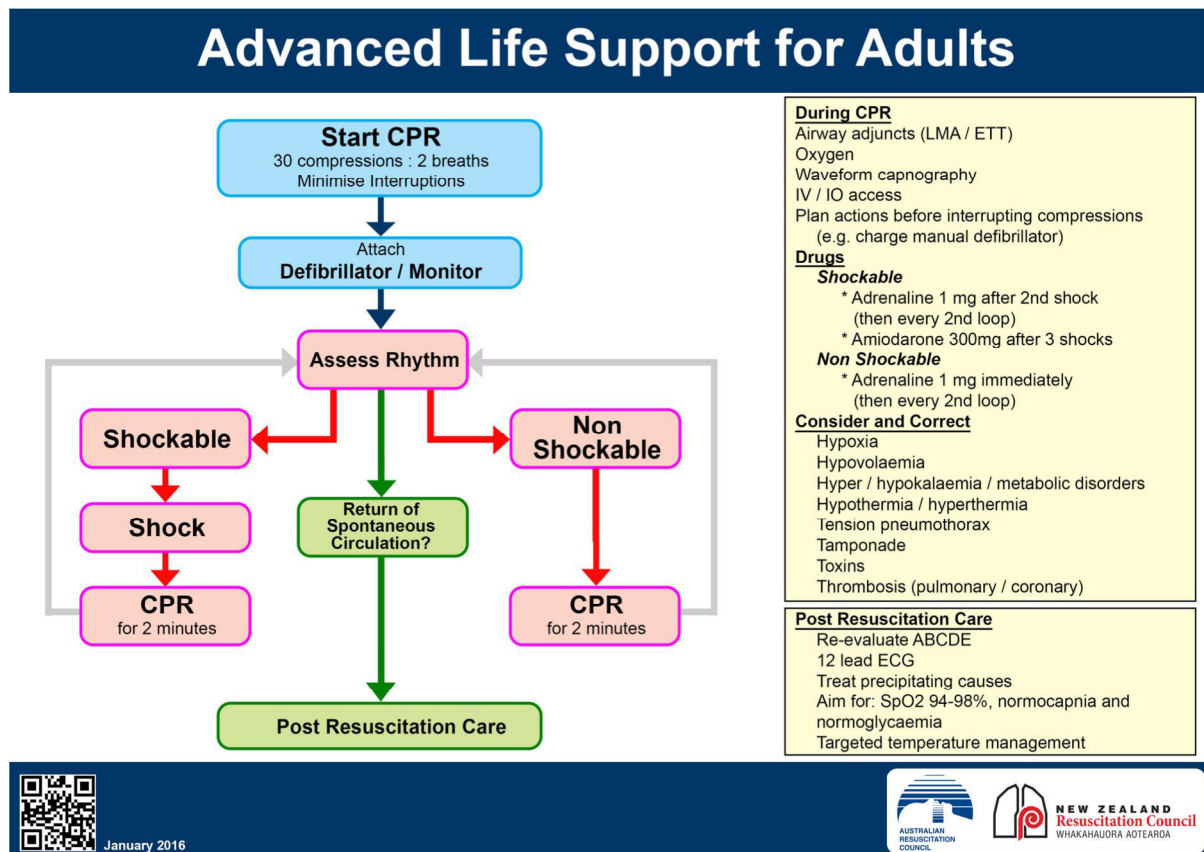


ALS Update

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The last update for ALS guidelines was in 2016 and there have been no changes since then. 2 large RCTs have been published – Airways 2 and Paramedic 2 which have generated some discussion relating to current recommendations.



Epidemiology

Out-of-hospital cardiac arrest (OHCA) is a leading cause of mortality in the world. Due to low survival rates and to the high risk for irreversible neurological damage and disability in survivors, it is a significant public, and global, health issue.

Overall survival to hospital discharge of around 10% internationally (6-22%) ^{Dyson 2019}

We have a 14% 30-day survival in New Zealand.

