



## Article Appraisal

**Article:** Evaluation of out-of-hospital cardiac arrest using transesophageal echocardiography (TEE) in the emergency department

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**Resident Reviewer Name(s) and Residency Affiliation:** Dr. Melissa Dekker, CCFP-EM (R3)

**Faculty Methodology/Bio-statistics Resource Person:** Dr. Brian Grunau

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### Background and Study Objective(s):

The 2015 ILCOR guidelines assert that cardiac ultrasound may be used during resuscitation care to identify reversible causes of cardiac arrest if it does not interfere with standard cardiac arrest treatments, particularly high quality CPR. Due to limitations in the use of TTE in cardiac arrest, most notably the difficulty obtaining adequate cardiac views during pulse and rhythm checks, TEE has been proposed as a potential tool to mitigate these challenges and improve outcomes in cardiac arrest.

In this study the authors aimed to use TEE as a modality to assess patients in cardiac arrest during resuscitation or immediately following ROSC and to determine the feasibility and clinical impact of TEE during Emergency Department evaluation of out of hospital cardiac arrest (OHCA).

### Study Design:

This was a prospective observational study using a convenience sample of 33 non-traumatic OHCA patients presenting to a single tertiary care center Emergency Department (University of Pennsylvania) with PEA or asystole as the initial rhythm as well as patients who achieved ROSC during pre-hospital care. The study ran from September 2017 to September 2018.

All physicians performing TEE in the study completed a standardized TEE training program and a minimum of 10 proctored exams. The authors did not specify outcomes in the methods section but in the results they described findings pertaining to successful 4-view ultrasound generation, time to first TEE image, the location of the area of maximal compression, presence of RV dilatation, and how often the information provided by TEE images changed management. The authors also commented on the identification of

reversible causes of PEA as well as rhythms not identified on the cardiac monitor (ex. Fine VF in asystole, and pseudo-PEA).

### **Results:**

All 4 specified TEE windows of the resuscitative protocol were successfully obtained in 100% of cases. The mean time from ED arrival to first TEE image generation was 12 minutes. The AMC was identified as not being over the left ventricle in 53% of the cases. The authors report that information provided by TEE lead to a change in management in 32 of 33 cases. Additionally, the authors report that 2 of 7 patients presenting with PEA were found to have psudeo-PEA (organized mechanical cardiac activity on TEE with organized electrical rhythm on the monitor) and that fine VF was found with TEE in 4 patients in which the cardiac monitor showed asystole. The authors assert that the likely etiology for cardiac arrest was established with TEE in 33% of the cases.

### **Validity of Results:**

The outcomes described in the study had several important sources of bias. The authors assert that information provided by TEE changed the management of cardiac arrest in their cohort in 97% of cases. However, this is only a hypothesis. The study would need a control group with no TEE information provided to ascertain whether or not it changed management. Furthermore, 5 of the 7 EPs performing TEE were study investigators and 30 of the 33 cases were supervised by the physician who leads the TEE resuscitation program at the study hospital. This leads to a potential source of investigator bias. The study does not discuss whether the images obtained during resuscitation and the interpretations made by the EPs were reviewed and confirmed by an expert echocardiographer.

### **Generalizability of Results:**

The study sample was from a single center in the United States. However, comparing the demographics to a large retrospective analysis of 3961 consecutive OHCA patients from 2003-2009, the demographics are very similar. The generalizability is limited by the small sample size and the fact that the Emergency physicians performing TEE in this study are leaders in the use of TEE in resuscitation.

### **The Bottom Line:**

TEE is feasible to implement by Emergency physicians with specific training in TEE. Due to the small sample size of the study and the lack of a control group, the clinical impact of TEE on patient outcomes remains unknown and requires further testing.