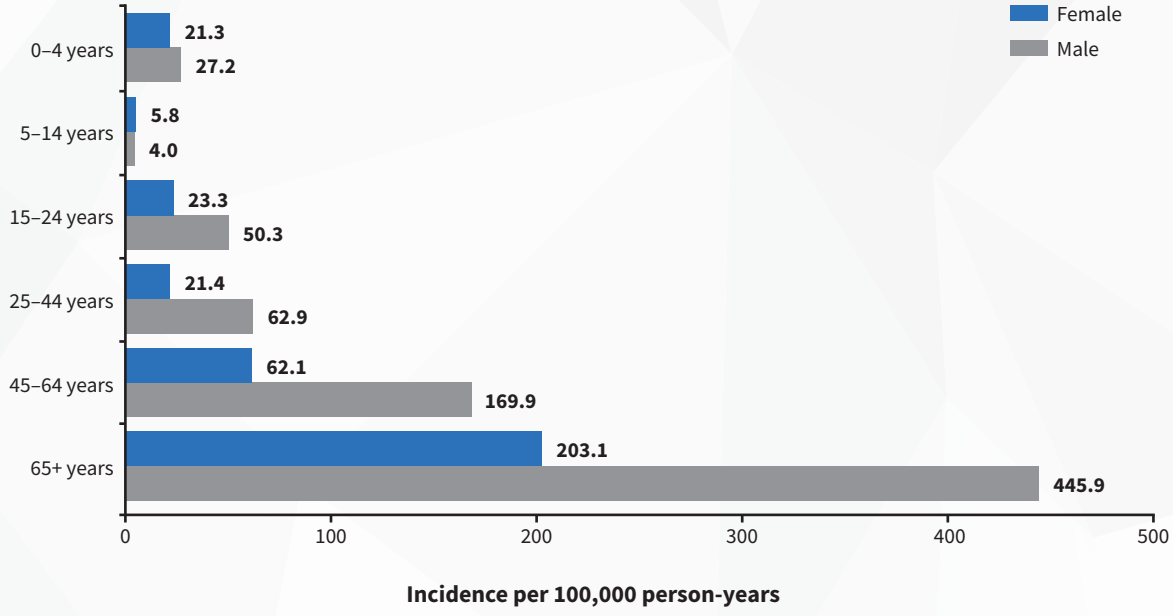


Figure 2: Age-specific rate of OHCA (all events, attended)[A].

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 almost every stage of life (Figure 2).

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

Ethnicity

The majority of OHCA events attended by EAS were for patients of European ethnicity, which reflects the NZ population demographics (Figure 3). 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 New Zealand Ministry of Health prioritised ethnicity categories[6]. Asian, Middle Eastern/Latin American/ African, and Other Ethnicities combined made up less than 5% of cardiac arrests attended.

European

96.8 per 100,000 person-years

Māori

131.7 per 100,000 person-years

Pacific Peoples

109.3 per 100,000 person-years

Distribution of OHCA according to ethnicity

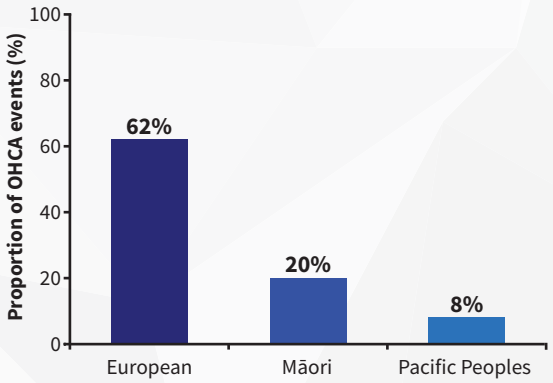


Figure 3: Distribution of OHCA according to ethnicity (all events, attended)[A].