Global Resuscitation alliance 10 steps to improving outcome:

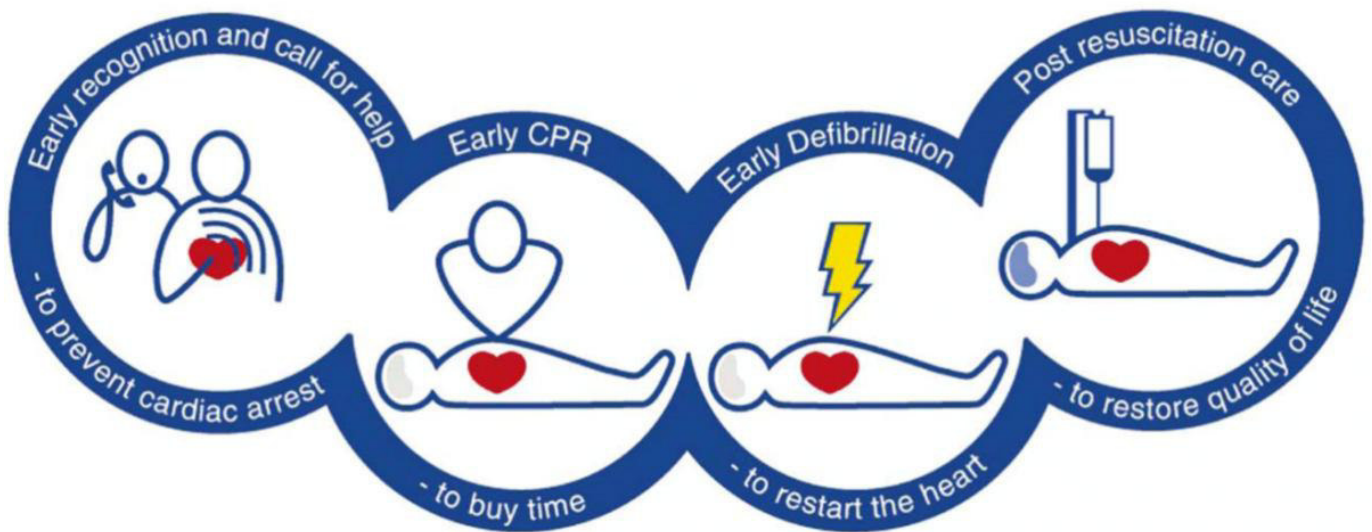
1. Establish a Cardiac Arrest Registry – Utstein comparators*
2. Begin Telephone-CPR with ongoing training and Quality improvement
3. Begin High-Performance EMS CPR with ongoing training and Quality improvement
4. Begin Rapid dispatch
5. Measure professional Resuscitation using the defibrillator recording
6. Begin and AED program for first responders, including police, security guards

7. Use Smart technologies to extend CPR and Public Access Defibrillation and use programs to notify volunteer bystanders to respond to nearby arrests
8. Make CPR and AED training mandatory in school and the community
9. Work toward accountability - submit annual reports to the community
10. Work towards a culture of excellence

*Utstein Comparators: Adults (>15yrs), all cause, resuscitation attempted, shockable presenting rhythm and bystander witnessed. Excludes children, EMS witnessed and no resuscitation attempt.

Community response: Early effective CPR and defibrillation

Community response remains a critical step in the Chain of Survival and the only aspect that is readily modifiable.



If you weighted intervention based on ability to improve outcome the chain of survival would look more like this for OHCA ^{Deakin 2018}:

