# First Responder

First Response AUSTRALIA

July '10 Newsletter

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# Tourniquets First ???

Few issues in the long and colorful history of medicine have generated as much controversy and confusion as the use of tourniquets to arrest severe extremity haemorrhage. As with many strongly held, traditional beliefs, the tradition is strong, but the evidence weak. Conventional teaching has upheld the belief that a tourniquet is a tool only to be applied as a last resort.

However, evidence is now available, both from the recent military use of tourniquets and their long, safe history of operative use for bloodless extremity surgery, which compels a reevaluation of this potentially lifesaving device in civilian prehospital care.

Modern tourniquets have been demonstrated to rapidly and effectively stop extremity haemorrhage, thus minimizing blood loss. Pressure dressings are, of course, also effective tools to stop bleeding, and are usually considered the preferred method of hemorrhage control because they do not risk limb ischemia or other complications.

However, effective pressure dressing application requires more time, hands and supplies to apply, and may require a rescuer to stay with the patient to continue to apply pressure sufficient to arrest severe haemorrhage.

A tourniquet, on the other hand, can be applied quickly, with minimal personnel and no other equipment. In fact, most modern tourniquets are designed to be self-applied, if necessary. This immediate hemorrhage control allows the rescuer to turn their attention to the airway, breathing, and circulation and assessment of other injuries. After completing this evaluation and stabilization, and when time and resources better allow—and if the wound allows—the well-trained responder can remove the tourniquet and replace it with a standard pressure dressing.

Ischemic complications from tourniquet use have been found to be related to the amount of time the tourniquet is left in place. Extensive experience with operative tourniquet use has demonstrated that the incidence of injury is very low with tourniquet times of two hours or less; military experience has confirmed the safety of this two-hour limit in the field.


***MAT Tourniquet***

Another consideration for the use of tourniquets: pain. The effective application of a tourniquet above arterial pressure will cause pain to the distal extremity, sometimes severe. Patients will generally require opiate pain medication, such as morphine or fentanyl, titrated to control such pain, particularly if the tourniquet is to be left in place for more than a short period of time.

To minimize complications, particularly those related to direct injury to skin, muscle and neurovascular structures, emergency personnel must use a commercial tourniquet specifically designed for the purpose. Such tourniquets feature wide straps without sharp edges, uniform application of pressure and ease of application and removal.

Field-expedient and hastily devised tourniquets (such as the cravat and stick, belt, cord or twine) are much less likely to be effective because it's difficult to get them tight enough.

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Because of narrow girth, sharp edges and difficulty in accurately controlling tightness, such makeshift tourniquets are also much more prone to compressive neuropathy and other injuries resulting from direct trauma to the underlying tissues. A number of commercial tourniquets are available and have proven effective in testing and combat use.

If the patient and clinical situation are stable, the responder may consider removal of the tourniquet. In cases of amputation or near- amputation, the tourniquet should be left in place because of the difficulty of applying a pressure dressing to such wounds. A pressure dressing is applied to the wound site and the tourniquet is then carefully loosened. If there's no further bleeding, the tourniquet should be left loosely in place in case it's needed again. For example, bleeding could resume as the patient is fluid resuscitated and perfusion and flow to the injury are improved. If further bleeding isn't controllable with the pressure dressing, the tourniquet can be easily retightened until the bleeding is once again controlled.

Tourniquets may be incorporated into the initial triage phase in Mass Casualty Incidents. Until now the initial phase of Triage did not allow for treatment such as severe external haemorrhage but with the advent of quick, effective commercial tourniquets, triage personnel can use tourniquets to control any visible extremity haemorrhage. They then assign a triage label to the patient and move to triage the next victim.

***MAT Tourniquet being applied***

It's possible that subsequent providers could overlook a tourniquet on a severely injured patient, as they attend to more obvious or urgent injuries. To minimize this risk, it is recommend that any patient treated with a tourniquet should be clearly marked with the letters "TK" on their forehead and on the triage tag; the time the tourniquet was applied should also be noted prominently. If possible, the tourniquet itself should be marked with brightly colored tape to make it stand out to all subsequent caregivers. If the patient is conscious, they should be instructed to tell every subsequent provider that a tourniquet is in place.