Ethnicity-specific incidence of OHCA[B]

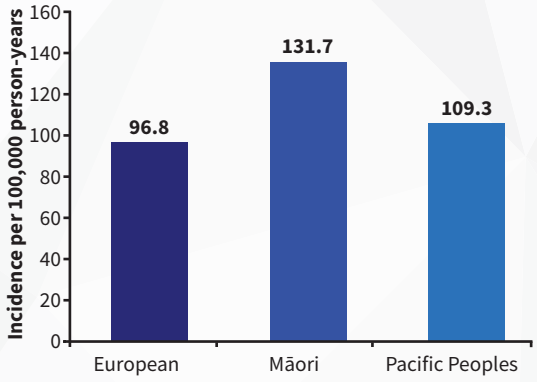


Figure 4: Ethnicity-specific incidence of OHCA per 100,000 person-years (all events, attended)[A].

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 2019 Q3 (July to Sept 2019)[1].

Deprivation-specific rates[A,B]

The NZDep2013 is a measure of socioeconomic deprivation calculated using census data. Some of the factors included in this measurement of deprivation are: no access to the internet, receiving a means tested benefit, household income below an income 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 NZDep2013 quintiles range from Q1–5, where the 20% least deprived areas are scored as Q1, and the most deprived 20% are scored as Q5[7]. The incidence of OHCA increases as deprivation increases (Figure 5).

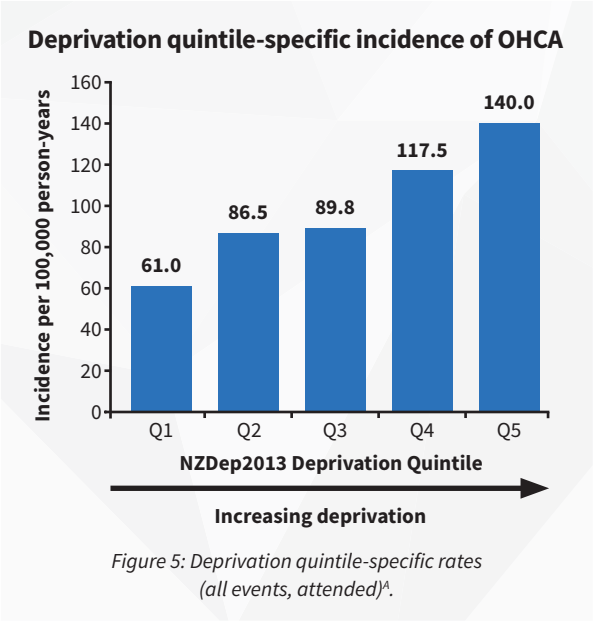


Figure 5: Deprivation quintile-specific rates (all events, attended)[A].

Incidence across urban and rural/remote areas[A]

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 (71%). The incidence rate for the urban population was 84.1 per 100,000 person-years and for the rural/remote population was 118.8 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, which constituted 81% of events. (Figure 6).

Precipitating causes for children

The occurrence of OHCA in children is significantly less than in adults. During the period of this report, the leading cause of OHCA in children was respiratory arrest followed by Sudden Unexpected Death in Infancy (SUDI) (Figure 7).

OHCA location

The most common place for an OHCA to occur is in a person's home, with 70% of events where resuscitation was attempted occurring at home. The second most common place for an OHCA to occur is in a public area (22%), which includes the workplace, the street, a shopping centre or similar (Figure 8).

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 NZDep2013 is a measure of socioeconomic deprivation assigned to a geographic area called a meshblock. The NZDep2013 quintile assigned to an event was derived from the incident location at the time of the event.

