

# First Responder



March '09 Newsletter

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## QUALITY CPR

### SPECIAL

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## How good is the CPR in your workplace ?

**CPR** has been the mainstay of cardiac arrest treatment for many years now and has consistently demonstrated improvement of outcomes when delivered promptly and correctly to arrest victims. The importance of CPR is emphasized in our basic first aid training and through to our more advanced programs such as First Responder courses, and the American Heart Association (AHA) provides on-going CPR guideline updates as new and innovative research becomes available. This then eventually flows through to other resuscitation councils such as the Australian Resuscitation Council (ARC). The most recent update in International Guidelines in 2005 introduced some significant changes in resuscitation technique and philosophies which have taken more than a couple of years to flow on and become appreciated by training organisations let alone workplace responders. The next changes in guidelines in 2010 are expected to again bring dramatic changes in technique but we have a real time problem on our hands. Changes are being adopted right now because research and evidence is showing that we still haven't got it right.

An example of this is the recent recommendation by the AHA to promote "compression only CPR". It appears that the Americans are the most innovative and progressive country in relation to allowing change to occur quickly.

The resistance to change in this country in the light of new innovative technologies is disturbing. Survival statistics for cardiac arrest in the USA are increasing dramatically and we are talking about people surviving with an intact brain.

For progressive and innovative training organisations in Australia the barrier regarding change comes up at every corner. Comments and questions such as "Does the ambulance service use this equipment?" "Do they use that technique?" "Is it approved by the Resuscitation Council?" "If its not used by anyone else it mustn't be good!"

These questions and comments are show stoppers because we unfortunately have a problem in this country with the unfounded belief that Australian's are leaders in this area.

The skill of CPR is unfortunately often regarded as a base skill which generally "can't be improved upon that much". *What we need to realise that out of all the interventions employed in a cardiac arrest; CPR is usually the poorest performed one. All major Resuscitation Councils throughout the world agree that the single greatest determining factor as to the survivability of a cardiac arrest is CPR!*

Our organisation is continually involved in "technical debriefs" after first aiders or first responders have had to administer real life CPR.

We often find that the CPR and other techniques were poorly performed and the underlying reasons are:

1. lack of regular updates other than annual refreshers.
2. lack of team and scenario based training
3. lack of adopting innovative equipment to enhance CPR performance.



*First Responder Training*

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The comment “they did their best” is simply not good enough, as there are numerous ways to improve the performance of CPR within organisations that require First Responders in its workplace:

*What can we do now to improve our care and survival rates from cardiac arrest, especially knowing that for some organisations the next cardiac arrest is not an “if” but a “when”?*

The key to survival improvement in the short term truly brings us back to basics. Recent investigations have shown that both in- and out-of-hospital CPR quality during actual cardiac arrest care is highly variable. In these studies, CPR providers were monitored and their actual performance was compared to guidelines recommendations. These guidelines included rate and depth of compressions, rate of ventilations and “no flow” time, or periods of time without chest compressions and therefore without circulation of oxygen to tissues.

The results of these evaluations were surprising.

*Marked deficiencies were found: Continuous chest compressions were performed for less than 50% of the duration of cardiac arrest, compressions were too shallow, ventilations were too fast, and “no flow” time was significantly greater than the time built in for life sign checks.*

### IMPROVING CPR

These findings are especially important in the context of recent work showing how delivering more and better CPR can make a big difference in real outcomes. In many parts of the USA “minimally interrupted cardiac resuscitation” (MICR) is demonstrating dramatic increases in survival rates of witnessed cardiac arrest victims with shockable rhythms from 4.7% with standard CPR to 17.6% with MICR. Similarly, another variant of CPR that emphasizes compressions over ventilations, termed “cardio cerebral resuscitation” (CCR), strongly advocates for strict attention to the amount of time spent “off the chest,” with the goal of neurologically intact survival—giving patients their best chance at returning to their normal lives after cardiac arrest. Additionally, it is important to realize that EMS providers tend to arrive between 4- 10 minutes after collapse, when chest compressions appear to provide the best chance at survival when followed by defibrillation. This fact lends even more support to the theory of MICR, as high-quality compressions before defibrillation improve the chance of shock success.