The tourniquet has traditionally been thought to be a dangerous tool of last resort. However, it is clear from recent experience with tourniquets on the battlefield and in the operating room that modern tourniquets are not only safe and useful, but lifesaving. It is our intent to encourage the safe and rational use of tourniquets in civilian EMS, using simple protocols and training to ensure they're used properly and safely.

In the past, the rule was "tourniquet last"; however, it's time we begin teaching the principle of "Tourniquet First!" in severe extremity haemorrhage.

## 2010 Resuscitation Guidelines - Prepare to be re-educated

The 2010 Resuscitation Guidelines are about to be announced in the second half of this year and no doubt there will be some dramatic changes that will again challenge old beliefs.

The 2005 Guidelines emphasised the importance of chest compressions over ventilations and recommend that the "hands off" time be reduced in an effort to produce more forward blood flow thus increasing the coronary artery perfusion pressure. In others words - get more blood to the heart in order to to increase defibrillation success and / or return of spontaneous circulation.

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One change that certainly is to be introduced is the philosophy that staying in contact with the chest during biphasic defibrillation is safe. This action will allow the responders to maximise the time spent on the chest. This is safely achieved by wearing high quality nitrile gloves and utilising specialised pads such as is seen with the ZOLL one 1 piece pads containing an accelerometer in the centre on which the rescuer has their hands placed on.

Another change will be the continuation of compressions during defibrillator charging. This is easily done with manual defibrillators but not with all AEDs. The ZOLL defibrillators range, both manual and AEDs allow this to be done. Our company already is teaching in its First Responder training that compressions are immediately re-commenced after analysis with "shock advised", continued for 15-20 seconds, then the shock administered with hands lifted off the chest for only a second or two and then immediate re-commencement of compressions without waiting for a prompt.

Another 2005 recommendation was to allow for full chest recoil during compressions. One study showed that by not allowing the chest to fully recoil by approximately 1cm, virtually no blood flows to the brain. Full recoil produces an intrathoracic vacuum that allows more blood to be drawn back to the heart and subsequently more blood to be push out on the next compression. The 2010 Guidelines will again emphasise this and we will no doubt see further recommendations for the combined use of "Active Compression Decompression CPR" and "Impedance Threshold Device Technology". The CardioPump and ResQPOD combination is producing amazing results in trials in the USA. It is showing that normal blood pressure and normal blood flow is achievable during CPR.

Performing ACD CPR with the CardioPump and ResQPOD®

***CPR being performed with passive oxygenation***

Also Cardio Cerebral Resuscitation (CCR) will be given a greater emphasise in the guideline changes. This entails no ventilations during the initial stages of CPR and concentrating on compressions only. Many Emergency Medical Services in the USA have now adopted similar protocols where responders administer compressions, passive oxygenation via a therapy mask, cardiac drugs via Intraosseous access, defibrillating shocks as required and secure the airway at the 6 minute mark - ensuring the high quality compressions are administered at a rate of 100/min. with full chest recoil)

Next to change will possible be the rate for ventilations. Over the last few years it has been established that ventilating the patient too often and over a long duration (hyperventilation) during CPR has actually resulted in drastically lowering blood flow and is now considered deadly. We have seen the ventilation rate go from 12/min to 10/min and now we believe it may come as low as 6/min. This again places the emphasis on compressions being the most important part of the initial stages of CPR in the Sudden Cardiac Arrest patient.

So watch this space for first hand news of the new 2010 Resuscitation Guidelines.

# Open airway or closed airway during CPR - Does it really matter ?

**A** recent study published in the European journal *Resuscitation* showed that conducting CPR with an obstructed airway made no difference in survival rates or neurological function. The study involved 30 pigs being ramdomised equally among three groups to receive either:

1. 30:2 CPR with an obstructed airway.
2. Continuous cardiac compressions (CCC) with an unobstructed airway.
3. Continuous cardiac compressions with an obstructed airway on inflow phase and an unobstructed airway on outflow phase.

The pigs were anaesthetised and then put into two minutes of untreated Ventricular Fibrillation (VF) then followed by 9 minutes of 9 minutes of single rescuer CPR. In the 30:2 CPR group, each set of 30 compressions were followed by a 15 seconds pause to simulate the realistic time taken to allow 2 breaths to be given. The other two groups were given continuous compressions with no ventilations. After 9 minutes of CPR defibrillation shocks and epinephrine were administered.