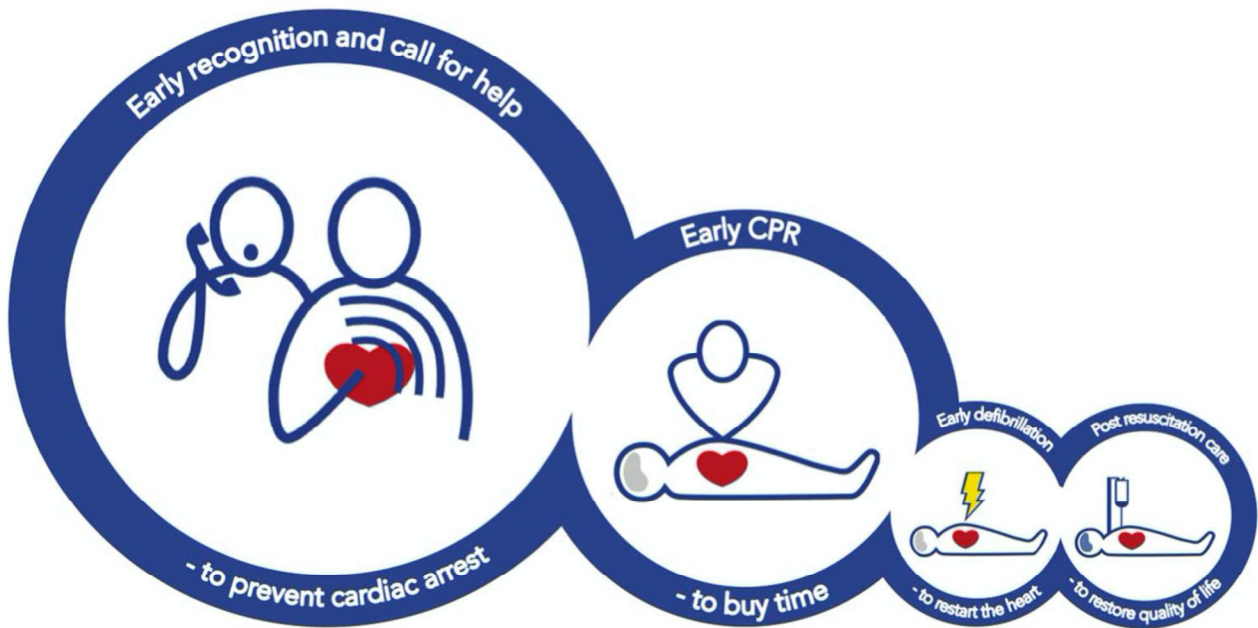


Fig. 1. Chain of survival for out-of-hospital cardiac arrest (Area ratios 1.0, 0.47, 0.12, 0.12).

Even in communities with mature infrastructure only about half of cardiac arrest victims receive CPR prior to EMS arrival and < 5% received defibrillation prior to EMS arrival ^{Blackwood 2020}

Cardiac arrest rates are higher, and bystander CPR lower in areas of socioeconomic deprivation ^{Van Nieuwenhuizen 2019} and usually there are less public access defibrillators ^{Dicker 2019}

Public access defibrillation programmes are consistently associated with better outcomes from OHCA

Good SAM is an international App, used in NZ, aiming to improve bystander CPR rates by calling on registered volunteers in the neighbourhood (alert sent at time of EMS dispatch). Studies are not showing a convincing benefit of such systems, but in NZ annual report into OHCA showed an improvement in survival if a Good SAM volunteer was present.

For in hospital cardiac arrest, the importance of early warning systems allowing intervention before arrest occurs is highlighted, and post resuscitation care plays more of a role:

