OHCA Registries
“Data Challenges – collection & coding”

Professor Judith Finn
29 October 2018

Judith.finn@curtin.edu.au

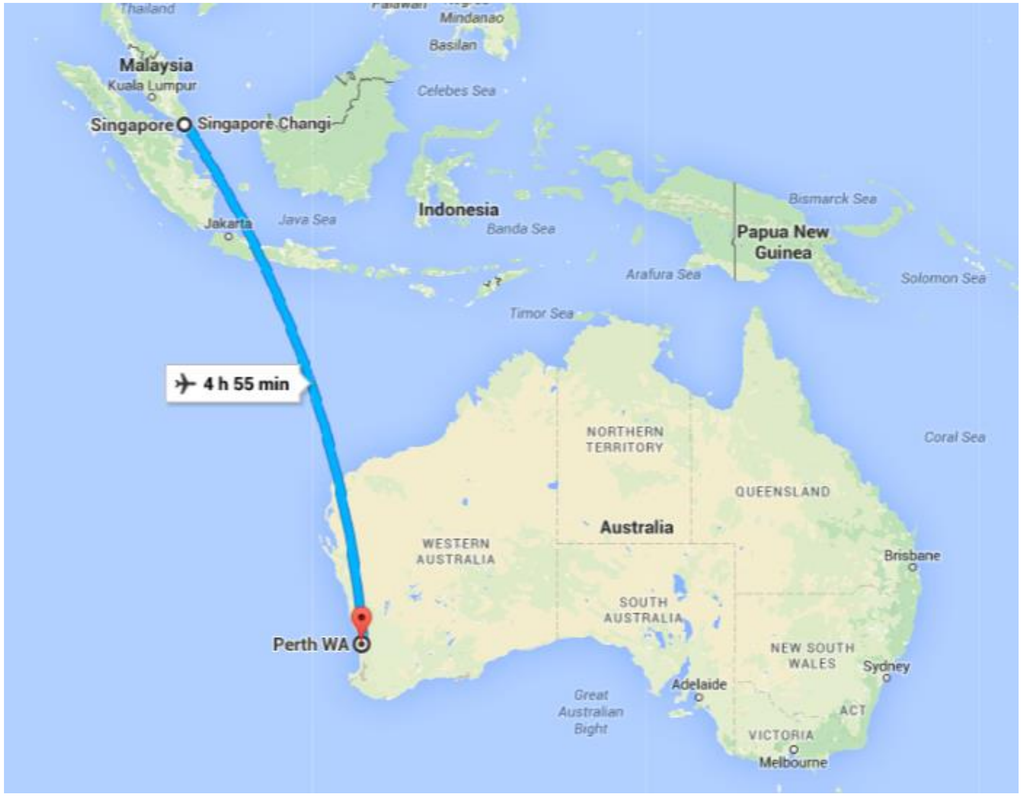

clarke quay

I ♥ Singapore

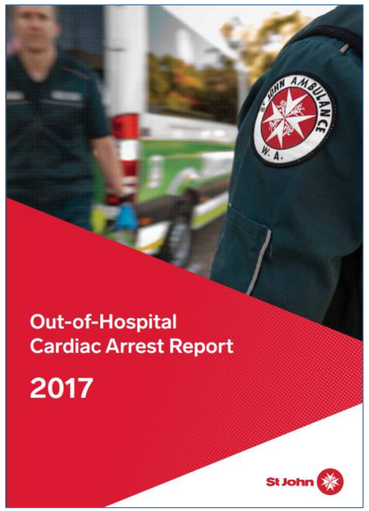

©Narong Jongsirikul/shutterstock

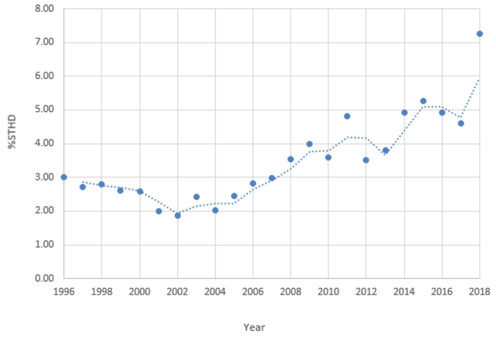

Free Wi-Fi
Chinatown Food Street
Hot/Cold Beverage · Desserts
©Hotels.com

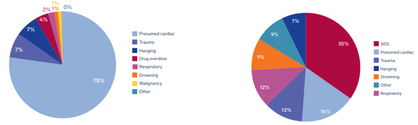
PERTH – Western Australia



St John Western Australia
Out-of-hospital Cardiac Arrest Database







St John

Curtin University

Summary of the St John WA OHCA Database

All OHCA cases attended by SJWA

22 years	Established 1996
34,000 cases	Total since 1996
2,505 cases	In 2017

Managed by PRECRU, Curtin University

Challenges

- 1996-2011 paper-based records
- 1996-2011 metro only
- 1996-2010 private ‘research’ funding