The study concluded that in the 30:2 CPR group 80% survived with good neurological function at 24 hours post resuscitation. In CCC open airway group 100% survived and in the CCC with inspiratory obstructed group 90% survived. The 30:2 group required more defibrillation shocks and doses of epinephrine than the other two groups.

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The group that required the least amount of shocks and doses of epinephrine was the CCC with inspiratory obstructed airway.

The study concluded that that there were no significant differences in neurological outcomes in the three experimental groups. During the first 11 min of cardiac arrest that included 9 min of bystander resuscitation performing only continuous chest compressions with a blocked airway had no significant adverse effects upon survival or neurological outcomes.

***These findings support the recommendation of "compression only CPR" for bystanders who witness an unexpected cardiac arrest.***

# Vancouver - Canada - the best place to have a cardiac arrest

If your heart has stopped, you're unconscious, and you need CPR from a stranger, you're better off in Vancouver. That's because, in Toronto, fewer than one in three bystanders who see you struggling will try to help, according to a study by researchers at St. Michael's Hospital.

The response rate in Toronto was a dismal 30 per cent compared to about 45 per cent in Vancouver and about 55 per cent in Seattle - roughly four or five in 10 people - stepping forward to assist. Toronto has "one of the lowest rates of bystanders helping others in the developed world," according to the study.

People say they don't help because they don't know CPR and they're afraid of hurting a stranger. "The answer to both is they're going to die if you do nothing," said Dr. Laurie Morrison, an emergency physician at St. Michael's Hospital who headed the research. "Doing anything is better than doing nothing."

A heart attack is characterized by chest pains, shortness of breath and sweatiness. The victim is conscious. Cardiac arrest is when the heart stops and the person has lost consciousness. That's when CPR is crucial because it ensures a continuous flow of blood to the brain. "You're keeping the heart and the brain alive until the EMS (emergency medical services) get there," Morrison said.

The focus of the population-based data study was to try to boost survival rates for heart attack outside the hospital by improving care provided by paramedics and firefighters. Morrison and her team tracked 11,000 incidents of cardiac arrest that occurred outside a hospital from 2004 to 2009. The good news is that in that time, the survival rate in the Toronto has tripled. The bad news is that the rate is still only 6 per cent, mostly because CPR has been unchanged for those years. When a good Samaritan attempts CPR, the chance of survival quadruples. When you call 911, the operator can give verbal instructions on how to administer CPR. "You can literally learn it over the phone if you just listen to the dispatcher and do exactly what they say."

The study also found that automated external defibrillators, can also boost survival rates by 50 per cent. But they're used in only 1 per cent of cases in Toronto. These devices also have easy to understand voice commands.

In Ontario, the Good Samaritan Act protects individuals from being sued after trying to help others in an emergency medical situation. So the emphasis now it to have as many people in the community training in CPR.

# Heart Disease: An Epidemic For US Firefighters

Late last year in Atlanta - USA, the preliminary findings in the world's first study of first responders at risk of suffering sudden death or other significant cardiac events was released. Firefighters are known to have a three hundred percent increased risk for cardiac disease as compared to other segments of the population.

Robert Superko, MD, was the principal investigator in the landmark FEMA-sponsored study of firefighters aged 40 and over conducted at Saint Joseph's Hospital in Atlanta, "Preliminary findings show that one third of firefighters had heart disease that is unrelated to traditional risk factors, such as high cholesterol," says Dr. Superko. "Those results are astounding and point at job duties and environment as the primary determinants for early death in our country's first responders."

Dr. Superko, recognized as a leading expert on lipids, cholesterol and advanced metabolic markets and their contribution to heart disease, and his team performed a comprehensive, scientific battery of sophisticated blood and imaging tests on three hundred firefighters in Gwinnett County, Georgia.

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Study volunteers underwent a comprehensive genetic screen of more than a million genes including newly identified KIF6 (statin responsiveness gene) and 9p21 (myocardial infarction gene), advanced phenotype (blood) and imaging analyses, diet and exercise review over the year-long study. Results and explanations were presented to the groups followed by individual consultations. Complete statistical and comprehensive genetics results are expected this year.

