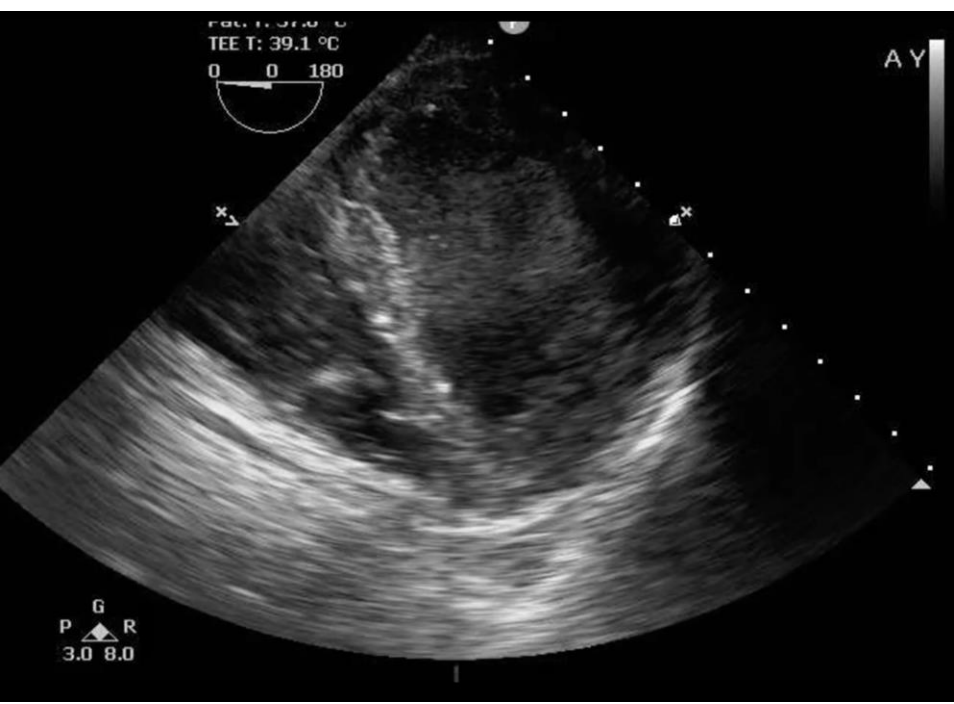


Recognition of Cardiac Activity with POCUS during Resuscitation of OHCA

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Introduction

More than 356,000 people have an out-of-hospital cardiac arrest annually in the U.S. [1], and approximately 8% of those patients survive to hospital discharge [2]. The presence of ventricular fibrillation and ventricular tachycardia are associated with better outcomes when compared to asystole or PEA [2]. VF/VT has been associated with as much as 20% survival, vs 8% with asystole. Early defibrillation is also associated with higher survival rates [3]. Therefore, earlier recognition of shockable rhythms is crucial to resuscitation of a patient in cardiac arrest. The goal of this study is to assess if cardiac POCUS (point of care ultrasound) during resuscitations can identify cardiac activity and shockable rhythms that are not apparent on the ECG. The secondary goal is to determine if the presence of cardiac activity on POCUS is associated with more instances of achieving (ROSC) return of spontaneous circulation.

Materials and Methods

1. Patients >18 years old, who were brought to the SBUH ED with out-of-hospital cardiac arrest were enrolled.
2. Cardiac ultrasound was performed on the patients, either by TEE (trans-esophageal echo) or TTE (trans-thoracic echo). The presence of cardiac activity was determined by the performing physician in real time and recorded. The clips were saved to QPath and then interpreted retroactively for presence of cardiac activity.
3. Definitions: the presence of cardiac activity included any degree of contraction involving the entire heart as viewed on ultrasound. We chose not to specify between organized and disorganized activity.
4. Patient demographics, cardiac rhythms as documented in the cardiac arrest forms and outcomes were also evaluated

Results

- Overall, 3% of the 37 enrolled patients survived to hospital discharge; while 84% of patients experienced death in the ED with and without ROSC at any point of the resuscitation [Figure 2]
- Most patients presented with non-shockable rhythms (asystole or PEA), with only 4 patients presenting in Vfib and none in V-tach [Figure 1]
- 12 patients (32%) were noted to have cardiac activity. Of these patients, 84% of them had a non-shockable rhythm on the cardiac monitor. [Figure 3].
- 4 patients were found to have cardiac activity only on retrospective interpretation of POCUS.
- All patients that experienced ROSC at any point of their hospital course had presence of cardiac activity on POCUS [Figure 4].
- There were 2 cases (5%) where the patient was defibrillated based on the presence of cardiac activity on POCUS.

