



**Medical Direction and Practices Board**  
**Maine EMS 2023 Protocol Updates to the Out of Hospital Cardiac Arrest**  
**Protocol - White Paper**

While the benefit of high efficiency CPR is well established in improving outcomes of out of hospital cardiac arrest (OHCA), medications used in OHCA such as epinephrine, amiodarone, sodium bicarbonate, calcium, etc. have never been demonstrated to improve neurologically intact survival, the outcome that is most important to patients and providers. One of the most recent and largest studies of epinephrine in OHCA, PARAMEDIC2<sup>1</sup>, found results similar to multiple previous trials: Epinephrine use in OHCA increases the chance of return of spontaneous circulation (ROSC), increases survival to hospital admission, and increases 30-day survival. However, use of epinephrine does *not* increase “neurologically intact” survival at 30 days. Most of the patients that epinephrine initially saves later die during their hospital stay or, if they survive hospitalization, they leave the hospital with significant cognitive impairments that require full-time ongoing medical care. Although epinephrine increases survivorship of OHCA, the additional people it saves are significantly neurologically impaired and generally not able to care for themselves, an outcome that few patients would desire (this question of desired outcomes was asked of the patients in the PARAMEDIC2 study).

So, why add epinephrine at the AEMT level for OHCA? There were two retrospective observational trials prior to PARAMEDIC2 that suggest the timing of epinephrine administration is important. Patients who received epinephrine within the first 20 minutes of arrest in one trial<sup>2</sup> and the first 10 minutes in another trial<sup>3</sup> had better outcomes in terms of ROSC, hospital survivorship, *and* most importantly neurologically intact survivorship. We recognize that there are large portions of Maine that do not have timely access to paramedics and some areas that are essentially uncovered by providers capable of ACLS interventions. With this in mind, the MDPB approved AEMTs to provide epinephrine during OHCA with the hope that the medication will be delivered earlier, when it seems to have the most impact on achieving neurologically intact survival. This recommendation is consistent with AHA recommendations from 2019, NASEMSO National Scope of Practice guidelines from 2018, and an ILCOR meta-analysis from 2019.

While the addition of epinephrine at the AEMT level is exciting and may improve patient outcomes, the MDPB urges all providers to remember that the foundational response to OHCA, namely, recognizing cardiac arrest and quickly initiating high-performance CPR, have been shown to be the most important interventions that lead to good patient outcomes. Initiating



and maintaining high-performance CPR is a much more powerful intervention than the administration of any medication in OHCA. The MDPB would also like to emphasize that while providing oxygen and ventilations is an important part of high-performance CPR, advanced airways have not been shown to be superior to BVM with OPA and NPAs. Advanced airways can offer some protection against aspiration, but they should only be placed if placement can be achieved without interrupting or interfering with high performance CPR.

In summary, interventions for OHCA should proceed in the following order:

- 1) Initiate high-performance CPR,
- 2) Apply monitor, defibrillate, if indicated,
- 3) IV/IO, epinephrine,
- 4) Consider advanced airway if this is possible without interfering with high-performance compressions.

The last important change to the red section addresses the care that should follow ROSC. While patients who have had OHCA and achieved ROSC have proven themselves to be quite sick, we now ask for your help stabilizing these patients on scene before starting transportation to the hospital. We understand the impulse to take the sick patient to the hospital as expeditiously as possible, but without further stabilization prior to transportation, too often these patients suffer re-arrests and therefore worse outcomes. Protocols will now reflect the importance of stabilizing an OHCA patient who has had ROSC prior to transporting. This is called the **“SAVE-A-LIFE”** protocol.

<b>SAVE A LIFE</b>	
S	Stabilize – Stay on scene vs. rapid departure
A	Airway – if still unresponsive, establish a definitive airway (SGA, ETT)
V	Vital signs/Vasopressors – Change BP frequency to every 3 minutes/focus on cerebral perfusion pressure, goal MAP is greater than 80 mmHg
E	EtCO <sub>2</sub> – Ensure this is placed and operational to monitor airway and for re-arrest
A	Alert/activate the destination hospital
L	Leave/Load in ambulance with mechanical CPR device in place, if available in case patient re-arrests en route to the hospital
I	IV – Obtain an IV if only an IO has been placed. Attempt up to 3 times.
F	Follow up vital signs to ensure stability prior to departure
E	EKG – Obtain an EKG to screen for STEMI, which may impact destination determination.



These changes are also reflected in the protocols of many other states, such as Rhode Island and Delaware, as well as the National Park Service EMS protocols and procedures.

#### References:

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2. Sagisaka R, Tanaka H, Takyu H, Ueta H, Tanaka S. Effects of repeated epinephrine administration and administer timing on witnessed out-of-hospital cardiac arrest patients. *The American Journal of Emergency Medicine*. 2017; 35(10):1462-1468. PMID: 28473275
3. Ueta H, Tanaka H, Tanaka S, Sagisaka R, Takyu H. Quick epinephrine administration induces favorable neurological outcomes in out-of-hospital cardiac arrest patients. *The American Journal of Emergency Medicine*. 2017; 35(5):676-680. PMID: 28087097
4. 2019 American Heart Association Focused Update on Advanced Cardiovascular Life Support: Use of Advanced Airways, Vasopressors, and Extracorporeal Cardiopulmonary Resuscitation During Cardiac Arrest: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Panchal, AR, et al. Originally published 14 Nov 2019. *Circulation*. 2019;140:e881–e894
5. <https://nasems.org/wp-content/uploads/Prepublication-Display-Copy-2018-National-EMS-Scope-of-Practice-Model-20180929.pdf>
6. 2019 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations: Summary From the Basic Life Support; Advanced Life Support; Pediatric Life Support; Neonatal Life Support; Education, Implementation, and Teams; and First Aid Task Forces. Soar, J, et al. Originally published 14 Nov 2019. *Circulation*. 2019;140:e826–e880