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July 19, 2010

To: All Prehospital Providers

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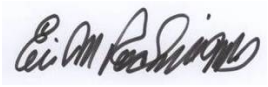

Subject: Best Practice – CPR

The following information is related to EMS Agency review of prehospital care. Best practices from these reviews are applicable to all paramedic providers. Please review this important information and incorporate it into your practice.

Cardio-cerebral Resuscitation (CCR):
There have been changes in the understanding of resuscitation from cardiac arrest. High quality CPR is now stressed as the key to survival from cardiac arrest. Cardiopulmonary resuscitation is thought of currently in terms of cardio-cerebral resuscitation, with emphasis on maintaining adequate blood flow to the heart and brain. High quality CPR is just as important as placing an advanced airway device and delivering cardiac medications.

Chest Compressions:
Excellent chest compressions and early defibrillation ***after*** restoration of blood flow from CPR is crucial. With good chest compressions (rate 100/minute, depth 1.5 to 2 inches, and full recoil), the chance of getting a shockable rhythm dramatically increases even if the initial rhythm is PEA or asystole.

We have reviewed cases where chest compressions were performed only 50 to 60% of the time of the entire resuscitation. This is not acceptable clinical care. These records demonstrate prolonged interruptions for airway management and transport (to the ambulance and the hospital). We all know that CPR performed in the back of a moving ambulance is less than ideal, but prehospital providers need to evaluate each clinical situation individually, making the decision rapidly of when to transport the patient for both optimum patient care and provider safety. There may be times that it is better to "stay and play" at the scene then to "scoop and run".

When CPR is stopped, the coronary and cerebral perfusion pressures rapidly drop to zero. Survival worsens when the heart and brain don't get perfused adequately. It takes additional time (up to 30 seconds) to reestablish the blood flow to these vital organs.

The Phases of Cardiac Arrest:

Through resuscitation research, three phases of Cardiac Arrest (for ventricular fibrillation (VF)) have been identified. Understanding these phases is critical to improving the return of spontaneous circulation (ROSC).

The electrical phase occurs first in VF cardiac arrest, lasting for approximately 5 minutes. During the electrical phase defibrillation is the most effective treatment. The second phase is the hemodynamic phase, lasting approximately 5 to 15 minutes after the cardiac arrest. Critical to the hemodynamic phase is the maintenance of both cardiac and cerebral perfusion pressures. This is accomplished with high quality CPR. Defibrillation during this time period is not as effective as in the electrical phase as the myocardium needs energy (from blood flow) to be receptive to defibrillation. Defibrillation can occur after adequate CPR has been performed. The third phase in VF arrest is the metabolic phase. Hypothermia may play a role for optimal outcome in this phase.

Three Phases of Cardiac Arrest in Ventricular Fibrillation

	Duration (Minutes)	**Treatment**
Electrical Phase	**0 to 5**	**Defibrillation**
Hemodynamic Phase	**5 to 15**	**Chest compressions**
Metabolic Phase	**15 minutes and beyond**	**Hypothermia**

Ventilation Issues

Avoid hyperventilation in any cardiac arrest resuscitation. It is easy to inadvertently over ventilate during a stressful event. If there is an advanced airway, ventilations should be based on the end tidal CO2 monitor readings. Hyperventilation causes an increase in intrathoracic pressure resulting in decreased venous return which causes reduced blood flow to the heart. If the heart does not have adequate blood volume to pump then both cardiac and cerebral perfusion pressures are decreased worsening the chance for survival.

Lapses in adequate chest compressions during the placement of advanced airways are problematic. We are still investigating which airway is superior during resuscitation, the endotracheal tube or the King Airway. The key to survival is using the device with which the provider is most comfortable. This will result in the least disruption in CPR, and the key to high quality CPR is to minimize the interruptions from any source.