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Roll-out of automated external defibrillators to rural and remote Australian communities

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Background

Cardiac arrest occurs in up to 33,000 Australians every year. In the event of cardiac arrest, CPR alone has low rates of effectiveness. However, when provided in combination with defibrillation, survival rates increase significantly.

An Automated External Defibrillator (AED) is a valuable piece of lifesaving equipment that, when used in conjunction with cardio pulmonary resuscitation (CPR), has the potential to improve the 'chain of survival' and better the outcome of a cardiac arrest patient by up to 75%.

A contributor to cardiac arrest can be chronic heart disease (CHD). Australians in remote areas are 1.6 times more likely than those in major cities to be hospitalised for, and 1.3 times as likely to die from, CHD. Indigenous Australians are overrepresented in these statistics. A 2018 report by the RFDS titled '*Cardiovascular health in remote and rural communities*', found that adults living in remote and rural parts of Australia are at increased risk of cardiovascular disease and rates were highest in these areas as compared to metropolitan areas. Further, cardiovascular disease was the most common reason for an Royal Flying Doctor Service (RFDS) aeromedical retrieval for the three year period between 2013 and 2016—an average of 16 patients per day. And while not always associated with cardiac arrest, more than half of these RFDS aeromedical retrievals were for chronic heart disease, the predominant of which was heart attack.

The need for AEDs

A cardiac arrest is when an abnormal electrical problem occurs in the heart, leaving it unable to pump blood to the body. The symptoms are immediate with the person non responsive and not breathing. It can happen to anyone at any time and although causes can vary such as electrocution, injury and a heart attack (myocardial infarction—blockage), many arrests occur for no immediately apparent reason. As many arrests are linked only to an electrical malfunction within the heart, this happens without warning, with the first symptom being collapse, and potentially, death.

After a cardiac arrest the heart often has electrical activity occurring for about 10 minutes where, although not beating or pumping blood, the heart 'quivers' with the uncoordinated electrical activity within it. CPR can help get blood to the body, but CPR 'alone' cannot correct this abnormal electrical activity. With each minute that passes after a cardiac arrest, a person loses a 10% survivability

chance, meaning there is only a 10 minute window of opportunity to potentially save the person's life.

Around the world there are estimated to be over 1.8 million cardiac arrests per year, including over 800,000 cardiac arrests in Europe and around 33,000 in Australia every year. Around 60% of patients are unable to be revived by the time the ambulance crew arrives.

Like elsewhere in the world, in metropolitan areas of Australia the average ambulance response times are approximately 10-12 minutes. The use of a defibrillator therefore needs to be initiated before the ambulance arrives.

Around the world over recent years, there has been extensive installation of AEDs in public places (Public Access Defibrillation programs) to reduce the death rate of cardiac arrest and this initiative is proving very successful. One program alone, called 'Citizens save lives association limited (CISALI)', reports 18 'Heartsafe' countries with over 86,000 defibrillator locations that have already saved over 3,700 lives. There are regular media stories of survival thanks to the use of AEDs, e.g. teachers saving the life of a student, colleagues saving a co-worker in the workplace, sport coaches saving the life of a player, a parent saving the life of their child and even of a child saving the life of their parent.

Technological improvements of AEDs in recent years have enabled units to become more light weight and portable. Their automation improves simplicity and safety of use, with the AED unit able to assess the heart rhythm, and only providing a shock if a shockable rhythm detected. The unit also audibly guides the user through the steps for use and assists with audio guidance on the provision of CPR. As the use of AEDs has become more common, the cost of these units has dropped significantly and their installation in public areas has become very effective in making AEDs accessible to the general population around the world.

AEDs in remote Australia

Remote Australia is vast, the population is sparse and minimal health services exist. For emergency situations, ambulance services can be many hours away and in some regions where there are no local services, the only medical assistance available is by phone. In acute medical emergencies, the RFDS may be tasked with retrieving a patient and transporting them to receive definitive medical care in a tertiary hospital. This can take many hours and is one reason why, for example in the situation of cardiac arrests, morbidity and mortality rates are higher in remote Australia.

The RFDS has operated with the concept of the 'mantle of safety' from early in its inception. As part of this mantle of safety, enhancing first responder capabilities to emergencies in this extremely remote part of the world can make a big difference to outcomes in emergency situations.

In an effort to support safety, survival, health and wellbeing of those living in these remote areas where medical attention is so limited, the Commonwealth Government make comprehensive Medical Chests freely available to remote Australian properties. These Chests are an extended version of first aid kits that also include various medications that can be prescribed over the phone by an RFDS doctor.

People in the outback are also encouraged to undertake free, government-funded First Aid training. Remote Australians are far more likely to be first responders in an emergency in the outback, compared with a metropolitan area where medically trained first responders are more accessible.