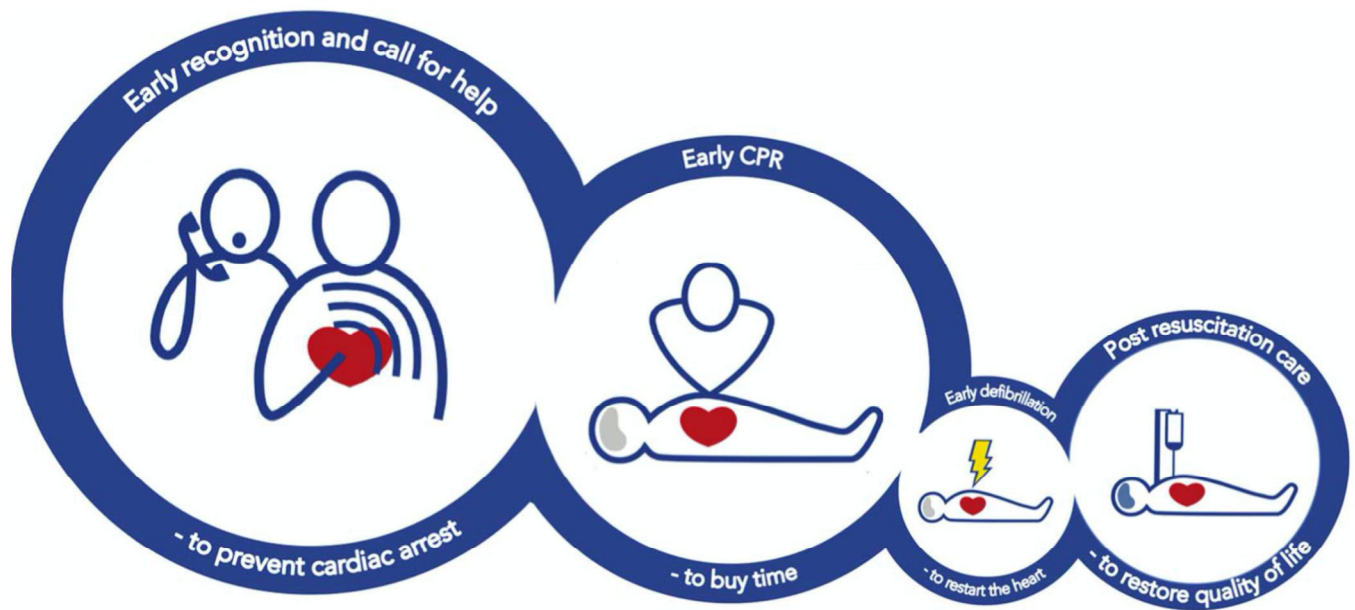


Fig. 2. Chain of survival for in-hospital cardiac arrest (Area ratios 1.0, 0.95, 0.17, 0.38).

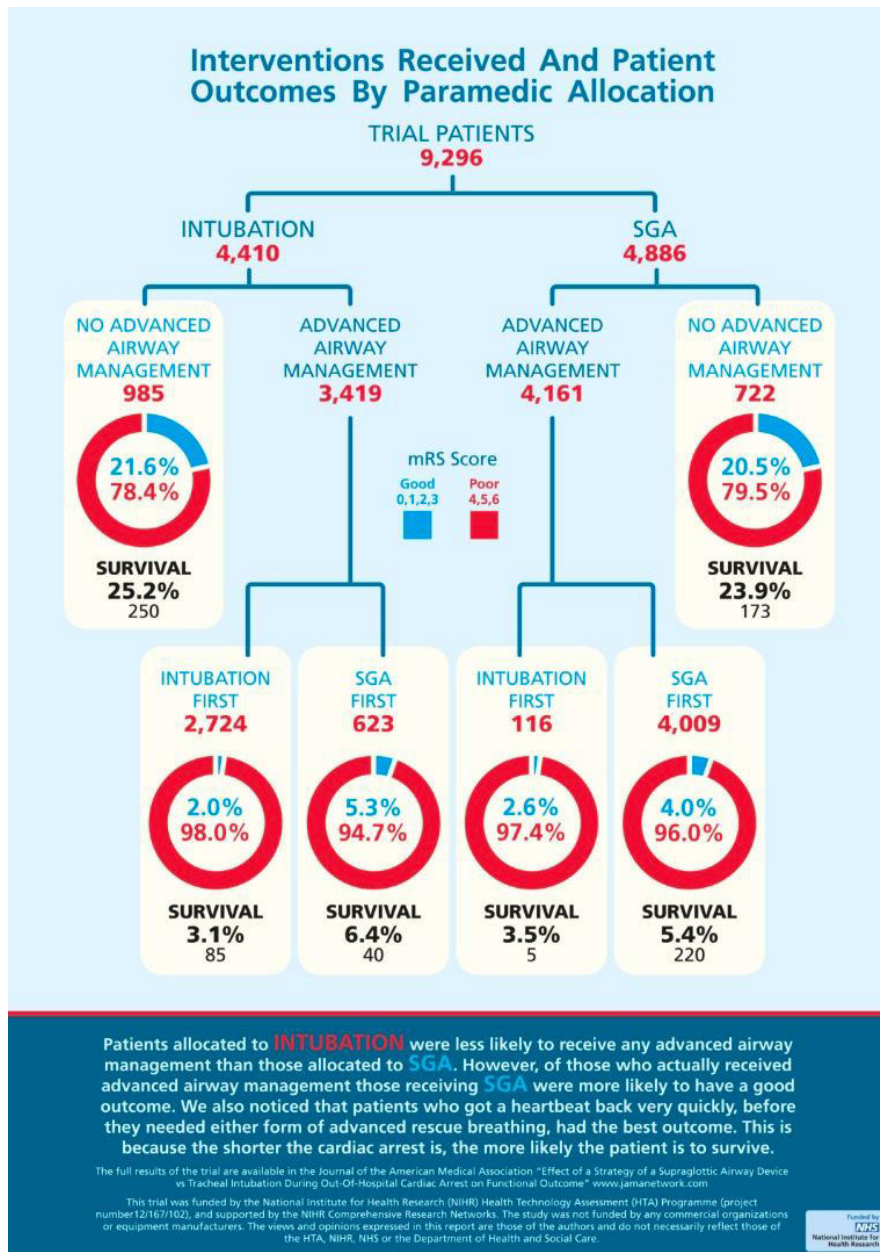
Defibrillation

Early is key. Start at 200J, then escalate to maximum the machine can go to (360J biphasic).