Precipitating causes for adults

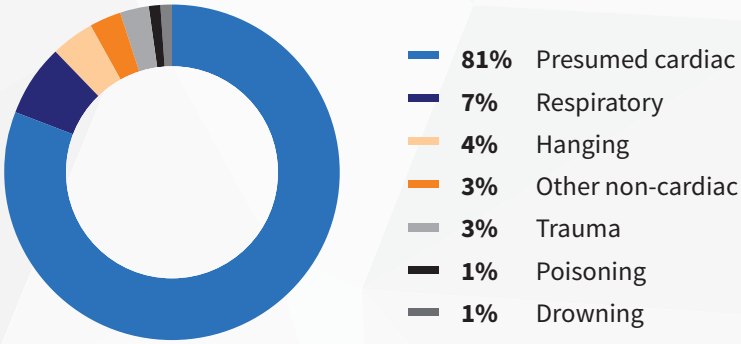


Figure 6: Precipitating causes for adults (all events, adult, resuscitation attempted)[A].

Precipitating causes for children

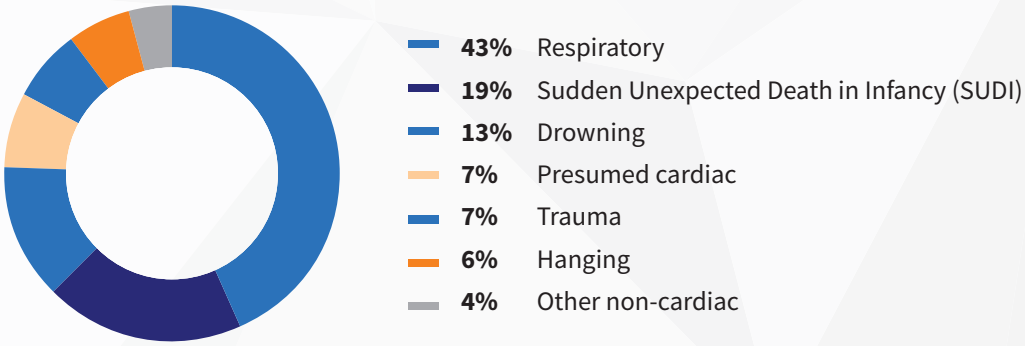


Figure 7: Precipitating causes for children (all events, child, resuscitation attempted)[B].

Location of OHCA

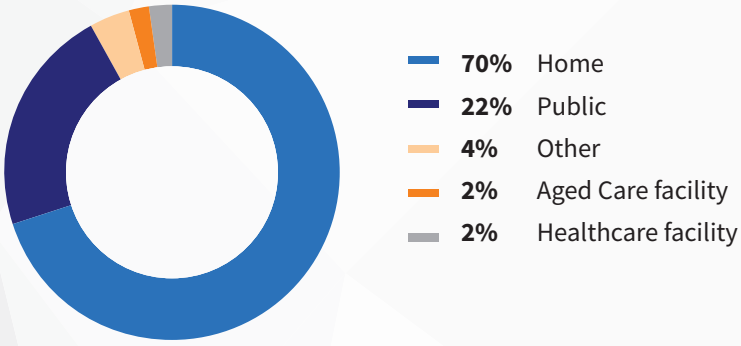


Figure 8: Location of OHCA for adults (all events, adult, resuscitation attempted)[A].

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.

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 27%.

The rate of survival to 30 days in adults where resuscitation was attempted was 14%.

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: includes 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 588 cardiac arrests that met the Utstein criteria. This subgroup of patients represented approximately 30% of all events where resuscitation was attempted.

For this selected subgroup the rate of 30-day survival was 35%. This result is benchmarked against other services within the executive summary (Table 3).

Outcomes for all-cause OHCA in adults[A] 2018/19

27%	14%
ROSC	30-day survival

Outcomes for OHCA in the Utstein Comparator Group[B] 2018/19

52%	35%
ROSC	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 9). The overall percentage of patients transported with CPR in place was 2%, transported with ROSC was 28% and died at the scene was 70%.

