

## IN THIS ISSUE:

- \* FRA funds stinger research
- \* Public Access Defibrillation saves lives
- \* Zoll AED plus leads the way
- \* Chest compression only CPR easier to perform and remember than standard CPR

## New Year Special



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## First Response Australia funds new research into stinger treatment

New research is being launched this year into the role Pressure Immobilisation Bandaging (PIB) should play in the treatment of stings from dangerous tropical jellyfish. First Response Australia will fund James Cook University's Jamie Seymour in ground breaking research to once and for all resolve this controversial issue regarding the use of PIB.

Jamie wants to prove that venom from Box Jellyfish (*Chironex fleckeri*) travels through the circulatory system and not through the lymphatic system (for which the current first aid treatment is based on).

To do this Jamie plans to envenom cane toads in the study and compare the toads that have PIB used as treatment against those that do not.

Current medical recommendations for first-aid treatment of severe Box Jellyfish (*Chironex fleckeri*) envenomings include the application of pressure-immobilisation bandaging (PIB) to the sting site, which theoretically arrests toxins by restricting lymphatic flow to and from the site. However, the speed with which clinical signs and symptoms manifest in box jellyfish envenomings imply a circulatory, not lymphatic, route of envenomation. Research in the last couple of years has produced substantial evidence to suggest that PIB may actually do harm to these patients.

So this new research that hopefully will definitively assess the route of envenoming, therefore clarifying whether PIB could have any palliative effect.

Envenomings by dangerous tropical jellyfish are a major concern in North Queensland and across the northern Australian coastline. Over 70 fatalities have occurred in Australia, since records were kept with many more serious envenomings requiring hospital admission and pain management.

Much research regarding prevention and treatment has been carried out over recent years but still there is some dissent amongst experts regarding effective medical first-response care.

This study aims to address and resolve such arguments, by elucidating mechanisms of envenoming to select the appropriate methods of care.

A standard treatment basis (recommended by the Australian Resuscitation Council) exists for first-aid treatment of victims of nearly all venomous animals, with few exceptions. This includes the immediate application of pressure immobilisation bandaging (PIB), on the premise that this will block absorption of venom and therefore delay or prevent systemic symptom. It was thought that "if it works for snakebite - then it should work for jellyfish".



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This "standard treatment" was based primarily on treatment of elapid snakebites; these animals deliver venom to lymphatic circulation in the body via fangs, and PIB has the effect of sequestering venom in the limb or area in which the bite was received.

This protocol is presently the recommended first aid treatment for severe cubozoan "box type" jellyfish envenomings by the Australian Resuscitation Council and by the Queensland Surf Life Saving Association of Australia though not by Northern Territory authorities.

However, data does exist to refute this as an effective blanket treatment for all cubozoan envenomings.

First and foremost, envenoming by the largest and most deadly of the cubozoans, the Box Jellyfish (*Chironex fleckeri*), results in immediate excruciating pain and potential fatality within minutes of onset. Such fast onset of signs and symptoms suggests that these animals deliver venom not to lymph, in which systemic response occurs more slowly, but directly to blood circulation.

Secondly, jellyfish deliver venom via an array of nematocyst stinging cells, which line the tentacles and are triggered on contact to fire outward, piercing the skin of prey and injecting venom. This has the effect not only of introducing venom from each individual nematocyst, but causing the tentacles to adhere to



victims or prey. In the case of a large, non-prey item such as a struggling human victim, this results in the tentacles tearing away from the animal itself and remaining stuck to the envenomation site. Therefore, application of pressure to the site and any residual tentacular material may increase venom load to the victim, even after the application of vinegar.

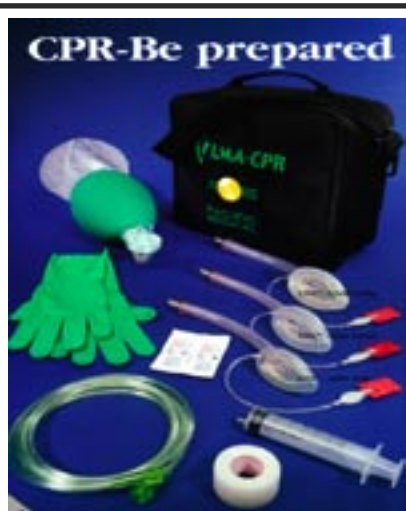
Experimental data shows that *in vitro* application of pressure equal to PIB indeed results in increased venom delivery. Some have refuted this by pointing out that this data was obtained without the use of acetic acid, which irreversibly inhibits the firing of undischarged nematocysts. Application of standard household vinegar, kept in prominent places along Queensland beaches is an integral part of first-aid protocol. It has been suggested, therefore, that a combination of PIB and vinegar would not increase venom loading to victims.