ELSEVIER

Resuscitation 51 (2001) 247–255

RESUSCITATION

www.elsevier.com/locate/resuscitation

Outcomes of out-of-hospital cardiac arrest patients in Perth, Western Australia, 1996–1999

Judith C. Finn [a,*], Ian G. Jacobs [b,1], C. D'Arcy J. Holman [c,2], Harry F. Oxer [d,3]

[a] *Department of Public Health, The University of Western Australia, Royal Perth Hospital, GPO Box X2213, Perth, Western Australia 6847, Australia*

[b] *Department of Emergency Medicine, Western Australian Pre-hospital Care Research Unit, The University of Western Australia, Nedlands, Western Australia 6009, Australia*

[c] *Division of Population Sciences, TVW Telethon Institute for Child Health Research, 100 Roberts Road, Subiaco, Western Australia 6008, Australia*

[d] *St. John Ambulance Australia, WA Ambulance Service Inc, 298 Great Eastern Highway, Belmont, Western Australia 6104, Australia*

Received 19 April 2001; received in revised form 1 May 2001; accepted 7 June 2001

Abstract

Study objective: To describe the epidemiology and survival from out-of-hospital cardiac arrest. *Design:* Longitudinal follow-up study from the time of paramedic attendance to 12 months later. *Setting:* Perth, Western Australia (WA), a metropolitan capital city with an adult population of approximately one million people. *Method:* The St John Ambulance Australia (WA Ambulance Service Incorporated) cardiac arrest database was linked to the WA hospital morbidity and mortality data using probabilistic matching. *Incidence:* Of 3730 cardiorespiratory arrests in 1996–1999, the age standardised rate of arrests of presumed cardiac origin, where resuscitation was attempted ($n = 1293$) was 32.9 per 100 000 person-years and 7.1 per 100 000 person-years for bystander-witnessed VF/VT arrests. *Survival:* Survival to 28 days was 6.8% following all bystander-witnessed cardiac arrests; 10.6% following bystander-witnessed VF/VT arrests and 33% for paramedic-witnessed cardiac arrests. Logistic regression analysis showed an inverse association between ambulance response time interval and survival following all bystander-witnessed cardiac arrests (and VF/VT arrests). *One year survival:* 89% of bystander-witnessed cardiac arrest survivors and 92% of paramedic-witnessed cardiac arrests were still alive at 1 year post-arrest. *Conclusion:* The trends in occurrence and survival following out-of-hospital cardiac arrest in Perth, WA, are similar to those found elsewhere. There is an opportunity to strengthen the chain of survival by reducing the response time interval and increasing the use of bystander cardiopulmonary resuscitation (CPR). First-responder programs and public access defibrillation will need to be considered in the light of local demographics, location and the epidemiologic features of out-of-hospital cardiac arrest.

Keywords: Sudden cardiac death; Emergency medical services; Out-of-hospital CPR; Incidence; Outcome

Inputs and workflow

ePCR case records (35,000 per month) + interventions and observations files

Apply syntax to select cases that contain potential indicators of OHCA
e.g. *CPR, defib, nil pulse, nil breathing, Prob code 418, 419, 248*.

Potential OHCA case records (1000 per month)

Manually scrutinise the complete ePCR record
to determine if the patient was a case of OHCA

Confirmed OHCA cases
(around 200 per month)

Inputs and workflow (cont.)

Confirmed OHCA cases
(200 per month)

Derived variables from ePCR

- Resuscitation attempt
- Aetiology
- Witness status
- ROSC
- Initial arrest rhythm
- Number of defib shocks
- Pre-ambulance care