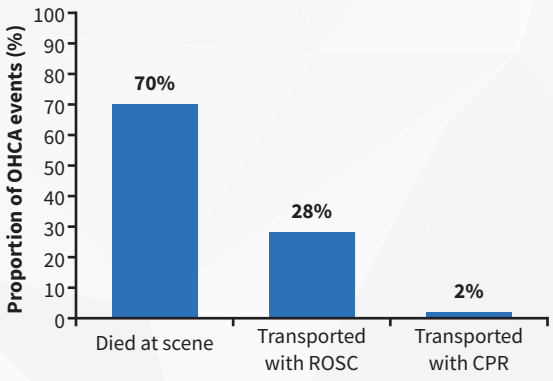


Figure 9: Scene outcome for all-cause OHCA (all events, adult, resuscitation attempted)[A].

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 10).

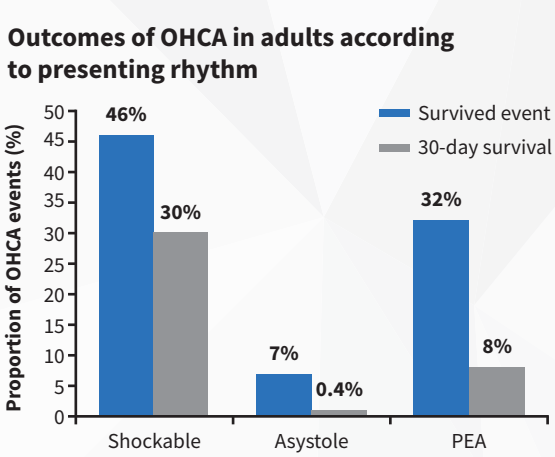


Figure 10: Outcomes for OHCA according to presenting rhythm (all events, adult, resuscitation attempted)[A].

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 78% and survival to 30-days was 55% (not shown).

Outcomes according to age

New Zealand has an aging population. It is important to review whether outcomes vary with age. Those who were 80 and over at the time of their cardiac arrest had the lowest percentage survival compared to those who were younger (Figure 11).

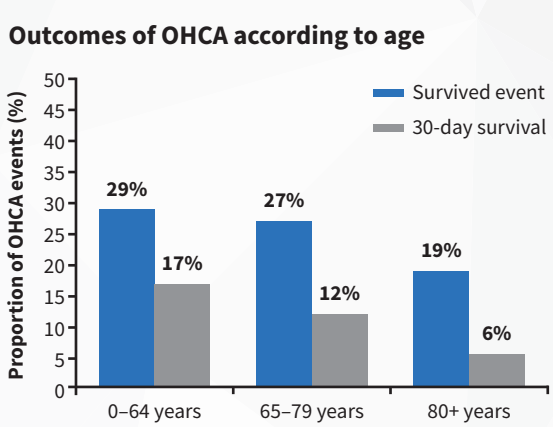


Figure 11: Influence of age on outcomes (all events, adults and children, resuscitation attempted)[B].

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

Rates of OHCA are higher in Māori and Pacific Peoples compared to European. Māori and Pacific Peoples had a lower 30-day survival than European (Figure 12). It is likely that there are greater differences in outcomes according to ethnicity. However, this data is only for a single year therefore the overall numbers of Māori and Pacific patients (n=432 and n=211 respectively) are small and thus may not be truly representative.

Adult outcomes according to deprivation

Incidence of OHCA increases with increasing socioeconomic deprivation. Compared to the least deprived quintile (Q1), those in the most deprived quintile (Q5) had lower 30-day survival (Figure 13).

Adult outcomes according to rurality

Incidents that occurred in rural locations also had lower event survival and 30-day survival than those that occurred in urban settings (Figure 14).

Outcomes of OHCA in adults according to ethnicity

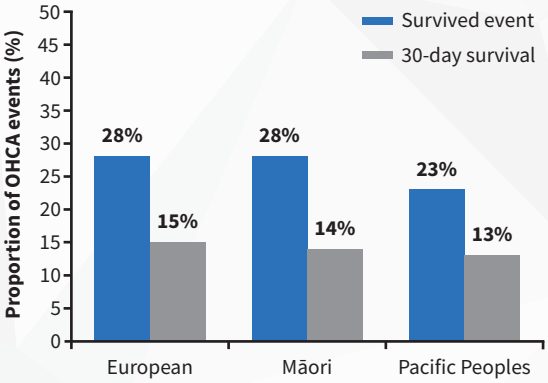


Figure 12: Influence of ethnicity on outcomes (all events, adult, resuscitation attempted)[A].

