September-October 2005

EMS Professionals

The Official Publication of the Wisconsin EMS Association – Your Voice For EMS

M.I. On Time

Save your cardiac patients valuable time by identifying their heart attack and preparing for immediate transport to the nearest interventional cardiac cath lab.

Working Together Celebrates 20th Anniversary!

The Working Together Conference & Exposition turns 20 this January. With the very best speakers, exposition, and entertainment, find out why you need to be there.

What Has Changed With FAP?

Find out how recent changes to Wisconsin's Funding Assistance Program will affect operations at your service.

Keith Wesley, MD, FACEP

Keep On Pump'n

Pop quiz hot shots: What's the single most important thing you can do to improve survival from cardiac arrest? AED? Nope, but thanks for playing. Unless the arrest is witnessed and receives immediate bystander CPR, the action you can perform that will most improve the survival outlook of your patient is effective CPR. Recent studies have shown that one to two minutes of CPR before defibrillation improves the likelihood of getting a rhythm back after defibrillation. Return of spontaneous circulation (or ROSC) is more likely if a couple of minutes of effective CPR is performed to move hypoxic and acidodic blood out of the coronary arteries, thereby oxygenating the heart and improving its response to defibrillation.

Did you notice I said "effective" CPR? What is effective CPR and how do we perform it? The first thing is to make sure that we don't stop CPR unless we absolutely must perform some task. Research has shown that CPR is performed for less than 50% of the total cardiac arrest time by both pre-hospital and hospital providers! Interruptions occur to check the rhythm, intubate the patient, start an IV, check for a pulse, hold for ventilations, and change off CPR providers. If the rescuers are performing CPR at the AHA guideline rate of 100 compressions per minute, that's less than 50 compressions per minute during the course of the arrest!

Members of your crew should have to physically move your hands away to place the AED pads. Don't stop compressions to allow for compression of the BVM. They only have to get one quick squeeze in while you're pumping. Leave it to them to time it correctly. Don't stop CPR for intubation unless they ask you to, but then only for 10 seconds. If they can't pass the tube in 10 seconds, they probably aren't going to get it anyway and should just place a Combitube. Don't stop CPR until the analyze button is pushed on the AED, and if you get "No shock advised," start CPR again for a minute and then reanalyze.

The second important factor in performing effective CPR is doing it in a manner that promotes blood flow out of and back to the heart. If you squeeze the heart and pump all of the blood out of the aorta but don't allow venous blood to return to the right ventricle, there won't be any going to the lungs to get oxygenated. Our classical thinking in CPR has been to feel for a pulse during CPR. Unfortunately, studies have shown that the presence of a pulse during CPR does not mean perfusion is occurring. For you firefighters, imagine a charged fire hose. You're holding the closed nozzle. Now have your chief (usually not the skinniest guy on the squad) jump up and down on the hose. You'll feel a pulse in the hose, but no water will flow out the closed nozzle. You're feeling the pressure wave created by the weight on the column of water in the hose. The same is true for CPR.

For perfusion to occur, venous blood must return to the heart from the superior and inferior vena cava. Remember that the veins are low pressure systems. The pressure in the chest cavity must be less than the pressure in the abdominal cavity for venous blood to return to the heart. When you compress the chest during CPR, the pressure in the chest rises. When you relax, the chest recoils and the pressure drops. If you don't release all your weight off the chest it won't recoil completely and the pressure will not drop as far and less blood will return to the heart. So look at the way you do compressions. One study showed that the pressure drops the most if you let your hands come completely off the chest during the recoil phase. Watch your fellow rescuers for fatigue because it takes more energy to bring your weight off the chest than it does to drop it down during compression. Don't let them rest their weight on the patient.

Another factor that increases the pressure in the chest is ventilations. When you compress the BVM, the chest fills with air and the pressure increases. This decreases venous blood return to the heart. Studies show that we over ventilate cardiac arrest patients. One study found that ventilation rates averaged 60 breaths per minute – that's one every second! The AHA guideline is 12 breaths per minute. Unfortunately, many of us still do one breath for every five compressions. Let's see, 100 compressions divided by five is 20. That's still eight too many. The primary purpose of ventilation is to remove carbon dioxide. It takes very little oxygen to oxygenate a patient. So watch your ventilation rate and use only one handful of BVM so as not to over inflate the chest and decrease venous blood return.

A new device has recently been studied which actually enhances venous blood return to the heart during CPR by helping to create a lower intrathoracic pressure. The impedance threshold device (or ITD) is placed on the mask, ET tube, or Combitube during ventilation. A small flutter valve closes off during chest recoil preventing air from flowing into the chest and thus lowers the intrathoracic pressure. The device – called the ResQPod – has timing lights that flash at 12 times per minute to help you ventilate at the proper rate. When the BVM is compressed, air flows around the flutter valve and enters the lung. Studies have shown that CPR performed with this device doubles the ROSC for cardiac arrest from PEA and Asystole.

We haven't seen much improvement in cardiac arrest survival over the past few years and these recent studies may give us some indications as to why. So don't be surprised if the 2005 AHA guidelines say that it's time to get back to basics to help our patients in cardiac arrest. And remember: Don't stop pump'n!

Dr. Wesley is a board certified emergency medicine physician, the author of several articles and textbooks in EMS, and a frequent speaker at state and national EMS conferences. He currently resides in Eau Claire, Wisconsin.