

## **PARAMEDIC CAT (Critically Acclaimed Topic)**

**Title:** Epinephrine: Lifesaving or Not?

**Reported by:** Spenser Kean

**2<sup>nd</sup> Party Appraiser:** Jennifer Greene

### **Clinical Scenario:**

Rural EMS arrive on scene to a local bar for a 55-year-old male in full cardiac arrest. Bystander CPR was not started and people seem to be in panic, from time of dispatch to time of arrival it was been 7 minutes. CPR is initiated and the monitor has been attached to the patient revealing that his heart is in asystole. Epinephrine is not administered due to the crew being BLS and no ALS units are in the area. The code is worked for 15 minutes then with direction from OLMC you stop resuscitative efforts. You wonder to yourself if epi had been administered, could this patient have survived and recovered fully from this event.

### **PICO(POPULATION-INTERVENTION-COMPARISON-OUTCOME)**

**Question:** Does the administration of Epinephrine prehospitally improve long term survival rates in victims of cardiac arrest?

P- in prehospital cardiac arrest patients

I- does epinephrine

C- verses no epinephrine

O- improve long term survival rates

**Search Strategy:** (*"prehospital" or cardiac arrest*); *cardiac arrest" or epinephrine or ventricular fibrillation*)) AND (*"cardiac arrest" or ventricular fibrillation or ventricular tachycardia or rosc*)) AND *"prehospital"; ("epinephrine" or cardiac arrest); ("cardiac arrest" or epinephrine or ventricular fibrillation); ("cardiac arrest" or ventricular fibrillation or ventricular tachycardia)*)

**Search outcome:** 36

**Relevant papers:**

Author/'s, Date	Population: Sample Characteristics	Design (LOE)	Outcomes	Results	Strengths/Weaknesses
<p><b>Jun Tomio, MD, PhD, Shinji Nakahara, MD, PhD, Hideto Takahashi, PhD, Masao Ichikawa, PhD, Masamichi Nishida, MD, PhD, Naoto Morimura, MD, PhD, and Tetsuya Sakamoto, MD, PhD. 02/2017</b></p>	<p>Bi-Bystander witnessed OHCA patients with non-shockable rhythms</p>	<p>They conducted a controlled, propensity-matched, retrospective cohort study by using Japan's nationwide OHCA registry database. We studied 110,239 bystander-witnessed OHCA patients aged 15-94 years with initial non-shockable rhythms registered between January 2008 and December 2012. We created 1-1 matched pairs of patients with or without epinephrine by using sequential risk set matching</p>	<p>1.Short term outcome of Epi administered by EMS saw significant survival rates with better neurological outcomes</p> <p>2.long term affects again does not significantly improve long term survival rates</p>	<p>With respect to the 4 end-point variables, in the initial unadjusted model, there was a significant difference between those who were administered epinephrine and those who were not before hospital arrival A positive association was detected between prehospital epinephrine use and the outcome measure in patients with ROSC before hospital arrival in the 3 models. A significant positive association in the crude</p>	<p>. A major confounder in this analysis is that patients who did not receive epinephrine in the prehospital setting may have received epinephrine after hospital arrival. Therefore, the differences may reflect changes in the type of care after hospital arrival and may not be attributable to the drug itself.</p> <p>. the actual timing of administration prehospitally varies from patient to patient affecting outcomes</p>

		<p>based on time-dependent propensity scores to balance the patients' severity and characteristics. We compared overall and neurologically intact survival 1 month after OHCA between cases and controls using conditional logistic regression models by category of the initial rhythm.</p> <p>LOE-2</p>		<p>model (OR, 1.15; 95% CI, 1.07-1.23; P.001) and a significant negative association in the adjusted model using selected variables (OR, 0.43; 95% CI, 0.39-0.46; P.001) or all variables (OR, 0.46; 95% CI, 0.42-0.51; P.001) were observed for 1-month survival with respect to an association between prehospital epinephrine use and the outcome measures. A significant negative association was detected between prehospital epinephrine use and CPC and OPC in the 3 models</p>	<p>. Strength is the huge sample size and how verified outcomes from reliable sources were synced to confirm statistical outcomes</p>
<b><u>Olasveengen TM1, Sunde</u></b>	851 patients in cardiac	Prospective, randomized	1*poor outcome in a	The rate of survival to	..the sample was good