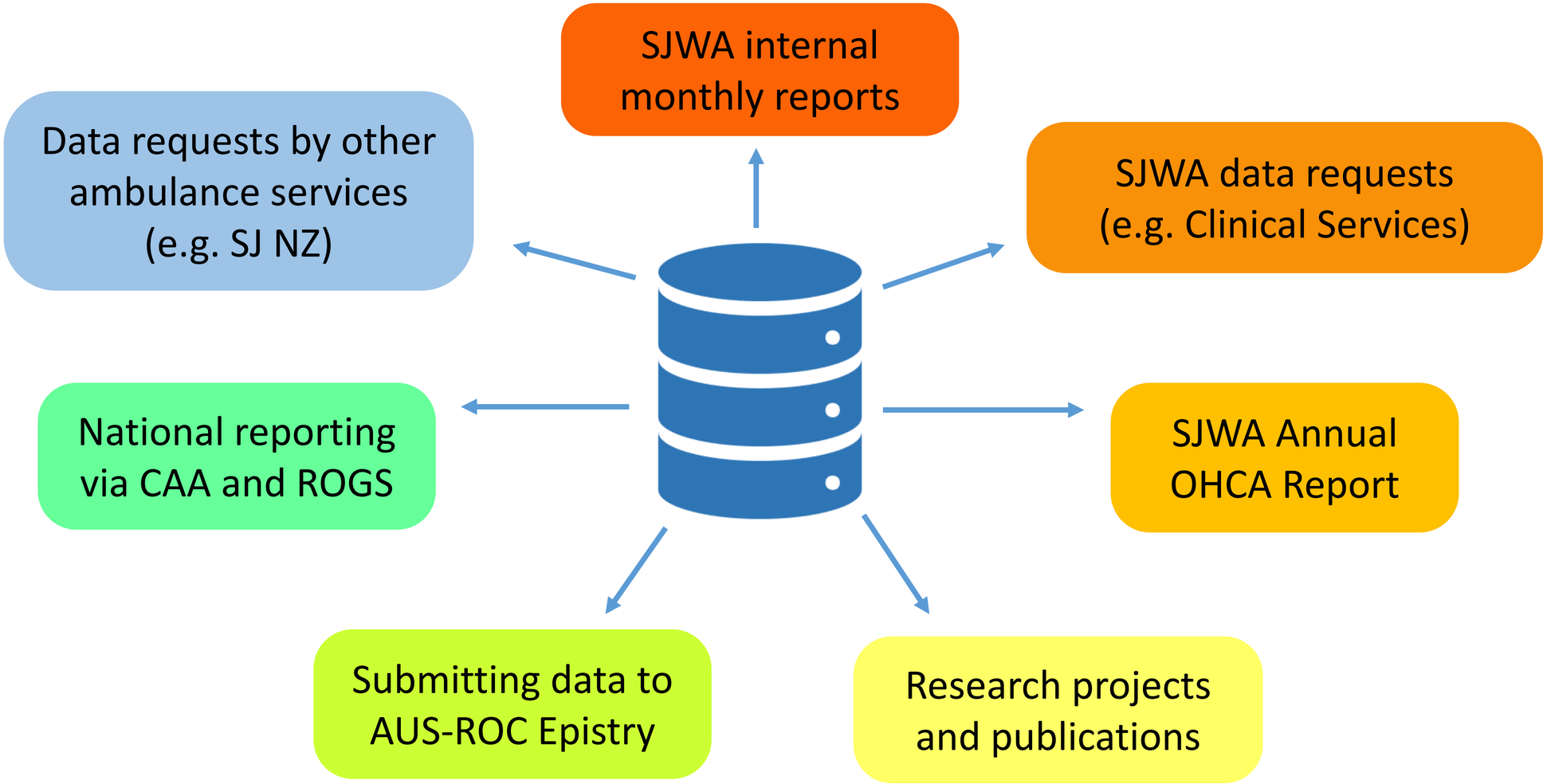
Hospital survival follow-up data

- Surv. to hosp. discharge
- Neuro. outcomes (CPC)

WA Death Registry data

- 30-day survival
- Days to death

Outputs of St John WA OHCA Database

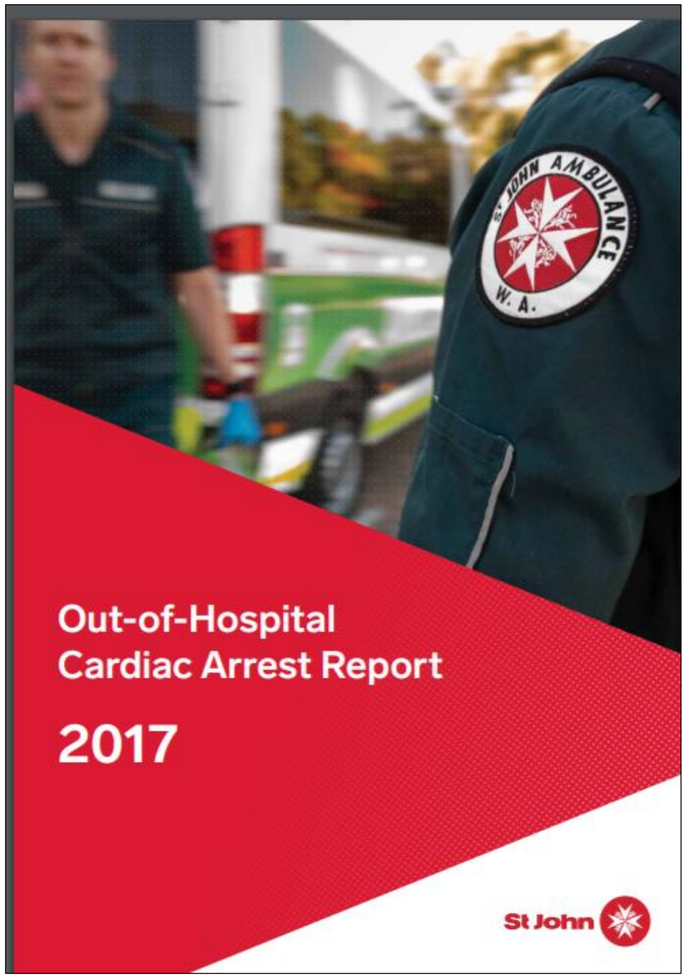


Management of the SJWA OHCA Database

FROM JUNE 2018

- **Personnel:**
  - S Ball (Database Manager; Reporting)
  - J Finn (Oversight)
  - S Gallant (Data Entry)
  - N McKenzie (Survival follow-up, CPC data)
- **Platform:** **MS Access (tables, queries, forms); SQL and VBA**
- **Communication with SJWA:** monthly reports + as required +
  Bi-monthly meetings of OHCA Database Steering Committee

