



OUT-OF-HOSPITAL CARDIAC ARREST REGISTRY

Summary Report
2021/22



**WELLINGTON
FREE AMBULANCE**
kia ora te tangata

Quality Improvement and Innovation

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HOW SOPHIA'S SIBLINGS HELPED SAVE HER LIFE WITH CPR

When Marlene was alerted to a child drowning in the family pool at their home, she never imagined it would be her 16-year-old daughter Sophia, a very confident swimmer.

As Marlene rushed to the pool with her son Elliott, she discovered Sophia's sister Brittany had jumped in and dragged Sophia from the bottom of the pool and Brittany and Elliott frantically tried to revive her with lifesaving CPR.

All the Phillips children are passionate surf lifeguards – meaning they are trained in CPR. This was to prove one of the most important tests of those resuscitation skills as they hastily worked to save their sister's life.

Meanwhile Wellington Free Ambulance Medical Director Dr Andy Swain was enjoying a refreshing afternoon ocean swim at nearby Oriental Bay beach. Noting the multiple emergency responders descending on a local house, Dr Andy headed towards the commotion to see if his medical assistance was needed by his colleagues.

The scene at the home was one of action – all emergency responders – FENZ, Wellington Free Ambulance and Police working together to save the young girl's life. Sophia's brother and sister had done a wonderful job using CPR to maintain the flow of oxygenated blood to her vital organs until the emergency services arrived. They quickly swung into action giving her heart two shocks with a defibrillator, the whole team worked in unison to try and stabilise Sophia enough for the ambulance to take her to hospital.

Sophia was still gravely unwell, but alive, largely thanks to the quick thinking and action of her brother and sister for immediately starting CPR.



"I know that Sophia would not be with us today if her brother and sister had not known CPR, it is such an important skill for anyone to have and no one ever knows when they might need to do it to save a life" reflects Marlene.

Sophia spent five days in Wellington Hospital's ICU but remarkably and despite all predictions regained consciousness and was discharged only 8 days after her drowning. It was later discovered that Sophia has a rare genetic heart condition called Long QT that can cause cardiac arrest.

Remarkably just seven months on Sophia is almost back to full strength, back at school, enjoying time with family and friends and looking to the future. Sophia experiences fatigue from time to time but is largely back to how things were before this life changing medical event.

The Phillips family and some of their friends recently did a Lloyd Morrison Foundation Heartbeat course. Heartbeat is the Wellington Free Ambulance CPR training that is freely available to anyone in the Greater Wellington

and Wairarapa thanks to the generous support of Julie Nevett and The Lloyd Morrison Foundation.

Senior Heartbeat Co-ordinator Rachel Evans says “our goal is to make sure that as many people as possible know how to do CPR, because early CPR combined with the use of an AED can increase a person’s chance of survival from a sudden cardiac arrest by up to 80%.”

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 the Wellington Free Ambulance EAS in the period from 1 July 2021 to 30 June 2022.

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



were treated for an out-of-hospital cardiac arrest by Wellington Free Ambulance

27% female
73% male



The median time in which an ambulance reached a patient was **8 minutes** in urban communities and **10 minutes** in rural and remote communities



97%

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



77%

of patients received bystander CPR



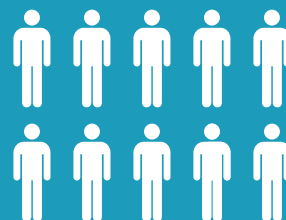
7%

received defibrillation by a Community Responder prior to ambulance arrival



26%

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



10%
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

Key figures for all-cause events

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

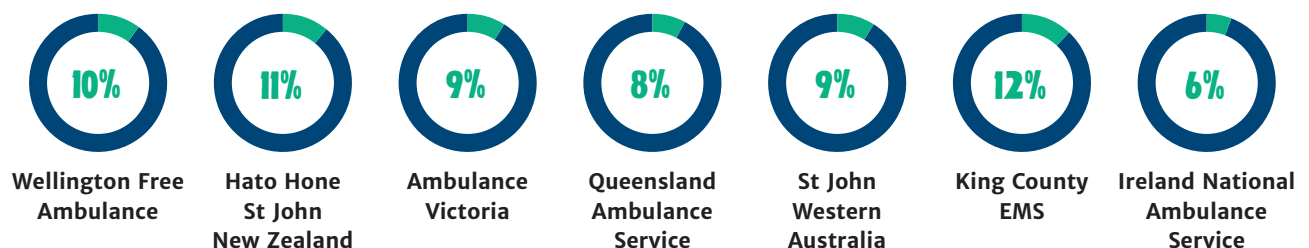
Year	Total number events	% Bystander CPR	% Community Responder AED use	Urban median response time	Rural & remote median response time	% Attended by Fire & Emergency New Zealand	% ROSC on handover	% Survival
2018/19	204	76	6	8	14	93	32	19
2019/20	209	77	6	9	14	94	32	16
2020/21	217	71	4	8	14	97	28	10
2021/22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

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 2021 to 30 June 2022	234	26%	10%
Hato Hone St John New Zealand	1 July 2021 to 30 June 2022	2,114	21%	11%
Ambulance Victoria ¹	1 July 2021 to 30 June 2022	2,467	28%	9%
Queensland Ambulance Service ^{2,C}	1 January 2021 to 31 December 2021	2,057	25%	8%
St John Western Australia ³	1 July 2021 to 30 June 2022	936	18%	9%
King County EMS ⁴	1 July 2021 to 30 June 2022	971	39%	12%
Ireland National Ambulance Service ^{5,C,D}	1 January 2021 to 31 December 2021	2,906	16%	6%



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.

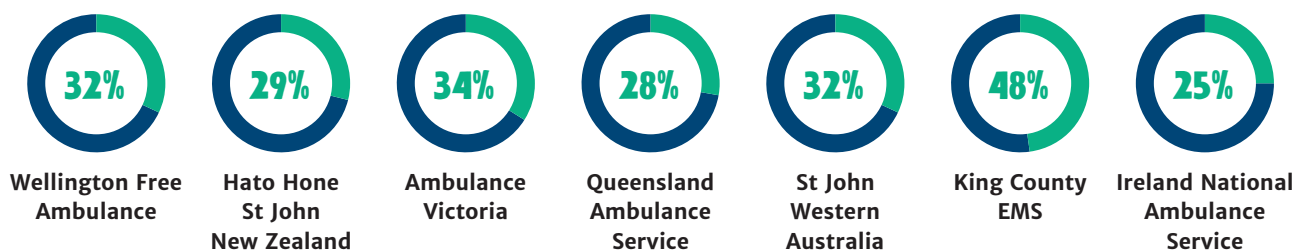
D Ireland National Ambulance Service data includes EAS witnessed events.

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 2021 to 30 June 2022	62	50%	32%
Hato Hone St John New Zealand	1 July 2021 to 30 June 2022	530	43%	29%
Ambulance Victoria ¹	1 July 2021 to 30 June 2022	461	60%	34%
Queensland Ambulance Service ^{2,C}	1 January 2021 to 31 December 2021	338	49%	28%
St John Western Australia ³	1 July 2021 to 30 June 2022	172	41%	32%
King County EMS ⁴	1 July 2021 to 30 June 2022	141	74%	48%
Ireland National Ambulance Service ^{5,D}	1 January 2021 to 31 December 2021	365	37%	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.



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	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. 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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