OUT-OF-HOSPITAL CARDIAC ARREST REGISTRY

Summary Report
2020/21

WELLINGTON FREE AMBULANCE
kia ora te tangata

We are the ones. 111

Quality Improvement and Innovation
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LLOYD MORRISON FOUNDATION
HEARTBEAT
COMMUNITY CPR TRAINING

THE IMPORTANCE OF CPR FOR OUR RURAL COMMUNITIES

Every week on average, six people suffer a cardiac arrest somewhere in the Wellington and Wairarapa regions.

Steve and his wife Diane know only too well how crucial early intervention is to save a life.

They recently undertook part in a Lloyd Morrison Foundation Heartbeat training programme that is delivered by Wellington Free Ambulance. The programme teaches life saving CPR skills to the community for free, thanks to generous support of Julie Nevett and the Lloyd Morrison Foundation.

Diane wanted a refresher; Steve wanted to be able to help her, as she had him, if ever needed.

"It was an excellent review—having the automated external defibrillator (AED) explained to us and how to use it," said Diane.

Wellington Free Ambulance's Senior Heartbeat Coordinator, Rachel Evans, believes most people learn CPR with the selfless motive of wanting to help a loved one or a member of their community.

Rachel says it is essential for communities living in rural areas to learn CPR and understand how to access and use a community AED.

"In rural areas medical help can take time to arrive, and for every minute without CPR, the chance of survival decreases by about 10%."

"Good compressions and the early use of an AED are the most important aspects when treating a cardiac arrest.

"Through the Lloyd Morrison Foundation Heartbeat programme we teach compression-only CPR at a rate of 120 compressions per minute. That may seem like a lot, but we teach you how to work as a team."

Diane remembers the day when Steve went into cardiac arrest.

It happened on a routine morning—there were no warning signs.

"Steve had been tired but nothing out of the ordinary. We both put it down to the work he had been doing outside and around neighbouring properties."

Hearing a funny noise, she thought "that's not right".

Finding Steve unresponsive at the breakfast bar, she shook him.

"Your body wants to panic, but you have to tell it not to and just do what you need to do."

Cellphone reception is limited on the couple's rural lifestyle block. Thankful they still had a landline, so she immediately dialled 111.

"The 111 call taker was absolutely brilliant at keeping me focussed."

"I knew I needed to do CPR—my mum was a nurse and taught me a lot—but it was 20 years ago and things have changed."

Luckily, Diane was able to put the call on speaker while the call taker gave instructions on what to do.

After 20 minutes of CPR, the paramedics arrived. "It was tiring but I just had to keep going."

When the ambulance left Steve had a 50/50 chance of survival.

Soon after he was flown to Wellington Hospital where he spent two days in an induced coma. Two weeks later and fitted with a pacemaker defibrillator he returned home.

Diane said she doesn't dwell on it now.

"We just carry on, there's always a lot more people worse off than us."

"You just get on with life, but I still keep an eye on him."

Steve said he feels fine now but acknowledges he's not the same.

"I know I'm not as good as I was but I'll still have a go at most things."

He doesn't remember much from that day but knows he is extremely fortunate to still be here.

He credits his recovery to taking things slowly but still keeping active.

"At the end of the day you have to push yourself, push the boundaries a little bit."

His perspective on life has changed, he says you never know what is around the corner.

"I try not to stress about the small stuff now."

He encourages others to do the same, enjoy life and be thankful especially if you're in good health. "Some people don't realise how lucky they are."

The couple now regularly donate to Wellington Free Ambulance; it's their way of saying thanks.

"There are a lot of people who worked together to save my life and get me to where I am today."

"I have a lot of guardian angels; there's one sitting beside me and others I don't even know."

He and Diane encourage everyone to learn CPR; especially their rural community.

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 2020 to 30 June 2021.

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

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

30% female,
70% male

71%
of patients received bystander CPR

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

The median time in which an ambulance reached a patient was **8 minutes** in urban communities and **14 minutes** in rural and remote communities

97%
of events were co-responded to and attended by Fire and Emergency New Zealand

28%
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]

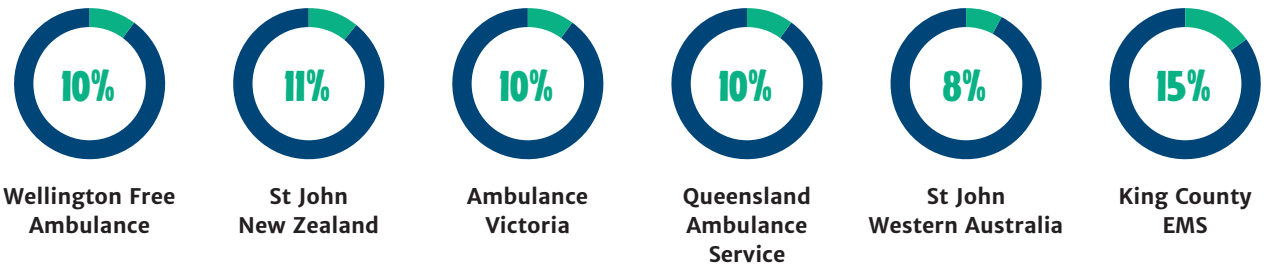
Year	Total number events	% Bystander CPR	% Community Responder AED use	Urban median response time	Rural & remote median response time	% Attended by Fire & Emergency New Zealand	% ROSC on handover	% Survival
2018/19	204	76	6	8	14	93	32	19
2019/20	209	77	6	9	14	94	32	16
2020/21	217	71	4	8	14	97	28	10

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 2020 to 30 June 2021	217	28%	10%
St John New Zealand	1 July 2020 to 30 June 2021	1,967	25%	11%
Ambulance Victoria[1]	1 July 2019 to 30 June 2020	2,564	27%	10%
Queensland Ambulance Service[2]	1 January 2020 to 31 December 2020	2,298	25%	10%
St John Western Australia[3]	1 July 2020 to 30 June 2021	924	18%	8%
King County EMS[4]	1 July 2020 to 30 June 2021	949	40%	15%



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, 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.

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	Collection period	Total number events	% ROSC on handover	% Survival[B]
Wellington Free Ambulance	1 July 2020 to 30 June 2021	66	53%	23%
St John New Zealand	1 July 2020 to 30 June 2021	534	48%	28%
Ambulance Victoria[1]	1 July 2019 to 30 June 2020	–	–	37%
Queensland Ambulance Service[2]	1 January 2020 to 31 December 2020	322	44%	26%
St John Western Australia[3]	1 July 2020 to 30 June 2021	174	48%	33%
King County EMS[4]	1 July 2020 to 30 June 2021	161	70%	43%

Wellington Free Ambulance | **St John New Zealand** | **Ambulance Victoria** | **Queensland Ambulance Service** | **St John Western Australia** | **King County EMS**

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, 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.

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 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 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	• 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 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 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 (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	**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 SA2_2021 Urban Rural coding of incident location. Rural includes: Small urban area, Rural settlement, Rural other.
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 SA2_2021 Urban Rural coding of incident location. Urban includes: Medium urban area, Major urban area, Large urban area.
Witnessed event	A witnessed cardiac arrest is one that is seen or heard by another person.

REFERENCES

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