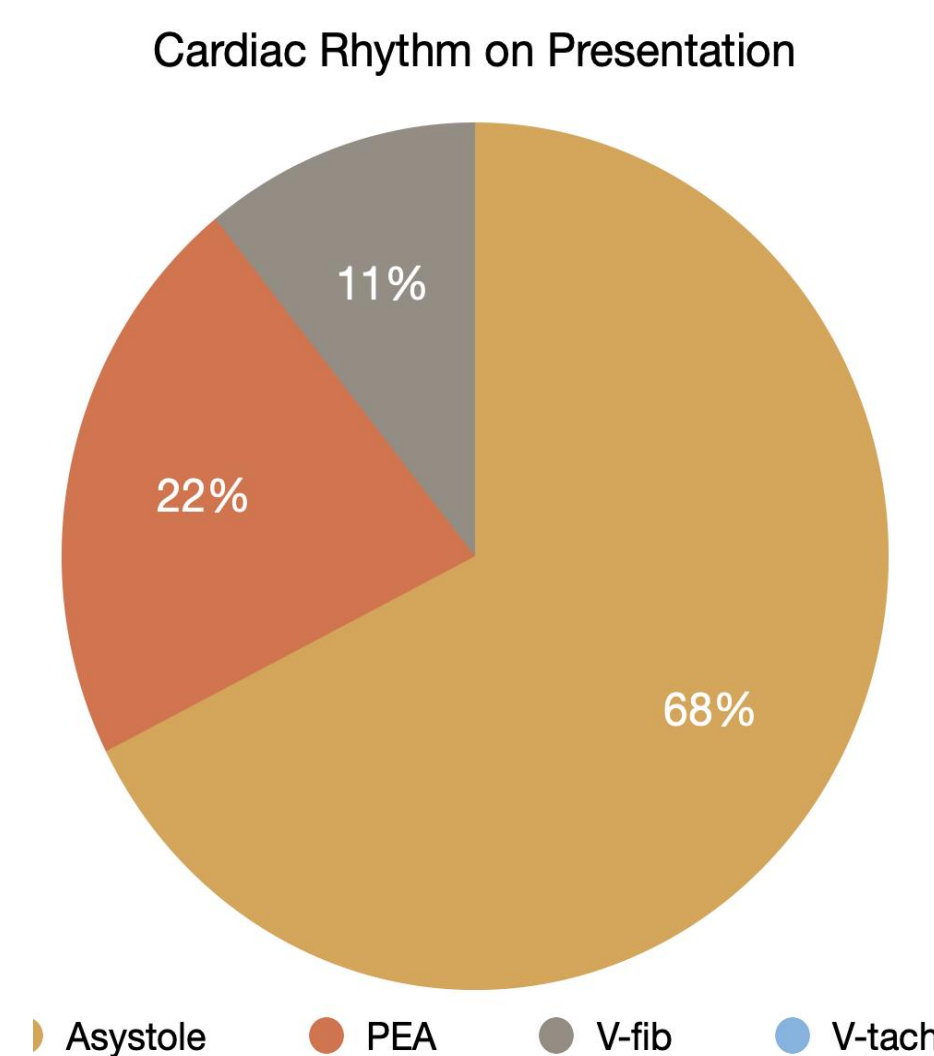


Figure 1

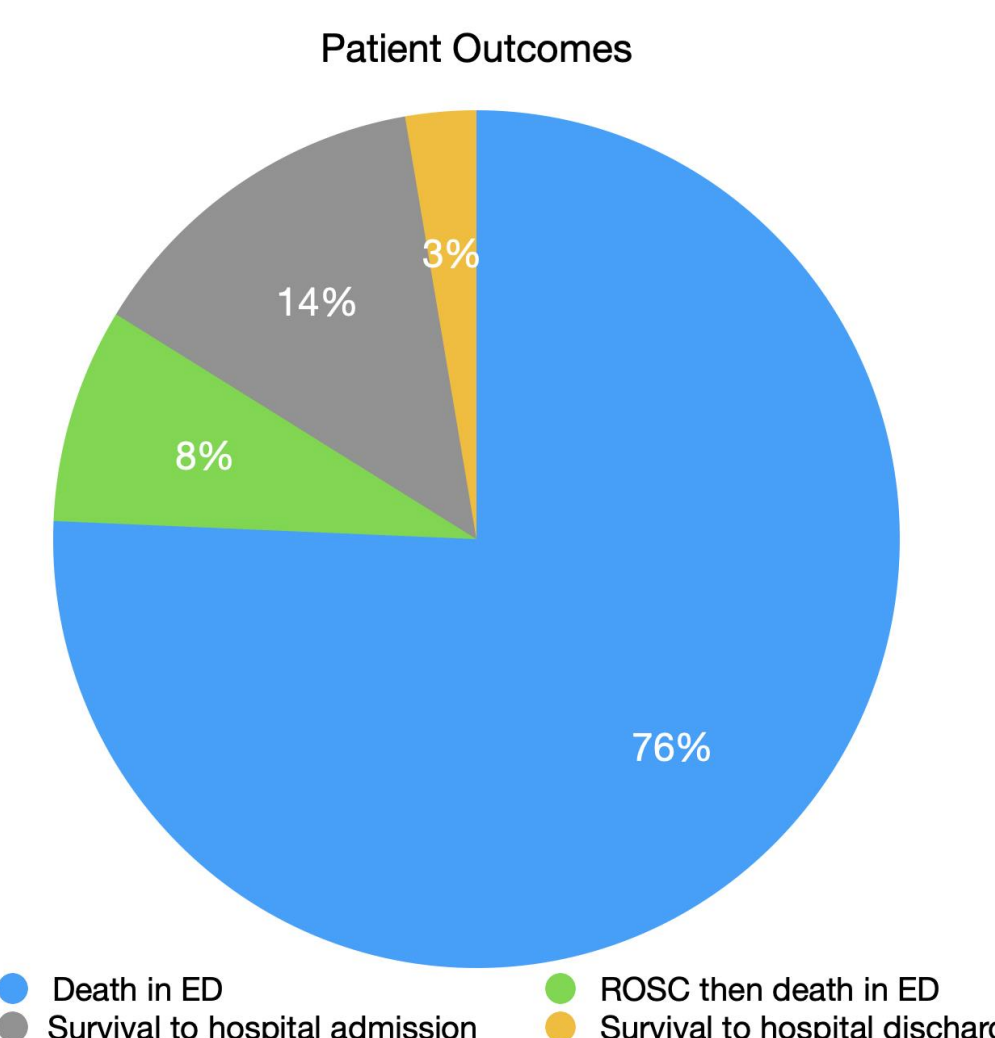