St John WA Out-of-hospital Cardiac Arrest Annual Report for 2016 and 2017



http://www.stjohnambulance.com.au/docs/default-source/corporate-publications/st-john-wa---out-of-hospital-cardiac-arrest-report-2016.pdf?sfvrsn=2

https://stjohnwa.com.au/docs/default-source/annual-report-2015/ohca-anual-report_2017_18_web.pdf?sfvrsn=2

Challenges of OHCA data collection

- Data capture at the scene (paper vs e-PCR) – what variables?
- Case selection / Data entry into OHCA ‘registry’
- Manual review of PCR - to derive variables not captured on PCR
- ‘Approvals’ for data collection plus HREC approval for data use
- Registry staff funding

- For EMS seeking to establish new OHCA registries….

Resuscitation 96 (2015) 328–340

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Cardiac Arrest and Cardiopulmonary Resuscitation Outcome Reports: Update of the Utstein Resuscitation Registry Templates for Out-of-Hospital Cardiac Arrest

A Statement for Healthcare Professionals From a Task Force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian and New Zealand Council on Resuscitation, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, Resuscitation Council of Asia); and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation☆,☆☆

Gavin D. Perkins, Ian G. Jacobs†, Vinay M. Nadkarni, Robert A. Berg, Farhan Bhanji, Dominique Biarent, Leo L. Bossaert, Stephen J. Brett, Douglas Chamberlain, Allan R. de Caen, Charles D. Deakin, Judith C. Finn, Jan-Thorsten Gräsner, Mary Fran Hazinski, Taku Iwami, Rudolph W. Koster, Swee Han Lim, Matthew Huei-Ming Ma, Bryan F. McNally, Peter T. Morley, Laurie J. Morrison, Koenraad G. Monsieurs, William Montgomery, Graham Nichol, Kazuo Okada, Marcus Eng Hock Ong, Andrew H. Travers, Jerry P. Nolan, for the Utstein Collaborators

"Utstein" definitions / criteria

Cummins RO, Chamberlain DA, Abramson NS, Allen M, Baskett PJ, Becker L, Bossaert L, Delooz HH, Dick WF, Eisenberg MS, et al. Recommended guidelines for uniform reporting of data from out-of- hospital cardiac arrest: the Utstein Style. A statement for health professionals from a task force of the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, and the Australian Resuscitation Council. *Circulation*. 1991;84(2):960-75.

- most recent template updated in 2013 in Melbourne:
Perkins,G et al …
Resuscitation 96 (2015) 328–340
Circulation. 2015;132(13):1286-300.

- Reports based on 'Utstein' definitions *should* 'standardise' definitions…

“Utstein comparator group” (system efficacy)

- “bystander witnessed cardiac arrest who had a first recorded rhythm that was shockable” (Perkins Circulation, 2015, 132(13), p1295)
- *bystander witnessed arrest of **suspected cardiac cause** and an initial recorded shockable rhythm*
- ..OHCA cases who are most likely to survive presenting with shockable heart rhythms, have witnessed arrests and where **prompt bystander CPR** is started
- The Utstein comparator subset includes the following subgroup of patients **Adult** (i.e. older than seventeen years); **Presumed medical aetiology** ; Bystander witnessed; First monitored rhythm shockable
- The Utstein comparator group (witnessed arrest, **bystander CPR**, shockable rhythm)
- Patients who are witnessed to arrest by a bystander, present in a shockable rhythm and **an attempt at resuscitation was made by EMS**.
- all-cause bystander-witnessed arrests with a shockable rhythm (**where resuscitation was commenced by EMS**)

