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A new emergency procedure for cardiac arrests aims to save more lives – here’s how it works

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As of January this year, Aotearoa New Zealand became just the second country (after Canada) to adopt a groundbreaking new procedure for patients experiencing cardiac arrest.

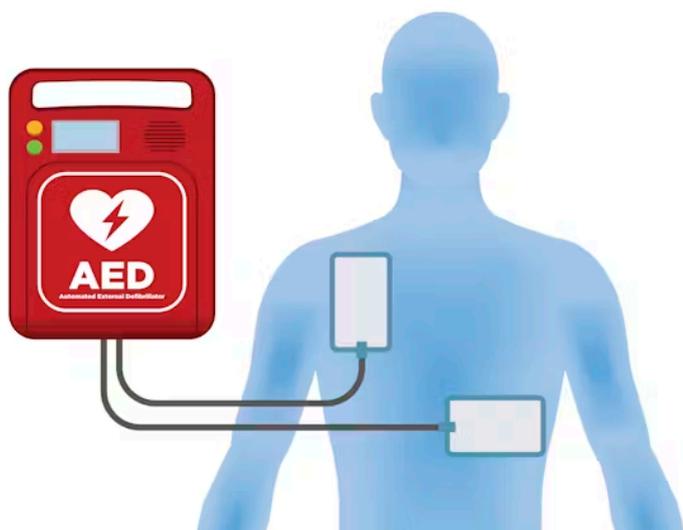
Known as “double sequential external defibrillation” (DSED), it will change initial emergency response strategies and potentially improve survival rates for some patients.

Surviving cardiac arrest hinges crucially on effective resuscitation. When the heart is working normally, electrical pulses travel through its muscular walls creating regular, co-ordinated contractions.

But if normal electrical rhythms are disrupted, heartbeats can become unco-ordinated and ineffective, or cease entirely, leading to cardiac arrest.

Defibrillation is a cornerstone resuscitation method. It gives the heart a powerful electric shock to terminate the abnormal electrical activity. This allows the heart to re-establish its regular rhythm.

Its success hinges on the underlying dysfunctional heart rhythm and the proper positioning of the defibrillation pads that deliver the shock. The new procedure will provide a second option when standard positioning is not effective.



Placement of pads during standard defibrillation. Getty Images

Using two defibrillators

During standard defibrillation, one pad is placed on the right side of the chest just below the collarbone. A second pad is placed below the left armpit. Shocks are given every two minutes.

Early defibrillation can dramatically improve the likelihood of surviving a cardiac arrest. However, around 20% of patients whose cardiac arrest is caused by “ventricular fibrillation” or “pulseless ventricular tachycardia” do not respond to the standard defibrillation approach. Both conditions are characterised by abnormal activity in the heart ventricles.

Read more: Cardiac arrests in young people – what causes them and can they be prevented or treated? A heart expert explains

DSED is a novel method that provides rapid sequential shocks to the heart using two defibrillators. The pads are attached in two different locations: one on the front and side of the chest, the other on the front and back.

A single operator activates the defibrillators in sequence, with one hand moving from the first to the second. According to a recent [randomised trial](#) in Canada, this approach could more than double the chances of survival for patients with ventricular fibrillation or pulseless ventricular tachycardia who are not responding to standard shocks.

The second shock is thought to improve the chances of eliminating persistent abnormal electrical activity. It delivers more total energy to the heart, travelling along a different pathway closer to the heart's left ventricle.

 Canadian ambulance on street

Canadian emergency medicine services became the first to adopt the new defibrillation method. Getty Images

Evidence of success

New Zealand ambulance data from 2020 to 2023 identified about 1,390 people who could potentially benefit from novel defibrillation methods. This group has a current survival rate of only 14%.

Recognising the potential for DSED to dramatically improve survival for these patients, the National Ambulance Sector Clinical Working Group updated the [clinical procedures and guidelines](#) for emergency medical services personnel.

[Read more: Arrested development: Can we improve cardiac arrest survival in hospitals?](#)

The guidelines now specify that if ventricular fibrillation or pulseless ventricular tachycardia persist after two shocks with standard defibrillation, the DSED method should be administered. Two defibrillators need to be available, and staff must be trained in the new approach.

Though the existing evidence for DSED is compelling, until recently it was based on theory and a small number of [potentially biased observational studies](#). The Canadian trial was the first to directly compare DSED to standard treatment.

From a total of 261 patients, 30.4% treated with this strategy survived, compared to 13.3% when standard resuscitation protocols were followed.

The [design of the trial](#) minimised the risk of other factors confounding results. It provides confidence that survival improvements were due to the defibrillation approach and not regional differences in resources and training.

[Read more: How do pacemakers and defibrillators work? A cardiologist explains how they interact with the electrical system of the heart](#)

The study also corroborates and builds on existing theoretical and clinical scientific evidence. As the trial was stopped early due to the COVID-19 pandemic, however, the researchers could recruit fewer than half of the numbers planned for the study.

Despite these and other limitations, the international group of experts that advises on best practice for resuscitation [updated its recommendations](#) in 2023 in response to the trial results. It suggested (with caution) that emergency medical services consider DSED for patients with ventricular fibrillation or pulseless ventricular tachycardia who are not responding to standard treatment.

Training and implementation

Although the evidence is still emerging, implementation of DSED by emergency services in New Zealand has implications beyond the care of patients nationally. It is also a key step in advancing knowledge about optimal resuscitation strategies globally.

There are always concerns when translating an intervention from a controlled research environment to the relative disorder of the real world. But the balance of evidence was carefully considered before making the decision to change procedures for a group of patients who have a low likelihood of survival with current treatment.

[Read more: Anyone can save a life, including kids. Here's why they should learn CPR and basic life support](#)

Before using DSED, emergency medical personnel undergo mandatory education, simulation and training. Implementation is closely monitored to determine its impact.

Hospitals and emergency departments have been informed of the protocol changes and been given opportunities to ask questions and give feedback. As part of the implementation, the St John ambulance service will perform case reviews in addition to wider monitoring to ensure patient safety is prioritised.

Ultimately, those involved are optimistic this change to cardiac arrest management in New Zealand will have a positive impact on survival for affected patients.