In the same vein, it stands to reason that first aiders and first responders may contribute to lifesaving efforts through continuous chest compressions (CCC). Training through CPR/Defibrillation courses and simplification of the first aider role by focusing solely on CCC (removing the element of mouth-to-mouth) may increase earlier intervention and potentially improve survival rates. These techniques are not widely taught here in Australia and it is sometimes difficult to convince organisations with First Responders that there is a better way.



*Real life CPR*

*Many researchers speculate that survival rates can be better with improved MICR compliance resulting from more training, retraining and feedback. In one MICR implementation study in the USA it was noted initial improvement that peaked at an impressive 48% survival rate after one year.*

The authors of this study noted that this trend declined and suggested lack of retraining and quality assurance efforts throughout the life of the study as potential contributors.



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Limited spaces conditions and prerequisites apply

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- Therapy masks (adult)
- Oropharyngeal Airways Set of 4
- V-Vac Suction Kit
- Glucometer (Accu-chek)
- Sphygmomanometer (palm style)
- Stethoscope (Sprague)
- Penlight torch
- Paramedic shears
- Sharps container
- X-Collar Cervical Splint
- Instructions for Use

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There appears to be a disconnect between the theoretical guidelines and practical application that may limit the ability to deliver excellent resuscitation care. How can this gap be narrowed? Can training and retraining be made practical, and can it really be effective?

There are three possible periods of time during which efforts to improve CPR can be considered: pre-arrest, during the acute event and post-event.

*- The pre-arrest phase includes training/retraining and education*

*- The acute event phase includes real-time feedback of CPR performance during the arrest.*

*- The post-arrest phase includes staff debriefing and quality assurance programs.*

These 3 periods provide room for provider improvement, and several new and promising initiatives have been suggested as new technology becomes available.

### **PRE-ARREST TRAINING AND EDUCATION**

When it comes to care during unpredictable occurrences, pre-event training is the most readily controllable. This is the time leading up to the event in which we have the freedom to prepare, to make plans, to practice, so when called upon, we can act swiftly and efficiently to bring about the best possible outcome.

Unfortunately, just as this is one of the first and most important steps toward success, it may also be one of the first places where the system of CPR performance breaks down.

For example, a recent study demonstrated that even during controlled, monitored training sessions, CPR quality was suboptimal — shallow chest compressions and prolonged "no flow" time persisted despite the 2005 guideline update.

*Our organisation has found that poor CPR manikin design contributes to poor practice performance. We found that the most commonly used CPR manikin does not allow for the technique of deep compressions (up to one third the depth of the chest) to be practiced unless some of the internal components were taken from the equipment and discarded. So in effect, thousands of CPR students are not being taught to compress deep enough because of poor equipment design.*

Training experiences also may not adequately train for the pressure and chaos of an actual code. As noted in one recent publication on CPR performance, "it is possible that the highly complex physical and mental situation of treating a patient with cardiac arrest is too different from the training situation on manikins, making the performance dramatically different and possibly less efficient." As many of us have experienced in training courses, the realities of real life management (inability to gain an airway, unfamiliarity with or malfunctioning equipment) and time pressure are not frequently included in practical training scenarios. This makes it easy to breeze through the basics, but may be under preparing us for real-life situations. Training providers should consider training scenarios that are more immersive, with time pressure built in, scenarios that are a surprise to trainees, or involving "actors" to add bystander stress to the environment.

*Large gaps in both exposure to retraining experiences and to actual cases requiring CPR are in many cases exceptionally long. In many organisations, it is likely that a First Responders can go the entire 1-2 years until CPR re-certification. These prolonged gaps in training/exposure may be contributing to the variability of delivered CPR.*



**Defibrillation training with Real Time CPR Feedback**

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## ATTENTION

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It stands to reason that frequent practice and review should help to hone resuscitation skills. Training and retraining should ideally ingrain these skills as second nature or reflexes.

#### IMPROVING CARE DURING RESUSCITATION

Preparation and practice are crucial to success; however, as noted, there is often a disconnect between training and actual events. What can be done during cardiac arrest itself in order to further focus efforts?. How can resuscitative efforts be maximized?

One solution that has been recently developed, is the function of real-time automated feedback—the use of technology to improve CPR quality.

Our organisation (FRA) only promotes defibrillators that are able to provide both verbal and visual feedback during real cardiac arrests. These defibrillators are equipped with special sensors to evaluate rate and depth of compressions, and correct the user when compressions are not optimal. This quality CPR information is stored in the defibrillator for later retrieval allowing analysis of the performance of the real life cardiac arrest scenario.