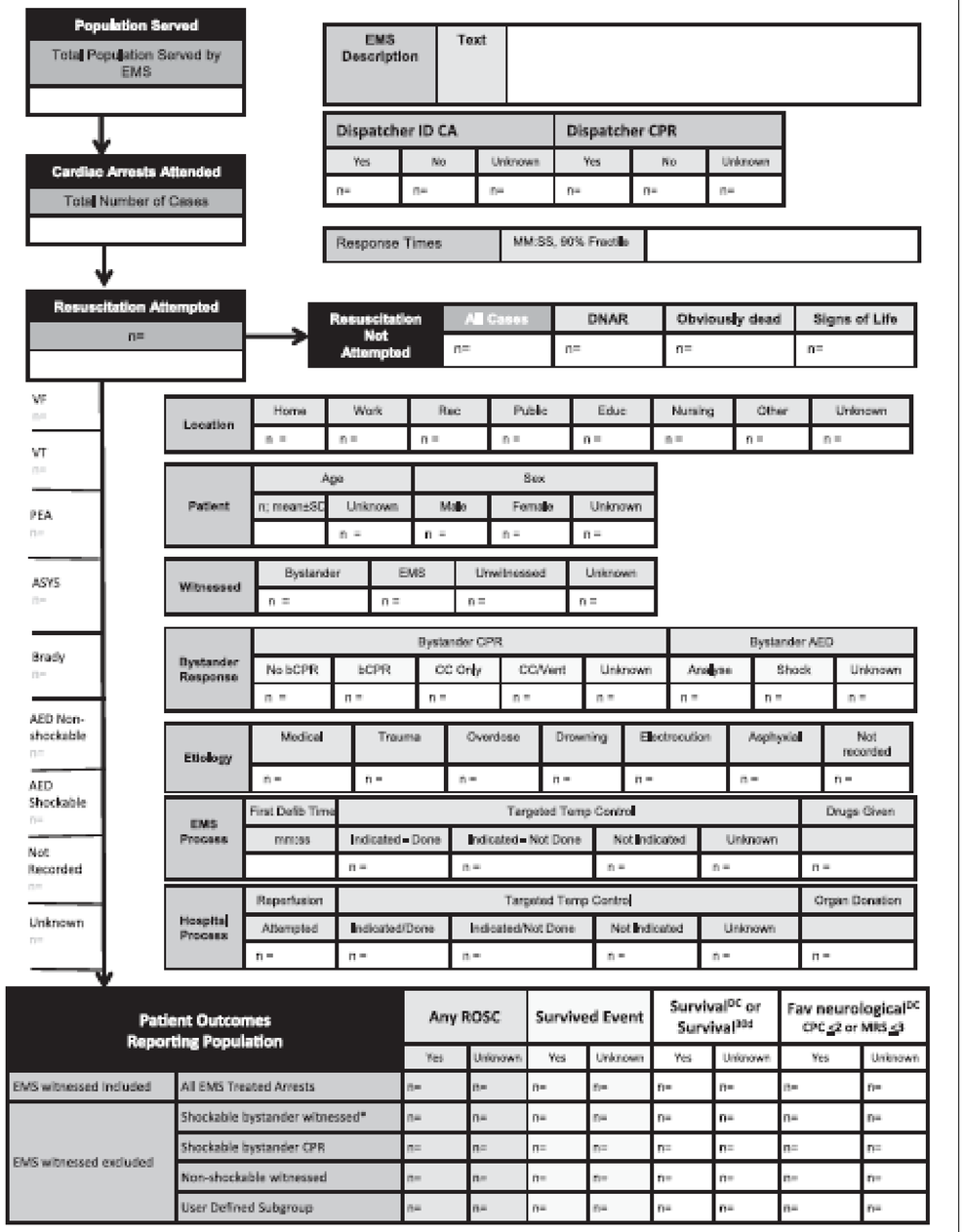


Figure 2. Utstein standardized template for reporting outcomes from out-of-hospital cardiac arrest. AED indicates automated external defibrillator; ASYS, asystole; bCPR, bystander cardiopulmonary resuscitation; Brady, bradycardia; CA, cardiac arrest; CC, chest compressions; CPC, Cerebral Performance Category; CPR, cardiopulmonary resuscitation; DC; discharge; Defib, defibrillation; DNAR; do not attempt resuscitation; Educ, educational institution; EMS; emergency medical services; Fav, favorable; ID, identified; mRS, modified Rankin Scale; PEA, pulseless electrical activity; Rec, sports/recreation event; ROSC, return of spontaneous circulation; Temp, temperature; Vent, ventilations; VF, ventricular fibrillation; and VT, ventricular tachycardia. *Utstein comparator group (system efficacy).

Utstein Reporting Template

- Cardiac arrest y/n
- Resus attempted
- Bystander witnessed
- Aetiology

Outcomes

- STHD vs 30-day survival (*for discussion is time)

OHCA or not?

- Utstein definitions: *Arrests defined by absence of signs of circulation*
- Pt dispatched as ?OHCA + bystander CPR performed; pt has ‘ROSC’ O/A
  - AED applied – shock delivered by bystanders ☑
  - AED applied – shock NOT delivered by bystanders ☒ ??
- Is tolerance of CPR performed by bystanders sufficient to count as OHCA?
- Is ‘no pulse’ assessed by bystanders acceptable? What about ‘no pulse by EMS?
- Can OHCA pts ‘spontaneously’ achieve ROSC prior to EMS arrival?
- **Example:** “Called to OHCA at Nursing Home …Staff commenced CPR. EMS continued CPR; no shocks given and circulation established. OE: B: Pt breathing spontaneously C: Strong femoral pulses and BP 175/D: GCS 3/15.” ?Include as OHCA
- Also - NFR / ‘Advanced directives’ / terminally ill pts?