<p><b><u>K, Brunborg</u></b>  <b><u>C, Thowsen</u></b>  <b><u>J, Steen PA,</u></b>  <b><u>Wik L.</u></b>  <b>10/2009</b></p>	<p>arrest...418 were administered Eppi 433 were not</p>	<p>controlled trial of consecutive adult patients with out-of-hospital nontraumatic cardiac arrest treated within the emergency medical service system in Oslo, Norway, between May 1, 2003, and April 28, 2008.</p> <p>LOE-1</p>	<p>large epidemiologic study, possibly due to toxicity of the drug</p> <p>2*patients with intravenous access and drug administration of epinephrine had higher rates of short-term survival</p>	<p>hospital discharge was 10.5% for the intravenous drug administrati on group and 9.2% for the no intravenous drug administrati on group (P = .61), 32% vs 21%, respectively, (P&lt;.001) for hospital admission with ROSC, 9.8% vs 8.1% (P = .45) for survival with favorable neurological outcome, and 10% vs 8% (P = .53) for survival at 1 year.</p>	<p>number for statistical analysis With a total number of 1183 patients with 851 of these being associated directly with the parameters set</p> <p>. The data was complete</p> <p>. the controls set for the experiment were stable and uniform</p> <p>. the data collected was objective with no indicators of bias</p>
<p><b><u>Loomba</u></b>  <b><u>RS,Nijhawan</u></b>  <b><u>K,Aggarwal</u></b>  <b><u>S,Arora RR</u></b>  <b>12/2015</b></p>	<p>14 studies with 655853 patients</p>	<p>Non-randomized meta-analysis</p> <p>LOE-2</p>	<p>does not improve survival to discharge</p> <p>2.does not improve neurological outcomes for those discharged</p>	<p>A total of 14 studies with 655853 patients were included for the meta-analysis. The use of epinephrine for OHCA before arrival to the hospital was associated</p>	<p>. lack of randomized studies to confirm findings .because the info is based on other studies and not a controlled study conducted directly,</p>

				<p>with a significant increase in ROSC (odds ratio, 2.86; P&lt;.001) and a significant increase in the risk of poor neurologic outcome at the time of discharge (odds ratio 0.51, P=.008). There was no significant difference in survival at 1 month or survival to discharge.</p>	<p>interpretation can but not necessarily become bias . strength is that it is based on so many other credible studies, that the opposite effect of non-bias but objective findings is prevalent</p>
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**Comments:**

1. Epinephrine has been proven to provide a better mortality rate if administered prehospitally to cardiac arrest patients.
2. It increases blood flow to the brain and the heart by means of vasodilation, which in short term provides better neurological outcomes according to GCS.
3. Does not however provide, according to current studies, enough evidence to prove the long-term survival benefits of administering epi.
4. The studies are subject to bias interpretation because the “timing” of prehospital administration of epinephrine use in cardiac arrest is not a controlling factor, which could affect long term outcomes and most certainly short term.
5. Increases risk of bleeding if underlying factors such as AAA is the root cause of the cardiac arrest

### **Consideration:**

Again, as a part of EMS, to administer epinephrine rashly without considering the short and long-term benefits versus the risks associated involving cardiac arrest, is not so clear cut. To change protocol or to be a “cowboy” and not think before administering any drug to a patient requires we remain in tune with ACLS guidelines! Right now, the short-term benefits of sticking to protocol, which we must at all times, is paramount! Unless more controls are put in place in these studies with variables such as when epinephrine is administered prehospitally and is factored in, we cannot definitely say the outcomes for versus not to in long term outcomes! But we can derive definite short-term ones! Therefore, we need to continue the discussion.

### **Clinical Bottom Line:**

Although the data considered and studied has some compelling arguments, there is still not enough evidence to confirm the real outcome unless more controls are put in place. Although the evidence points to support the fact epi does not improve long term outcomes if administered prehospitally, we do not factor in the certain timing of cardiac events such as CPR, and when the drug was actually administered since it can differ from call to call.

### **References**

1.EFFECTIVENESS OF PREHOSPITAL EPINEPHRINE ADMINISTRATION IN IMPROVING LONG-TERM OUTCOMES OF WITNESSED OUT-OF-HOSPITAL CARDIAC ARREST PATIENTS WITH INITIAL NON-SHOCKABLE RHYTHMS. Jun Tomio, MD, PhD, Shinji Nakahara, MD, PhD, Hideto Takahashi, PhD, Masao Ichikawa, PhD, Masamichi Nishida, MD, PhD, Naoto Morimura, MD, PhD, and Tetsuya Sakamoto, MD, PhD

2. Intravenous drug administration during out-of-hospital cardiac arrest: a randomized trial. Olasveengen TM1, Sunde K, Brunborg C, Thowsen J, Steen PA, Wik L. Institute for Experimental Medical Research, Oslo University Hospital, Ullevaal, N- 0407 Oslo, Norway

3. Increased return of spontaneous circulation at the expense of neurologic outcomes: Is prehospital epinephrine for out-of-hospital cardiac arrest really worth it? Loomba RS1, Nijhawan K2, Aggarwal S3, Arora RR4.

1 Division of Cardiology, Children's Hospital of Wisconsin/Medical College of Wisconsin, Milwaukee, WI. Electronic address: loomba.rohit@gmail.com.

2 Division of Medicine, Rush University Medical Center, Chicago, IL.

3 Division of Cardiology, Creighton University Medical Center, Omaha, NE.

4 Division of Cardiology, Chicago Medical School, North Chicago, IL.