In South Australia, first aid training and Medical Chests are administered on behalf of the Federal and state Governments by RFDS Central Operations. In 2018, First Aid training delivered by RFDS Central Operations incorporated the use of an AED for the first time.

Historically, there has been very little access to AEDs in the outback. Given the small populations in these areas, programs providing AED's have traditionally been implemented in areas where higher concentration of population reside.

Following a critical incident at the races in Roxby Downs, South Australia, where an AED was successfully used to save a young mum who went into cardiac arrest, the SA outback community became increasingly aware of the potential of AED units to 'save one of their own.' The RFDS subsequently received a request for inclusion of AEDs with medical chests from a remote station owner, who had noticed the proliferation of AED's in public places in major cities and sensed the importance of their presence in the outback.

Through the support of our corporate partner, TAL, the RFDS embarked on national roll-out of AEDs. The primary aim of this AED project, the first of its kind in Australia, is to reduce the number of people who die from cardiac arrest in remote and rural Australia by improving access to AEDs for first responders.

Initial implementation

Building on the 2018 report by the RFDS, a further review of cardiovascular disease among RFDS patients in remote Australia was undertaken. Over two years of retrieval data was analysed to identify the locations most commonly attended in response to a patient experiencing cardiac arrest, along with national data relating to prevalence of CHD. These locations were mapped, and combined with local knowledge from our service managers, identified the best locations for provision of an AED. South Australia determined as the first state to implement this offering and a tender process determined the model of AEDs to be purchased. Staff fundraising efforts by TAL ensured that funds for purchase were secured.

In South Australia, AED units were identified as an extension of the 'mantle of safety' and were linked with the Medical Chest management system (to facilitate support with pad changes and battery replacement). Provision of training and ongoing support for any AED placement is a critical aspect to any AED rollout.

The Senior Health Programs Advisor was allocated to coordinate the rollout and training for the program. The Senior Health Programs Advisor initially undertook a literature search to identify similar programs and to determine how best to implement the program, based on previous findings. This research identified university-developed AED guidelines that could be amended for local use, and useful publications outlining how to optimise the efficiency of AED programs. A step-by-step program plan was then developed, and a flow chart was designed to show the four options for distribution.

The pre-existing database of Medical Chest holders in South Australia was used as a starting point to directly contact outback properties. The contact task was to explain the AED offer and obtain permission to have an AED on site, ensuring they understood the need for this valuable piece of equipment to be mounted on an external wall with protection from rain and direct sun. This initial approach was undertaken primarily by phone, and proved a challenging and onerous task. With many in these areas working long hours, having unpredictable times present at homesteads, and

technological difficulties meaning phone or emails can be out of order for months at a time, many contact attempts were necessary (often out of hours to increase likelihood of success) in order to gain initial agreement at each site. Hence, this initial stage took significantly more time to complete than expected or initially planned for.

A service being established simultaneously by RFDS Central Operations and coordinated by the same project officer, was remote fly in/fly out (FIFO) dental services. Given the strong alignment of the outback community who required AEDs (and training) with those being targeted for the remote dental service, it was decided that, where possible, the delivery of the AEDs would be done on a group basis. Bringing people from the remote communities together has social benefits and this also increased the efficiency of delivering the AED units.

It seemed most appropriate to make the first group of AED presentations also the launch of the FIFO dental program. (i.e. with every AED comes a 'free oral health check' for you and your family). Kingoonya (a small township west of Glendambo, or 330kms NW of Port Augusta) was chosen as the trial site for this, with a sausage sizzle lunch in the local pub where the training sessions were also hosted.

The community member who had initially approached the RFDS for AEDs for remote properties, was a valuable and important part of this inaugural rollout, and following their significant fundraising efforts, a TAL staff member presented the first AED to this community member. This community approach worked well and was repeated in places like Marree, Nonning (Eastern Gawler Ranges) and in the Western Gawler Ranges, and an article was placed in the RFDS magazine to further raise awareness about the availability of AEDS in communities where the RFDS provides services.

Further implementation and distribution processes

The following detailed process was undertaken in preparing for distribution of AEDs:

- An Excel data base was created to record the serial number and RFDS asset number along with the sites med chest number and current contact details for the person responsible.
- A flowchart was created to identify the various ways to distribute the units in recognition of the importance of working with the hosts to ensure an effective and appropriate method (this often changed as circumstances changed and RFDS flexibility was important).
- A quiz for post education testing was designed (using a tool from the AED manufacturer).
- An acceptance form (to be completed and returned at the time of delivery of the AED) was designed to record the serial numbers, asset numbers, contact details and sign off the acceptance with each AED.
- The handbooks that came with the units were adapted to an RFDS context and rebranded/reprinted with permission from the manufacturer.
- A checklist was designed to facilitate the self-checking that needed to be done at the time of handover of the unit as part of the education of its use.