EMS Resus attempt or not?

- Utstein definition Resus attempt: *When EMS personnel perform chest compressions or attempt defibrillation, it is recorded as a resuscitation attempt by EMS personnel*
- AED applied – shock delivered by bystanders. Should these pts be included in the ‘EMS resus attempted sub-group?
- What about drug overdose ‘OHCA’ pt who seemingly responds to airway only? ?EMS resus attempt
- Risk – remove survivors from ‘Resus attempt’ group

Bystander-witnessed vs unwitnessed

- **Utstein Definition** “A cardiac arrest that is **seen** or **heard** by another person”.

Examples (de-identified) ...

- **Over-the-phone witnesses are not bystander-witnesses:** “000 call-taker states pt suddenly stopped talking and call taker could hear pt snoring in background… O/E: GCS 3…agonal respiration…VF cardiac arrest confirmed”
- **Witness status is independent of proximity of others:** “Pt found by flight steward slumped in her seat nil breathing nil pulse”
- **Witness status is independent of delays in contacting EMS:** “Patient had reportedly collapsed at 2330hrs however nil ambulance called for 20 minutes until daughter arrived”
- **Witness status of collapse is not always the same as witness status of the arrest:** Collapse in bathroom unwitnessed. LOC was witnessed shortly afterwards by pts mother.
- **How reliable are pulse measurements by bystanders?:** “[pt] found lying on the pavement…[bystander] did not see pt collapse…states pt initially had a pulse however it soon stopped”
- **Unclear:** "Pt visited by relatives this am at approx 1030 and said pt stopped talking to them from bedrooms at approx 1210.”

Aetiology: Utstein: Medical / traumatic / drug overdose / drowning/ electrocution / asphyxia

Examples (de-identified) ...

- **Drug overdose (vs arrest of a known drug user)? : "**Evidence of drug paraphernalia around including spoons needles and lighters. Mother states previous IVDU. Pt appears to have struck head on tiled floor."
- **Medical vs drowning?:** "Pt was reportedly found in shower collapsed covering the drain hole. Water had filled the shower hob and pt face fully immersed."
- **Medical vs traumatic?:**
- a) "Driver states he saw pt pull out of the way and over corrected and rolled - car landed around 70-100m from road side. Driver states no response when he went to check him."
- b) "Pt was … in car stopped at traffic lights rolled back into another car. Person got out and observed pt to be unresponsive and ? Seizure activity."

Other variables-Bystander CPR

- Utstein definition

Bystander CPR is CPR performed by a person who is not responding as part of an organized emergency response system to a cardiac arrest. Physicians, nurses, and paramedics may be described as performing bystander CPR if they are not part of the emergency response system involved in the victim's resuscitation. Bystander CPR may be compression only or compression with ventilations (the act of inflating the patient's lungs by rescue breathing with or without a bag-mask device or any other mechanical device).

- "Good Sam" apps??

Outcomes – STHD or 30-day survival

Utstein

- *30-d survival or survival to discharge*
- *Was the patient alive at the point of hospital discharge/30 d?*

- *PROs and CONs*
- Personal opinion – 30 day survival – assuming that absence of death record can be assumed to mean that patient is alive

Solutions?

- Develop consensus ‘rules’ re coding of ambiguous variables
- SJ WA – default to paramedic coding (OHCA / witnessed status) unless clear contradiction in the examination text
- Flag ambiguous cases – for group discussion and decision
- Consider implications of changes for reporting
  - Internal comparisons
  - External comparisons
- Develop more granular international guidelines for definitions