**ZOLL AED plus with real time CPR Feedback**

*Many studies have now shown that the rate and depth of compressions and “hands on” time improved to consistently follow international guidelines with real-time automated feedback when compared to standard CPR (without feedback). These studies actual showed that rescuers using the defibrillators with real time feedback had almost a doubling of survival to hospital discharge.*

Other solutions to improving care during resuscitation is to use innovative technology such as “Impedance Threshold Device Technology.

*A device called the ResQPOD, now used extensively in over 2000 EMS and Acute Care Systems in the USA is producing amazing results in the rates of cardiac arrest survival both in and out of hospital. When used in conjunction with "minimally interrupted cardiac resuscitation" (MICR) survival rate are close to tripling compared with pre 2005 Guideline CPR.*

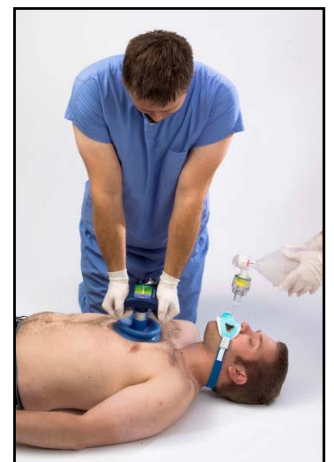


**ResQPOD**

the USA shows that it increases the return of spontaneous circulation and survival from hospital discharge - neurologically intact.

Yet another innovative technique use in CPR is “Active Compression Decompression CPR”. This technique employs the same principle of increasing intrathoracic vacuum to increase blood flow. This is done with a device called the “Cardio Pump” which operates like a suction cup on the chest of the casualty allowing greater vacuum to be produce by literally sucking up the chest wall during the decompression phase of CPR.

The device works by selectively preventing air being drawn in to the thoracic cavity when cardiac compressions are being done. This increases the vacuum in the thoracic cavity and draws more blood to the heart during CPR and therefore increases the output of the heart, providing greater blood flow to the vital organs. Importantly it provides greater blood flow to the brain by reducing intracranial compressions. The evidence form



Performing ACD CPR with the CardioPump and ResQPOD®

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***Coupled with the Impedance Threshold Device (ResQPOD) 70% of normal blood flow can be attained during CPR. It must be remembered that only 20-25% of normal blood flow is achieved during standard CPR.***

More innovative technology comes in the form of “automatic cardiac compression devices” sometimes referred to as CPR vests. The “Lucus Pump” incorporates the suction cup like system of the Cardio Pump and produces consistent mechanical “Active Compression Decompression CPR” where the Autopulse utilises an encircling band around the patient to produce consistent positive pressure compressions. In Australia the Autopulse is being trialed by Victorian Ambulance with the NSW Ambulance about to start trialling the device.

Not only is the quality of chest compressions important but the management of the airway during CPR needs to improve because poor airway management leads to complications that reduce effectiveness of compressions and result in poor oxygenation. Many studies have indicated that where prehospital personnel have attempted to secure an airway with an Endotracheal Tube, the outcomes have been extremely poor. Hence, forward thinking EMS systems in the USA are delaying this procedure in Cardiac Arrests scenarios and concentrating on getting forward blood flow. Supraglottic Airways (Rescue Airways) are now being used to secure airways due to their speed of placement, simplicity and high degree of success, all without interruptions to those all important compressions.



***Autopulse***



***i-gel insertion***

With the introduction of the i-gel airway from Intersurgical FRA now teaches first aiders as well as First Responders how to use them in a cardiac arrest situation.