Outcomes of OHCA in adults according to deprivation quintile

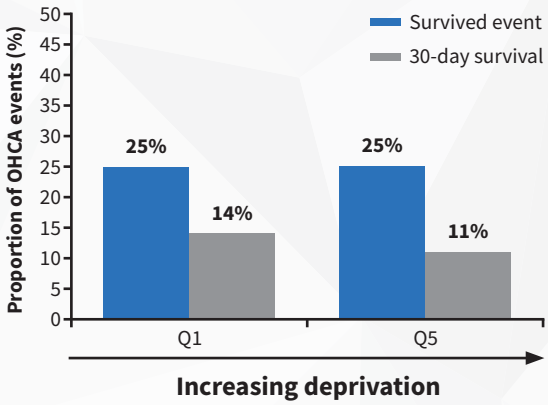


Figure 13: Influence of deprivation on outcomes (all events, adult, resuscitation attempted)[A,B].

Outcomes according to rurality

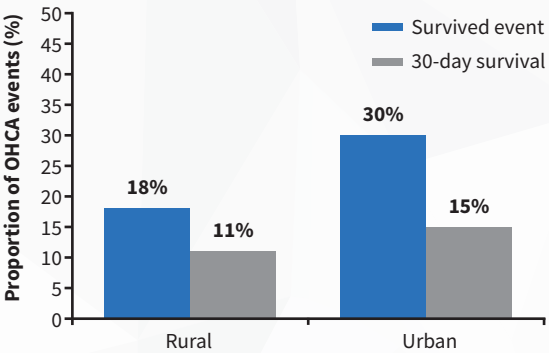


Figure 14: Influence of rurality on outcomes (all events, adult, resuscitation attempted)[A].

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

B **Deprivation calculation:** The NZDep2013 is a measure of socioeconomic deprivation assigned to a geographic area called a meshblock. The NZDep2013 quintile assigned to an event was derived from the incident location at the time of the event[7].

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 (**https://youtu.be/EPwY3yGj8IY**).

In 12% of all confirmed cardiac arrests a GoodSAM responder was present. 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 15).

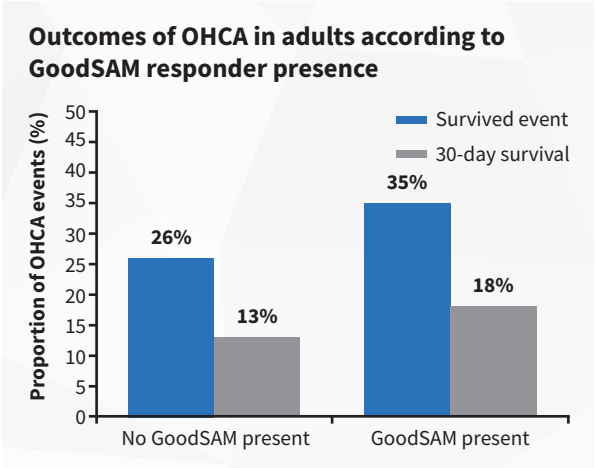


Figure 15: Influence of GoodSAM responder presence on outcomes (all events, adult, resuscitation attempted)[A].

Adult outcomes according to defibrillation by Fire and Emergency New Zealand

During this reporting period Fire and Emergency New Zealand personnel were present at 92% 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. Fire and Emergency New Zealand were fundamental in the early defibrillation of 169 adult patients in cardiac arrest, 22% of these survived to 30-days compared with only 11% that did not receive defibrillation prior to EAS arrival (Figure 16).