However, it is notable that acetic acid has no effect on venom itself, only on the undischarged nematocysts containing it. When Jamie Seymour repeated the above experiment using pressure and acetic acid, venom loading increased comparably to its increase in the absence of acetic acid. Microscopic observation suggests that this is due to mechanically induced expression of further venom from previously fired nematocysts.

Thirdly, considerable anecdotal evidence exists that does not support the use of PIB. In a study of 40 Darwin patients, none received PIB treatment; all survived. Other cases exist in which symptoms worsened substantially after the application of PIB.

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The study, hopefully will come up with some conclusive evidence to either support or refute the use of PIB in stinger treatment. It may even lead to the suggestion that indeed PIB could be used for first aid treatment of Irukandji Syndrome by applying PIB only above the stung area if on a limb (director's quote). This study is another example of evidence based science being used in first aid and pre hospital care instead of the stubborn adherence to some traditional methods we now realise are much outdated. Keep up the good work Jamie Seymour.

## Review of popular AEDs puts ZOLL out in front

If your thinking of purchasing or upgrading your Defibrillator it would be worth visiting this website first. <http://automated-external-defibrillators.com/> James Bock, an EMT-B and CPR instructor in the USA has reviewed a number of popular AEDs currently on the market and graded them by assessing their performance in a number of categories. These categories include: batteries, pads, water resistance, financial stability of manufacturer, ease of use, electrode connections CPR assistance, airway management and pricing. The scale used to assess each category was terrible, poor, fair, good and excellent.

The review raised the following concerns:

**Pad Placement:** incorrect placement of pads by first responders was not an uncommon problem. The only manufacturer to address this was Zoll with its unique one piece pad and the only pads to have a 4 year shelf life.

**Patent Airway:** patients suffocating after successful defibrillation due to improper airway management by first responders. Again the only brand to address this was Zoll with its "Passive Airway Support System" which utilises the AED cover by allowing responders to slide it under the patient's shoulder blades, thus creating a patent airway.

**Water Resistance:** no AED manufacturer provided protection for rescuer's by incorporating significant water resistance. But Zoll has developed by far the most resistant AED to water.

**Hearing Impaired:** where elderly persons attempted to utilise an AED on a mate or fellow patient they were frequently found to be hard of hearing and misunderstood the voice prompts - Zoll integrated illuminated pictures for each portion of the rescue that can easily guide children, hearing impaired and elderly rescuers on proper use of their AED.

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**Updating Operating System:** all AEDs utilise complex computerised operating systems and if guidelines regarding the energy of shocks change every AED will need to be upgraded or retrofitted, except Zoll. It is the only unit where the user is able to update the system if necessary.

**Consumer Batteries vs Medical batteries:** where batteries sometimes died unexpectedly by being exposed to extreme temperatures and moisture, rescuers were at the mercy of AED companies to supply proprietary batteries and prices that range from \$200 to \$500. Most defibrillators require a spare batteries for those "just in case" situations. Zoll integrated consumer lithium batteries manufactured by companies that actually know what they are doing. The Zoll unit utilises 10 separately installed batteries that provide tremendous redundancy, because up to 5 batteries can die and the unit still remains functional. The replacement cost is as low as \$50 for all 10 batteries.

And on top of it all Zoll's unit was approximately \$1500 less than comparable AEDs. It's a winner.

## Public Access Defibrillation (PAD) - an overview

Over the next few years we will no doubt see the deployment of AEDs in public areas such as airports, railway stations, shopping malls etc.

At the moment numerous strategies exist to deal with out of hospital Sudden Cardiac Arrest (OHSCA) and can generally be categorised under the following headings:

- \* Emergency Medical Services (EMS) - Defibrillation by ambulance service personnel
- \* First Responder (FR) - Defibrillation by appropriately trained people in specified workplaces or communities
- \* Public Access Defibrillation (PAD) - Defibrillation by anyone untrained or trained

The outcomes of a PAD program established at three Chicago airports (O'Hare, Midway and Meigs Field) are encouraging. AEDs were placed within 90 seconds walking distance throughout these airports.