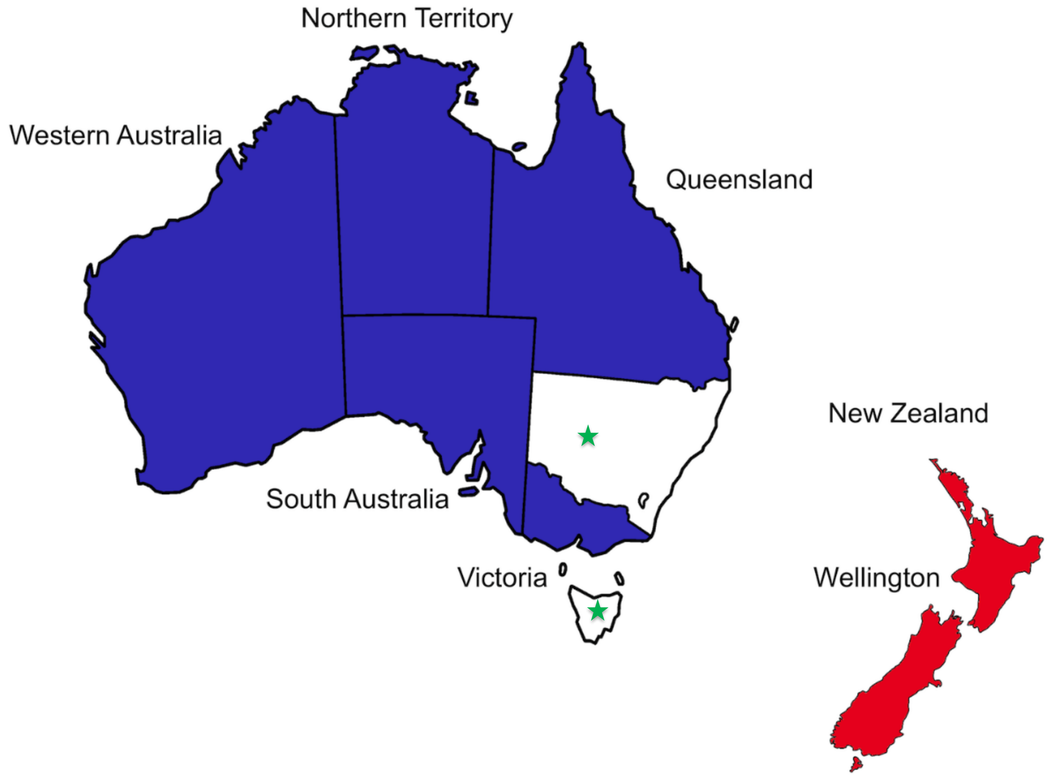
Professor Judith Finn

judith.finn@curtin.edu.au
+61 (0) 417189841

Curtin University

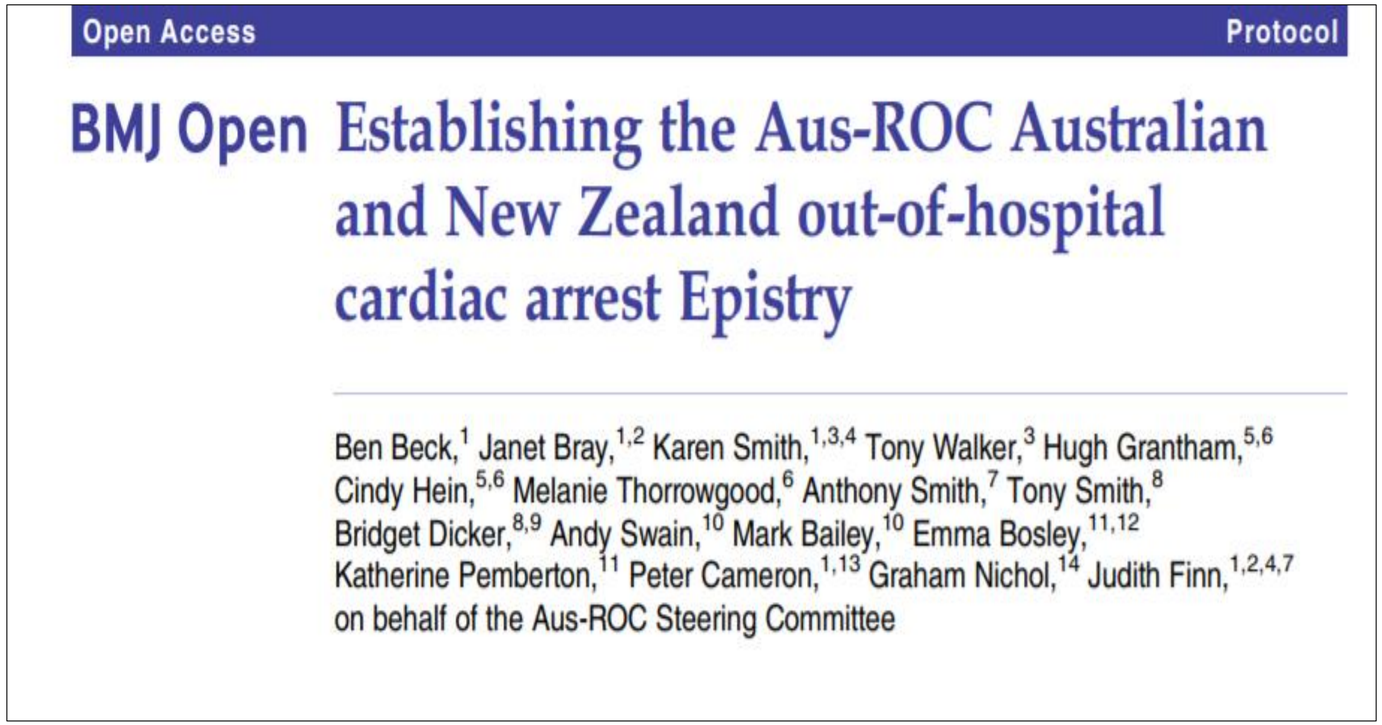
Aus-ROC Australian and New Zealand Epistry