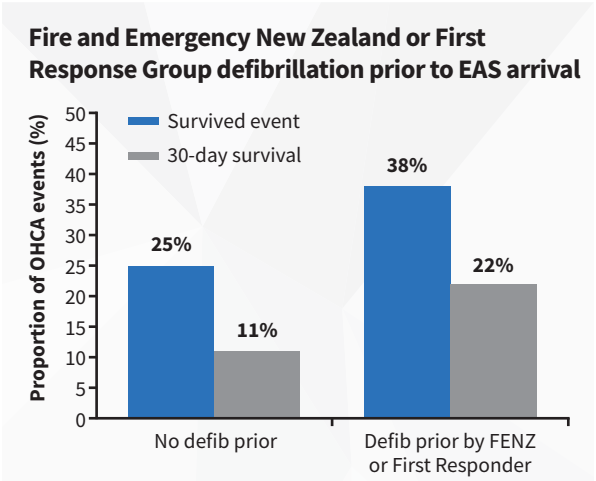


Figure 16: Influence of Fire and Emergency New Zealand or First Response Group defibrillation on outcomes (all events, adult, resuscitation attempted)[A].

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 86 adult patients in cardiac arrest, 48% of these survived to 30-days compared with only 11% that did not receive community defibrillation prior to EAS arrival (Figure 17).

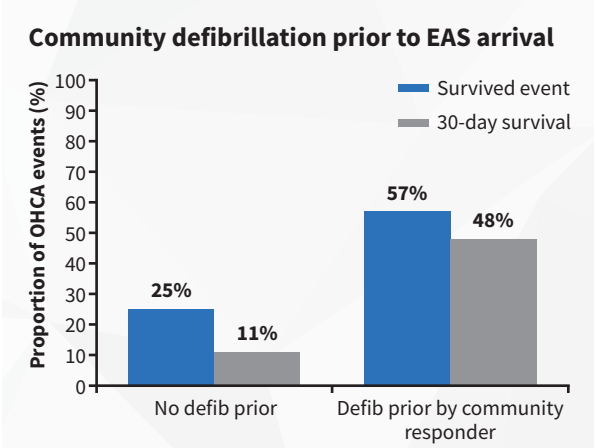


Figure 17: Influence of community defibrillation on outcomes (all events, adult, resuscitation attempted)[A].

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

Conclusion
Mutunga

The data presented in this report represent the 2018/19 results from the Aotearoa New Zealand National OHCA registry. They provide a substantive benchmark from which continuous improvements can be made.

Appendices

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

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

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 4 and Table 5.

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 Australian 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 Clinical Control 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.

Table 4: 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	› 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 5: 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

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.

If a patient dies the date of death is updated by the 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

A period of industrial action occurred within the St John jurisdiction between December 2018 and July 2019. During this period there were 288 records that were transcribed manually into the electronic platform from paper records. It is unknown if there were additional records that went missing during this time. However, the total number of records within the registry is similar to previous years, therefore it is likely the amount of missing data is less than 5%.

These data do not include any patients from the Christchurch Mosque shootings that occurred on March 15th 2019.

Ethical review

The OHCA Registry has been approved by the New Zealand Health and Disability Ethics Committee (Ethics reference: 19/NTB/187).

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

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	Where EAS personnel respond to a medical emergency in an operational capacity as part of an organised medical response team.
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, normal end tidal CO_2 or normal movement.

Rural and remote service area	**Includes:** Minor urban area: centred on smaller towns with a population between 1,000 and 9,999. **and** Rural centre: rural settlements or townships with population between 300 and 999. **and** Other: areas not classified as urban or rural centres with population under 300. (http://nzdotstat.stats.govt.nz/wbos/Index.aspx)
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	**Includes:** Main urban area: centred on a city or major urban area with a minimum population of 30,000. **and** Secondary urban area: centred on large regional centres with a population between 10,000 and 29,999. (http://nzdotstat.stats.govt.nz/wbos/Index.aspx)
Witnessed event	A witnessed cardiac arrest is one that is seen or heard by another person.

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