According to Dr. Superko, stress and psychological pressures related to the job, as well as diet, exercise issues and inherent personality, interacting with a genetic predisposition to heart disease, probably have tremendous impact on the risk of heart attack in these first responders. "Imagine being awakened from a dead sleep by a loud, shrieking siren several times during the night, responding through the rush of adrenaline, carrying a hundred pounds of equipment on your back, and meeting people at the very worst possible moments in their lives every day and you can begin to understand the toll it takes on the first responders," says Superko. "And, consider the emotional and psychological stress they encounter each day as they respond to society's most brutal moments from murders to car wrecks and death. Finally, those who serve as first responders have a mind-set and a desire to help people. They certainly bring a competitive nature to the job but also a profound desire to help and to do the best for others. All these elements create an environment that puts them at an increased risk for cardiac disease."

In response to the growing awareness to issues of diet and exercise, Gwinnett Fire Department has instituted exercise programs within local firehouses and the county now re-reimburses for fitness club memberships. The department also educates firefighters on proper diet and nutrition with one-on-one opportunities as well as "lunch and learn' programs in the station houses. And, over the years, the traditional firehouse alarm in Gwinnett stations has been replaced with softer alarms and even-voiced prompts to awaken sleeping first responders. As a result of the study, Saint Joseph's Hospital and Dr. Superko's team implemented a two month screening program for all Atlanta first responders (firefighters, Police and EMS)

regardless of age in order to provide them with some basic and advanced diagnostic tests at prices affordable to firefighters.. Several physicians are providing their services free of charge. "There are tremendous costs associated with early deaths of our first responders in every community as we lose men and women in their 30s, 40s and 50s who are our first line of defense but who don't live to perform their jobs for very long," says Chief Rolader. "With the results of this study, we can implement programs across the country that will save lives."

Final results are expected to be submitted for presentation consideration at the annual American Heart Association meeting.

# NSW Ambulance adopt innovative trauma equipment

**NSW** Ambulance this year has adopted two innovative pieces of trauma equipment. Firstly, the service has started to replace all of its HARE Traction Splints for the new CT-6 Traction Splint (see picture). The CT-6 traction splint is incredibly compact and lightweight, require only one person to apply it to the patient where as traditional traction splints could require up to three.

The second item now to be eventually found in each of the service's ambulance is the MAT tourniquet. (see picture page one). NSW Ambulance Service has over 2000 ambulances and as the services paramedics are trained in the new equipment it is expected to become standard equipment.

The South Australian Ambulance Service has also adopted the CT-6 Traction Splint. Much of the compact innovative equipment we see today in the pre-hospital arena has often seen its beginnings in the military application. Along with devices such as Intraosseous FAST 1 and Quikclot molecular sponge for bleeding control these devices allow for safer and more rapid response for critically injured patients.

*Charles Makray*
*Managing Director*

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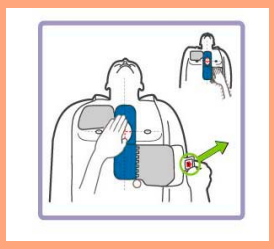

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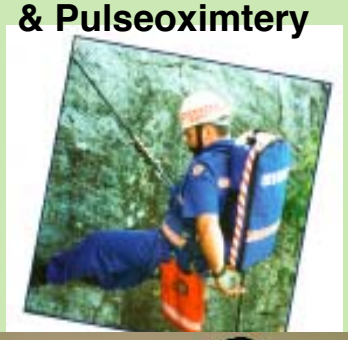


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The American Heart Association (AHA), in their 2005 guidelines, designated the impedance threshold device (e.g., ResQPOD) a Class IIa recommendation for increasing blood flow and immediate survival rates in patients in cardiac arrest. It is the most highly recommended CPR adjunct in the new guidelines and carries a higher recommendation than any medication used to increase circulation in adults in cardiac arrest. The ResQPOD is the only impedance threshold device on the market.

The ResQPOD is easy to use. It provides a unique way to increase circulation during CPR by refilling the heart after each chest compression. In addition, timing assist lights on the ResQPOD provide guidance on the proper compression and ventilation rates.

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