Evidence for Double sequential external defibrillation (DSED) and vector change defibrillation for refractory VF so far does not suggest improvement over current strategy ^{Cheskes 2019, Delorenzo 2019}. An RCT is currently underway in Canada attempting to find a robust answer as to whether there is benefit or not (DOSEVF).

Airway

Airways 2 trial published in 2018 ^{Benger 2018}. Showed that early ROSC was key to survival! And that SGA was easier to insert with similar outcomes.



Drugs

Adrenaline

- Paramedic 2: the Adrenaline trial ^{Perkins 2018} published after last guidelines formulated
 - o Showed current bolus regime of adrenaline resulted in improved survival but with worse neurological outcomes
- Is adrenaline bad, or is it the way we give it that is bad?

Amiodarone vs Lignocaine

No difference between the 2 in arrest, but lignocaine better than placebo. ^{Kudenchuk 2016} Although note lignocaine not currently part of ALS recommended therapy.

COVID 19 and CPR

Is CPR aerosol generating and what is the risk to a rescuer? This has generated much discussion over the last few months. Evidence is low, although cadaveric and simulation studies have been published demonstrating aerosol generation with chest compressions. So, how should we tailor our strategy to CPR in the presence of COVID given that some organisations classify as aerosol generating and some do not?

NZRC published a revised algorithm – key being have a plan and intervene early in an attempt to reduce the need for CPR. In the event of an arrest, anyone entering room needs to be in droplet PPE, and then airborne PPE for chest compressions/airway interventions. However, this recommendation is not universal.

References

1. Bengner JR, Kirby K, Black S, et al. Effect of a Strategy of a Supraglottic Airway Device vs Tracheal Intubation During Out-of-Hospital Cardiac Arrest on Functional Outcome
2. The AIRWAYS-2 Randomized Clinical Trial. *JAMA*. 2018;320(8):779-791.
3. Blackwood J, Mancera M, Bavery S et al. Improving response to OHCA: The verified Responder Pilot Program. *Resuscitation* 2020; 154: 1-6.
4. Cheskes S, Wudwud A, Turner L, et al. The impact of double sequential external defibrillation on termination of refractory ventricular fibrillation during out-of-hospital cardiac arrest. *Resuscitation* 2019;139:27581.
5. Deakin. The Chain of Survival: Not all links are the same. *Resuscitation* 2018; 126: 80-82.
6. Delorenzo A, Nehme Z, Yates J, Bernard S, Smith K. Double sequential external defibrillation for refractory ventricular fibrillation out-of-hospital cardiac arrest: a systematic review and meta-analysis. *Resuscitation* 2019;135:1249.
7. Dicker B, Garrett N, Wong S, et al. Relationship between socioeconomic factors, distribution of public access defibrillators and incidence of out-of-hospital cardiac arrest. *Resuscitation* 2019;138:538.
8. Dyson K, Brown SP, May S, et al. International variation in survival after out-of-hospital cardiac arrest: a validation study of the Utstein template. *Resuscitation* 2019;138:16881.
9. Jacobs IG, Finn JC, Jelinek GA, Oxeer HF, Thompson PL. Effect of adrenaline on survival in out-of-hospital cardiac arrest: a randomised double-blind placebo-controlled trial. *Resuscitation* 2011;82:113843. – PACA
10. Kudenchuk PJ, Brown SP, Daya M, et al. Amiodarone, lidocaine, or placebo in out-of-hospital cardiac arrest. *N Engl J Med* 2016;374:171122.
11. Perkins GD, Ji C, Deakin CD, et al. A randomized trial of epinephrine in out-of-hospital cardiac arrest. *N Engl J Med* 2018;379:71121. (PARAMEDIC 2)
12. Perkins GD, Kenna C, Ji C, et al. The effects of adrenaline in out of hospital cardiac arrest with shockable and non-shockable rhythms: findings from the PACA and PARAMEDIC-2 randomised controlled trials. *Resuscitation* 2019;140:5563.
13. Resuscitation highlights in 2019. *Resuscitation* 2020;148:234-241
14. van Nieuwenhuizen BP, Oving I, Kunst AE, et al. Socio-economic differences in incidence, bystander cardiopulmonary resuscitation and survival from out-of-hospital cardiac arrest: a systematic review. *Resuscitation* 2019;141:4462.