OUT-OF-HOSPITAL CARDIAC ARREST REGISTRY

Summary Report
2018/19

WELLINGTON FREE AMBULANCE
kia ora te tangata

We are the ones. 111

Quality Improvement and Innovation
Enquiries email: Improvement.team@wfa.org.nz
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Authors: Bridget Dicker, Andy Swain, Mirjam Morris, Verity Oliver, Graham Howie, Justin Bu, Glen Stewart, Dan Whitfield, Sarah Coulthard
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LIFE CAN CHANGE IN A HEARTBEAT

In one heartbeat on 16 September Jonty's life changed. It all started when Jonty was hanging out the washing at his Martinborough home. When suddenly he fell to the floor. His step-daughter, Hannah, was in the kitchen and couldn't see him. Her initial reaction was that Jonty was mucking around. But she questioned the silence. It felt awkward, so she went outside to investigate and found Jonty sprawled across the deck not breathing.

Hannah panicked and screamed for her step-sister, Missy, who came running. For these two young women it was an emotional moment. Jonty's life was in their hands.

"We picked him up and laid him on the deck. I could see that he was turning blue; there was no movement in his chest. I went through my little checks – you're not breathing, your airways are open but you need help now," Hannah explains.

Jonty was extremely lucky that Hannah knew what had to be done and how to do it. She immediately got Missy to call 111 so she could start doing CPR.

"You never think you'll be involved in something as serious as this. We just couldn't lose him. Jonty has been such a big part of the last four years for me and mum – nothing else mattered in that moment, I was just like 'you're not dying with me here'."

Hannah's focus was on the CPR when the crew from Fire and Emergency NZ arrived followed by Wellington Free Ambulance Paramedics Andrew, Doug, Anne and Allan.

Our paramedics got to work doing all they could to help Jonty survive; quickly and efficiently they managed to get Jonty's heart to start beating in a rhythm that could keep him alive.

"We're usually on the back foot and having to play catch up to improve the person's condition before we get a successful heartbeat again. Excellent CPR, an early shock from an AED – especially with where Jonty lives – in our opinion the two most important things had already been done when we got there," explains Paramedic Andrew.

Saving a life is about more than medicines and monitors; it's about human decisions. Hannah had acted quickly and decisively. This highlights the importance of people knowing how to do CPR in our communities.

Today, Jonty is back at home with his family and is grateful that help was there.

"Something like this does change your attitude. I am so fortunate to have my family around me. I could have been anywhere on the farm; the reality is that the outcome could have been a lot different.

"I'd like to think I have a lot of years left but that could have all been taken away. I'm really grateful that the support was there for me that day. I owe my life to everyone who helped me; I just can't thank everyone enough," Jonty says.

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 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.

EXECUTIVE SUMMARY

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

30% female,
70% male

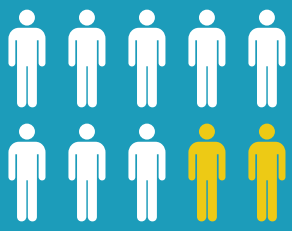
76%
of patients received bystander CPR

6%
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

93%
of events were co-responded to and attended by Fire and Emergency New Zealand

32%
of patients survived the event (had a pulse on arrival at hospital)



19%
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

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[B]	Collection period	Total number events	% ROSC on handover	% Survival[C]
Wellington Free Ambulance	1 July 2018 to 30 June 2019	204	32%	19%
St John New Zealand	1 July 2018 to 30 June 2019	1,808	27%	13%
Ambulance Victoria[1]	1 July 2018 to 30 June 2019	3,036	29%	12%
London Ambulance Service[2]	1 April 2018 to 31 March 2019	4,004	36%	11%
St John Ambulance Western Australia[3]	1 January 2018 to 31 December 2018	971	22%	12%
King County EMS[4]	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 Wellington Free Ambulance and St John New Zealand 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[B]	Collection period	Total number events	% ROSC on handover	% Survival[C]
Wellington Free Ambulance	1 July 2018 to 30 June 2019	55	55%	45%
St John New Zealand	1 July 2018 to 30 June 2019	534	51%	34%
Ambulance Victoria[1]	1 July 2018 to 30 June 2019	504	57%	39%
London Ambulance Service[2]	1 April 2018 to 31 March 2019	533	63%	37%
St John Ambulance Western Australia[3]	1 January 2018 to 31 December 2018	215	46%	38%
King County EMS[4]	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 Wellington Free Ambulance and St John New Zealand 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 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.

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 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 5: 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	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.

REFERENCES

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