1: Supplemental Methods

I. Dataset linkage processes

For this study, data linkage was performed to combine electronic patient care record data with key Victorian datasets. These included:

1. Victorian Emergency Minimum Dataset: Victorian Department of Health administrative and clinical data related emergency department (ED) presentations at public hospitals in the state. Data is submitted by individual health services and is then subject to validation checks. For this study, EMS patient identifiers were matched with Department of Health identifiers using Dataflux software with deterministic data linkage and fuzzy matching for variables such as names and dates. ED presentations for matched patients were then linked to ambulance cases as follows:

a. Where the patient was transported to hospital by ambulance, the VEMD arrival time was required to be within one hour of the ambulance ED arrival time.

b. Where the patient contacted ambulance but was not transported to hospital, the VEMD arrival time was required to be within 48 hours of the emergency call for ambulance. If multiple VEMD records existed within the 48-hour period, the presentation occurring closest in time to the ambulance call was used.

2. Victorian Admitted Episodes Dataset: Victorian Department of Health demographic, clinical and administrative data relating to each admitted episode of care occurring in public and private hospitals, as well as rehabilitation centres, extended care facilities and day procedure centres in the state. For this study, EMS patient identifiers were matched with Department of Health identifiers using Dataflux software with deterministic data linkage and fuzzy matching for variables such as names and dates. For matched patients, individual admitted episodes of care occurring up to 48 hours after the emergency ambulance call were linked to the ambulance patient care record data. Where multiple admitted episodes were recorded within the 48 hours, the episode occurring closest in time to the ambulance call was used.

3. Victorian Death Index: Victorian Department of Justice and Community Safety capturing the date and cause of all deaths in Victoria. For matched patients, death records were then linked to all ambulance contacts occurring in the study period.

II: Study definitions:

Socio-economic status was determined by The Index of Relative Scio-Economic Disadvantage Score (IRSD), a validated measure that ranks individual post-codes into deciles of relative disadvantage. This score is derived from Census data that includes household income, education level, employment status, occupation, housing ownership, and non-English speaking background (1). For this analysis, we divided the IRSD into quintiles, with the 1st quintile being the most disadvantaged (comprising of ISRD deciles 1 and 2) and the 5th quintile being least disadvantaged (IRSD deciles 9 and 10).

Etiology of shock was defined in accordance with the final discharge diagnosis from hospital using the International Classification of Diseases (ICD) codes. The ICD-10-AM codes used identify patients with cardiogenic shock remains constant across the different ICD-10-AM editions of codes used by hospitals over the study period (i.e. ICD-10-AM: 8th edition in 2014-15; 9th edition in 2015-16 & 2016-17; 10th edition in 2017-18 & 2018-19).
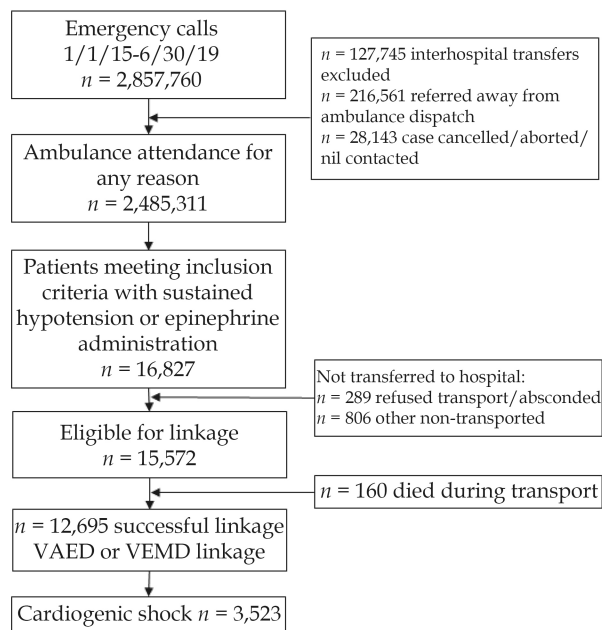
Cardiogenic Shock:

1. Cardiovascular diagnoses: I00-I99

2. ST-elevation myocardial infarction: I210-I213,I220-I229, I256

3. Non-ST elevation myocardial infarction: I214, I219

4. Unstable angina: I200

5. Stable coronary syndromes: I201, I208, I209, I248-I252, I254,I255,I258, I259

6. Atrial fibrillation: I480-I489

7. Supraventricular tachycardia: I471

8. Other arrhythmia: I441, I442, I456, I458- I461, I469, I470, I472, I479, I490-I499

9. Heart failure: I420-I438,I500-I509

10. Myocarditis: I012, I090,I400-I418,I514,

11. Valvular heart disease: I050-I089,I340-I379,I390-I394

12. Other cardiac: I00-I1528 excluding codes categorised above

13. Other vascular: I600-I99 excluding codes categorised above

Procedures were defined according to the Australian Classification of Health Interventions (ACHI) codes (8th edition in 2014-15, 9th edition in 2015-16 & 2016-17, 10th edition in 2017-18 & 2018-19):

1. Coronary angiography: 3820300, 3820600, 382500, 3821800-3821802

2. Percutaneous coronary intervention: 3830600-3830605, 3831200, 3831201, 3831800, 3831801

3. Coronary artery bypass graft surgery: 3849700-3849707, 3850000-3850005, 3850300-3850305, 9020100-9020103

4. Extracorporeal membrane oxygenation (ECMO): 9022500

5. Intra-aortic balloon pump (IABP): 3836200

2: Cohort Derivation: Consort Diagram

VACIS: Victorian ambulance clinical information system; VAED: Victorian admitted episodes database; VEMD: Victorian emergency minimum dataset.