Further, there was a 12-step process in preparing each of the 100 units for distribution that was labour intensive:

- a sturdy carry bag;
- a CD Rom- training tool;
- a CD Rom- AED Management resource;
- a data connection cable (that links the AED with a computer);
- a quick reference guide;
- the lithium battery (to be inserted in to the AED on arrival to host);
- a carry strap;
- spare adult and paediatric chest pads;
- a wall sign;
- a tag recognising TAL as the donor, with the 1800 RFDS number for SA attached;
- a wall mount bracket;
- a first aid kit with:
 - blunt scissors to cut clothes,
 - disposable shaver to remove hair from chests gloves
 - alcohol preps
 - one way CPR mask
 - sterilise
 - disposable gloves.

Distributing nearly 100 AEDs was done concurrently with establishing the RFDS FIFO dental program and the alignment of the two programs enabled some 'opportunistic synchronicity'. A number of Medical Chest audits were also done as the community embraced the opportunity to gain support with this process whilst they had an RFDS person present who could assist. Overall the rollout of the AEDs provided a great chance for some extra contact with community members and was a great public relations opportunity for RFDS.

The delivery phase of the project was conducted over a 6-month period with about 100 days of delivery activity occurring in that time.

- The group training sessions commenced the AED rollout with about 35% completion done in this way.
- A few remote drive runs enabled further drop offs of another 25%.
- Using existing methods of receiving goods was then used e.g. the Birdsville truck; a train to Cook; the contracted remote first aid trainer.
- Australia Post or the clinic run by an RFDS deputised AED trainer were also used.
- Finally, some sites chose to collect their AED unit from either the Port Augusta RFDS base or the Adelaide base when there for supplies, receiving their training at the same time.

Next steps

With the initial distribution phase completed, evaluation of the program has commenced with a questionnaire being sent by email to all AED recipients. Sites were also invited to submit a selfie of their AED in situ to be part of the Outback Rescue Ready Collage.

The RFDS Operations Control Centre (OCC) in Port Augusta, is the central location who deal with the outback SA emergencies have been advised of the location of the AEDs in outback SA. SA Ambulance Service has also been advised of locations.

The ongoing maintenance system of support of the units, replacement of pads and batteries have all been integrated with the Medical Chest management program that is currently being reviewed. This brings an opportunity to review where in the state there is a lack of Medical Chest coverage and further enhance the mantle of safety offered by RFDS to these remote areas.

There is no doubt that this has been a successful venture, with overwhelming support and an increasing amount of people of remote South Australia now more aware and equipped for life saving techniques. The challenge and success of this rollout has been a rewarding experience to all involved and is expected to save lives in remote Australia.

‘A fabulous initiative and very grateful for the people behind the idea, the roll out and the sponsorship to make it happen. Thank you.’

Presenters

Lindy Harkness is currently the senior health programs advisor for RFDS Central Operations, based in Adelaide. A registered nurse, with a Masters in Health Science (Health Management) Lindy started with RFDS Central Ops in May 2017 and is involved in many programs with RFDS. She has various additional certificates in child health, midwifery, immunisation, sexual and reproductive health, and has experience working in community health as a women’s health nurse in regional SA and in hospital settings both in the more traditional sense and in running a nurse-run immunisation service at the Women’s and Children’s Hospital in Adelaide, then converting it to a GP service and subsequently setting up other GP services (co-located with emergency departments). Lindy also has over 10 years’ experience as a director of care in large aged care facilities, and has worked for a few years as a director of nursing in a regional NSW public hospital. One of Lindy’s programs at Central Operations was to distribute 100 AEDs to remote stations in South Australia, where there are medical chests.

Lauren Gale is the Director of Programs and Policy for the Royal Flying Doctor Service, responsible for leading the RFDS Research and Policy Unit in Canberra, which has most recently released publications looking into the health of older people, cardiovascular disease, mental health, oral health, accident and injury in rural and remote Australia and, the demand from Indigenous Australians in remote and rural areas for aeromedical services. Prior to commencing with the RFDS in 2013, Lauren was a policy adviser in the Department of the Prime Minister and Cabinet, with responsibility areas including rural health, mental health, Indigenous health and women’s health. Lauren completed a Master of Public Policy (Social Policy) at the Australian National University in 2013 and previously completed a Bachelor of Arts and Sciences (Hons.) at the University of Sydney, including an honours thesis on Australian rural health policy and persistent health workforce shortages in rural areas.