***With an i-gel airway can be secured in as little as 6 seconds with comparatively greater ease than the use of a basic resuscitation mask. What needs to be emphasised at all levels of CPR training that the maintenance of an airway comes a very close second priority to compressions.***

## ***IMPROVING CARE POST-ARREST***

The third and final time period with the opportunity for improvement comes after completion of resuscitation. Review of a cardiac arrest case goes hand-in-hand with real-time feedback. Just as new sensing technology allows for the detection and measurement of mechanical aspects of CPR, they can also record and replay them, thus allowing for case-by-case review. By attempting to maximise CPR quality during an event, the groundwork is prepared for additional improvement when the adrenaline has subsided. One study found a significant decrease in hyperventilation and increase in compression depth that correlated with an increase in the return of spontaneous circulation in cardiac arrest patients when the rescuers reviewed and discussed resuscitation efforts in debriefing sessions. Another study found that when real-time feedback was combined with debriefing, compression rate guideline compliance significantly improved, from 45% to 84%, and both rate and depth of compressions improved from 29% to 64%, nearly doubling the measured quality of CPR.<sup>11</sup>

## ***DEBRIEFING IN WORKPLACE***

While the concept of debriefing is not new, the application of debriefing sessions in the workplace setting will not be the same or as frequent as with in-hospital settings. However, one good example of field debriefing can be seen in the military's After Action Report, or AAR (sometimes referred to as a "hot wash" after larger scale drills). An AAR has three main objectives: identify areas that need improvement, recommend ways to improve, and discuss the key lessons learned. While it is frequently used in the discussion and future planning of training exercises, an AAR may be applied to real cases or operations. Generally, all team members are included, so everyone has an opportunity to make recommendations for future scenarios. This type of “technical debrief” is rarely done in industry possibly due to wishing to keep cardiac arrest events low key. Technical debrief should be part of an organisation's Health and Safety policy.

***The “technical debrief” includes a case overview, goals and objectives of review (in this case, quality assurance of CPR), analysis of outcomes, critical task performance, and a concluding summary with recommendations.. These debriefs need to be employed directly following a case.***

## SOME HARD FACTS:

- \* *Standard CPR only produces 20-25% of normal blood flow - all body cells are deteriorating rapidly - the heart and brain are dying*
- \* *The utilisation of simple equipment and training can produce up to 70% of normal blood flow - body cells now can stay alive and function*
- \* *Studies now indicate that less than 1:2 or 3 cardiac arrest patients present with a shockable rhythm (this group has the best survival rates because a defibrillator may convert the rhythm back to normal if the downtime is not too great) - the rest of the victims need Quality CPR to survive (this group is the largest and has the poorest survival rates because standard CPR simply cannot supply enough blood to the heart to allow it to function by itself)*
- \* *Poor airway management is extremely common in arrest situations often leading to complications and poor outcomes*

## CONCLUSION

From "minimally interrupted cardiac resuscitation" (MICR) to the new real-time feedback defibrillators, ResQPODS, Cardio Pumps, cutting-edge research demonstrate both that CPR quality is elusive and that it can be improved dramatically. Where employees are expected to respond to cardiac arrests (often a responsibility thrust upon them by virtue of them just holding a first aid qualification), it is the organisation's responsibility to provide skills and technology to give cardiac arrest victims the best possible chance at survival. Through improvements in pre-event training/retraining, use of scenario based simulations, real-time CPR quality improvement with the aid of automated feedback, and consistent, honest debriefing and review, the likelihood of successful resuscitations can be increased.

## The Last Word

This month's newsletter has been devoted to getting the message of QUALITY CPR out there.

We have almost universal agreement that AEDs should be essential emergency care equipment but unfortunately Australia may be going down a track that the USA diverted from some time ago. The massive deployment of defibrillators throughout workplaces and the community in the USA did not result in the rise in survival rates that was hoped for.

We now see a shift of emphasis to QUALITY CPR due to the change in demographics of presenting rhythms in sudden cardiac arrest. Ten to fifteen years ago it was suggested that at least 75-85% of cardiac arrest victims presented with a shockable rhythm which made the use of AEDs a smart idea, but over the last decade this has changed dramatically and EMS systems in the USA are changing track. This doesn't mean we shouldn't have AEDs in our workplaces. To the contrary, they should be regarded as an important and necessary tool in dealing with a cardiac arrest.

In Australia we still have major training agencies using these outdated statistics. This may give quite a false impression that a defibrillator is the silver bullet in a cardiac arrest.

Until First Aid providers move away from just selling a AED with minimal training, we won't really see a great improvement in survival rates. What's required is a holistic package.

***Remember the 3 Ps of circulation: PUMP, POD, PADS.***

**PUMP - start compressions immediately with Cardio Pump or good recoil**

**POD - get the ResQPOD in place, preferably with a rescue airway**

**PADS - get the defibrillator pads in place, during pre-shock CPR**

*Charles Makray  
Managing Director*