NSW & Tas to contribute data from 2017 onwards



Capture population: 19.5 million

Initial publications…



Open Access Protocol

BMJ Open

Establishing the Aus-ROC Australian and New Zealand out-of-hospital cardiac arrest Epistry

Ben Beck,[1] Janet Bray,[1,2] Karen Smith,[1,3,4] Tony Walker,[3] Hugh Grantham,[5,6] Cindy Hein,[5,6] Melanie Thorrowgood,[6] Anthony Smith,[7] Tony Smith,[8] Bridget Dicker,[8,9] Andy Swain,[10] Mark Bailey,[10] Emma Bosley,[11,12] Katherine Pemberton,[11] Peter Cameron,[1,13] Graham Nichol,[14] Judith Finn,[1,2,4,7] on behalf of the Aus-ROC Steering Committee

BMJ Open. 2016;6(4):e011027.

EMA Emergency Medicine Australasia

Emergency Medicine Australasia (2016) **28**, 673–683 doi: 10.1111/1742-6723.12690

ORIGINAL RESEARCH

Description of the ambulance services participating in the Aus-ROC Australian and New Zealand out-of-hospital cardiac arrest Epistry

Ben BECK,[1] Janet E BRAY,[1,2] Karen SMITH,[1,3,4] Tony WALKER,[3] Hugh GRANTHAM,[5,6] Cindy HEIN,[5,6] Melanie THORROWGOOD,[6] Anthony SMITH,[7] Madoka INOUE,[2] Tony SMITH,[8] Bridget DICKER,[8,9] Andy SWAIN,[9,10,11] Emma BOSLEY,[12,13] Katherine PEMBERTON,[12] Michael MCKAY,[14] Malcolm JOHNSTON-LEEK,[14] Peter CAMERON,[1,15] Gavin D PERKINS[16] and Judith FINN,[1,2,4,7] on behalf of the Aus-ROC Steering Committee

Emerg Med Australas. 2016;28(6):673-83.

Aus-ROC Australian and New Zealand Epistry

TABLE 1. *Summary data related to ambulance service characteristics*

	Australia					New Zealand	
	SAAS	AV	SJAWA	QAS	SJANT†	SJNZ	WFA
Service area population	1 685 714[10]	5 841 667[10]	2 573 389[10]	4 722 447[10]	210 000	4 018 370[11]	491 380[11]
Geographical area (km^2)	984 179.8[12]	227 495.5[13]	2 526 417.9[14]	1 725 825.9[15]	1 353 163.9[16]	261 521.9[17]	8130.1[18]
Population density (persons per km^2)	1.71	25.68	1.02	2.74	0.18	15.37	60.44
Employment type							
Full time	784 (33%)	2578 (63%)	655 (18%)	3083 (80%)	152 (88%)	1168 (52%)	226 (55%)
Part time	211 (9%)	240 (6%)	57 (1%)	182 (5%)	2 (1%)	97 (4%)	64 (16%)
Casual	70 (3%)	172 (4%)	0 (0%)	273 (7%)	8 (5%)	455 (20%)	30 (7%)
Volunteer	1286 (55%)	1103 (27%)	2968 (81%)	323 (8%)	10 (6%)	536 (24%)	92 (22%)
Total of number of paramedics with:							
BLS-only‡	1469 (64%)	30 (1%)	2968 (82%)	235 (8%)	48 (28%)	1288 (59%)	47 (37%)
ALS	657 (29%)	2473 (83%)	655 (18%)	2697 (87%)	113 (66%)	633 (29%)	56.5 (44%)
Intensive care training	173 (7%)	488 (16%)	8 (0%)	161 (5%)	11 (6%)	262 (12%)	25 (19%)

Beck B, *et al.* 'A description of the ambulance services participating in the Aus-ROC Australian and New Zealand out-of-hospital cardiac arrest Epistry'. *Emergency Medicine Australasia*, 2016; 28:673-683.

Australia & New Zealand OHCA Epistry: 2015 Results

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Regional variation in the characteristics, incidence and outcomes of out-of-hospital cardiac arrest in Australia and New Zealand: Results from the Aus-ROC Epistry☆

Ben Beck[a,*], Janet Bray[a,b,c], Peter Cameron[a,c], Karen Smith[a,d,e], Tony Walker[d], Hugh Grantham[b,f,g], Cindy Hein[f,g], Melanie Thorrowgood[g], Anthony Smith[h], Madoka Inoue[b], Tony Smith[i], Bridget Dicker[i,j], Andy Swain[j,k], Emma Bosley[l,m], Katherine Pemberton[l], Michael McKay[n], Malcolm Johnston-Leek[n], Gavin D. Perkins[o], Graham Nichol[p], Judith Finn[a,b,h], on behalf of the Aus-ROC Steering Committee

Beck B *et al. Regional variation in the characteristics, incidence and outcomes of out-of-hospital cardiac arrest in Australia and New Zealand: Results from the Aus-ROC Epistry.* ***Resuscitation. 2018;126:49-57****.*