3. Baseline characteristics of patients with cardiogenic shock who did not sustain out-of-hospital cardiac arrest.

	All	18-63 years	64-77 years	>77 years	p-value
	2060	560 (27.2%)	636 (30.9%)	864 (41.9%)	
Mean age	71.3 (15.9)	50 (10.8%)	71 (4)	85.3 (5.1)	< 0.001
Female	937 (46%)	242 (43%)	252 (40%)	443 (51%)	< 0.001
Hypertension	821 (42%)	126 (25%)	299 (49%)	396 (47%)	< 0.001
Dyslipidaemia	529 (27%)	89 (18%)	205 (33%)	235 (28%)	< 0.001
Diabetes mellitus	430 (22%)	94 (19%)	167 (27%)	169 (20%)	< 0.001
Pre-existing coronary artery disease	523 (27%)	82 (16%)	176 (29%)	274 (32%)	< 0.001
Pre-existing heart failure	315 (16%)	35 (6.9%)	88 (14%)	192 (23%)	< 0.001
Chronic kidney disease	168 (8.5%)	39 (7.7%)	49 (7.9%)	80 (9.5%)	0.42
Peripheral vascular disease	37 (1.9%)	1 (0.2%)	15 (2.4%)	21 (2.5%)	0.005
Cerebral vascular disease	161 (8.2%)	22 (4.3%)	45 (7.3%)	94 (11%)	< 0.001
COPD	187 (9.5%)	22 (4.3%)	88 (14%)	77 (9.1%)	< 0.001
Shock aetiology†					
STEMI	310 (15%)	98 (18%)	101 (16%)	111 (13%)	0.044
NSTEMI	151 (7.3%)	20 (3.6%)	51 (8%)	80 (9.3%)	< 0.001
Decompensated heart failure	231 (11%)	49 (8.8%)	65 (10%)	117 (14%)	0.013
Arrhythmias‡	639 (31%)	197 (35%)	199 (31%)	243 (28%)	< 0.001
Mean initial systolic blood pressure (mmHg)	80.5 (24)	79 (22.2)	81.9 (26.3)	80.4 (23.2)	0.20
Mean initial heart rate, beats/min	96.6 (51.9)	116.3 (58.5)	94.6 (50.5)	85.4 (44.1)	< 0.001
Pre-hospital intubation	42 (2%)	10 (1.8%)	19 (3%)	13 (1.5%)	0.12
Pre-hospital epinephrine infusion commenced	580 (28%)	134 (24%)	212 (33%)	234 (27%)	< 0.001

Data are presented as *n* (%). †Shock aetiology determined by hospital primary ICD discharge diagnosis derived through linkage with VEMD and VAED datasets; ‡Arrhythmia included hospital primary discharge diagnoses of complete heart block, atrial tachyarrhythmias, and ventricular arrhythmias. COPD: chronic obstructive airways disease; NSTEMI: non-ST elevation myocardial infarction; STEMI: ST elevation myocardial infarction; SVT: supraventricular tachycardia.

4. Outcomes and inpatient interventions in cardiogenic shock patients who did not sustain out-of-hospital cardiac arrest.

	All	18-63 years	64-77 years	>77 years	*P*-value
	n = 2060	*n* = 560	*n* = 636	*n* = 864	
Linked 30-day mortality	471 (23%)	53 (9.5%)	118 (19%)	300 (35%)	< 0.001
Death within 24 hours of ambulance arrival	146 (7.1%)	16 (2.9%)	27 (4.2%)	103 (12%)	< 0.001
Coronary angiogram	374 (18%)	125 (22%)	140 (22%)	109 (13%)	< 0.001
Percutaneous coronary intervention	217 (11%)	81 (15%)	87 (14%)	49 (5.7%)	< 0.001
Inpatient admission length of stay (days)	5.3 (7.3)	5.4 (7.8)	5.5 (8.1)	5.1 (6.2)	0.62
Requirement for mechanical ventilation	164 (8%)	56 (10%)	65 (10%)	43 (5%)	< 0.001
Requirement for dialysis	76 (3.7%)	24 (4.3%)	30 (4.7%)	22 (2.5%)	0.06

REFERENCES

[1] 2033.0. 55.001 seifa 2011 technical paper. pdf [Internet]. [cited 2022 Jan 10]. Available from: https://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/22CEDA8038AF7A0DCA257B3B00116E34/$File/2033.0.55.001%20seifa%202011%20technical%20paper.pdf