Over the first two years of operation 21 persons suffered SCA of which 18 were in Ventricular Fibrillation (VF) requiring defibrillation. Although the AEDs were available for the lay person to use, the majority of these saves were by persons trained in the use of an AED (75%). So having AEDs in public places and available to anyone to use does increase the survivability of SCA. In the Chicago Airports situation, no inappropriate defibrillations occurred nor where any safety issues identified.

Another trial has been undertaken in the USA. This trial saw 1000 AEDs deployed in 24 sites. The trial was randomised to CPR only (control group) or CPR/AED intervention. The sites included shopping centres, workplaces, community centres, entertainment complexes, hotels, transit lounges and residential complexes. All rescuers were interested lay persons.

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**Zoll's unique one piece  
pads and consumer  
batteries  
(see special page 6)**

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The results were significant in the CPR/AED group where a doubling of the success rate was achieved.

Survival from OHSCA in Australia unfortunately remains poor at approx. 10% of victims surviving hospital. Overseas PAD programs have seen success rates of 62% of victims leaving hospital, neurologically intact and alive one year later.

The Australian Resuscitation Council has released a recommendation regarding the implementation of PAD programs. It suggests that Defibrillation should be preferably undertaken by trained personnel but if trained persons are unavailable then untrained bystanders should also have access to the use of public access defibrillators.

## Uninterrupted chest compression CPR easier to perform and remember than standard CPR



In our last newsletter we detailed First Response Australia's method of making Resuscitation easier to teach, perform and remember by under certain circumstances doing "compressions only" CPR in a Sudden Cardiac Arrest emergency. From the feedback we got it was received as a breath of fresh air but still some "traditionalists" still would rather wait a few more years so the change is gradual and not so challenging for them.

Well, a recent study in Arizona, USA demonstrates that "compression only" CPR was easier to perform and remember, resulting in more compressions per minute of CPR achieved than in standard CPR. The study had 28 medical students taught both methods of CPR and then tested at 6 months and 18 months after training. It concluded that chest compression performance during "standard CPR" declined in repeated testing over 18 months whereas the study found minimal decline in chest compression performance in the "compression only" CPR. In addition it found that substantially more chest compressions were

delivered during the "compression only" CPR than the "standard" CPR at all times primarily due to the excessive pauses required for ventilations (EAR).

First Response Australia recommends that where a Sudden Cardiac Arrest is witnessed and assistance in administering 2 operator CPR (15 compressions : 2 breaths) can occur within a couple of minutes that the initial rescuer administer "compression only CPR".

### UNRESPONSIVE CASUALTY

If suddenly collapsed and unresponsive- suspect sudden cardiac arrest !!

CHECK AIRWAY

CHECK BREATHING

Sudden Collapse  
+ Unresponsive  
+ No Colour  
+ No Breathing  
= Cardiac arrest

### CALL FOR DEFIBRILLATOR CALL EMS

START CPR

Start cardiac compressions immediately  
(no ventilations)

Do not waste time looking for barrier device

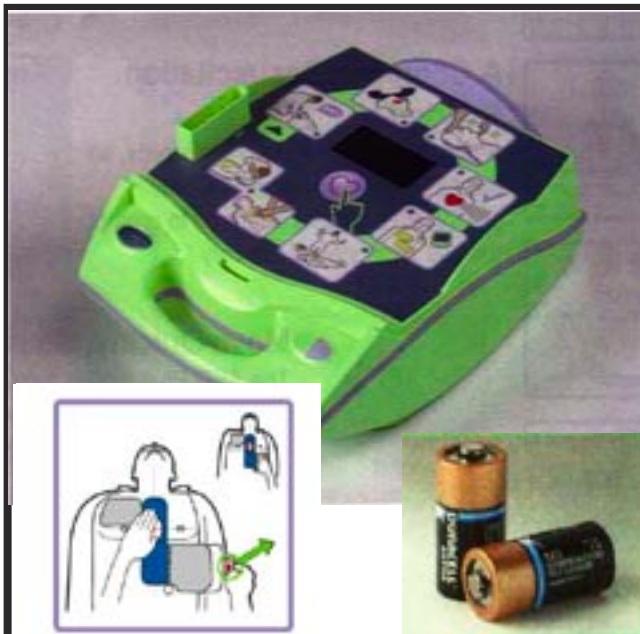
Let someone else bring the barrier device to you if possible

Continue compressions for 2-3 minutes before reassessing

*Edited by Charles Makray  
Managing Director*

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- \* *Around 5-10 Australians die each day from out-of-hospital sudden cardiac arrest*
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