Figure 2

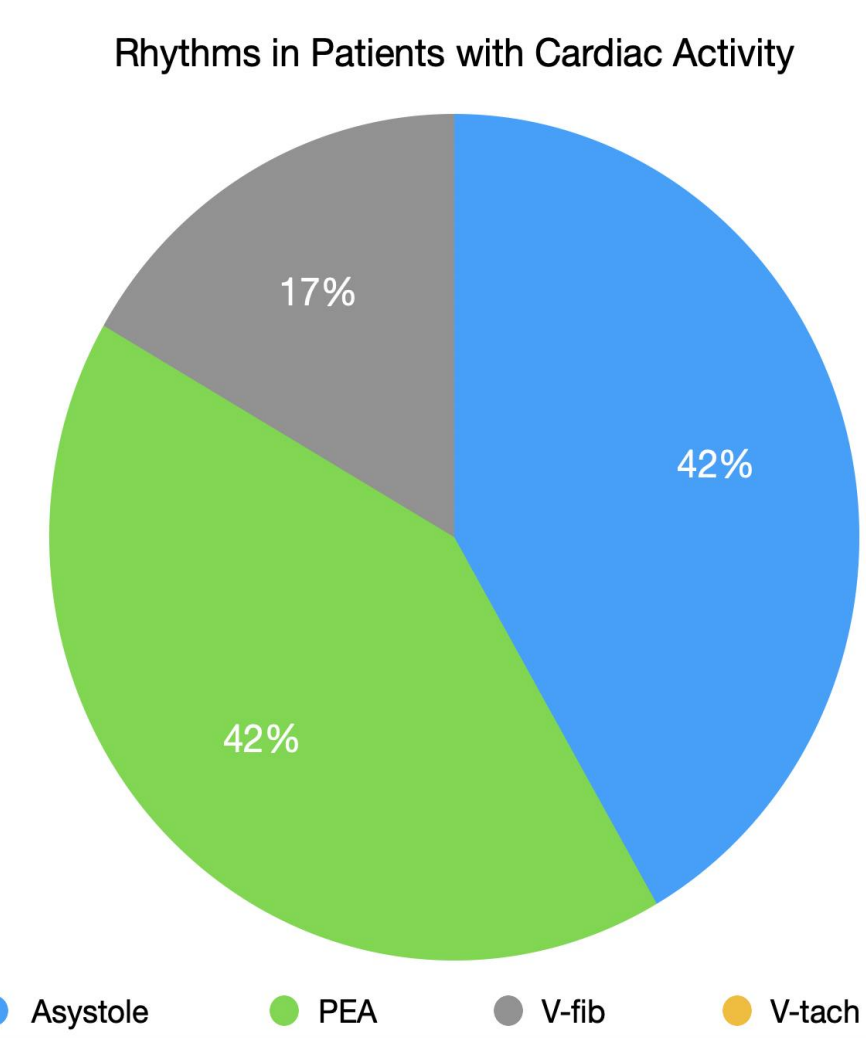


Figure 3

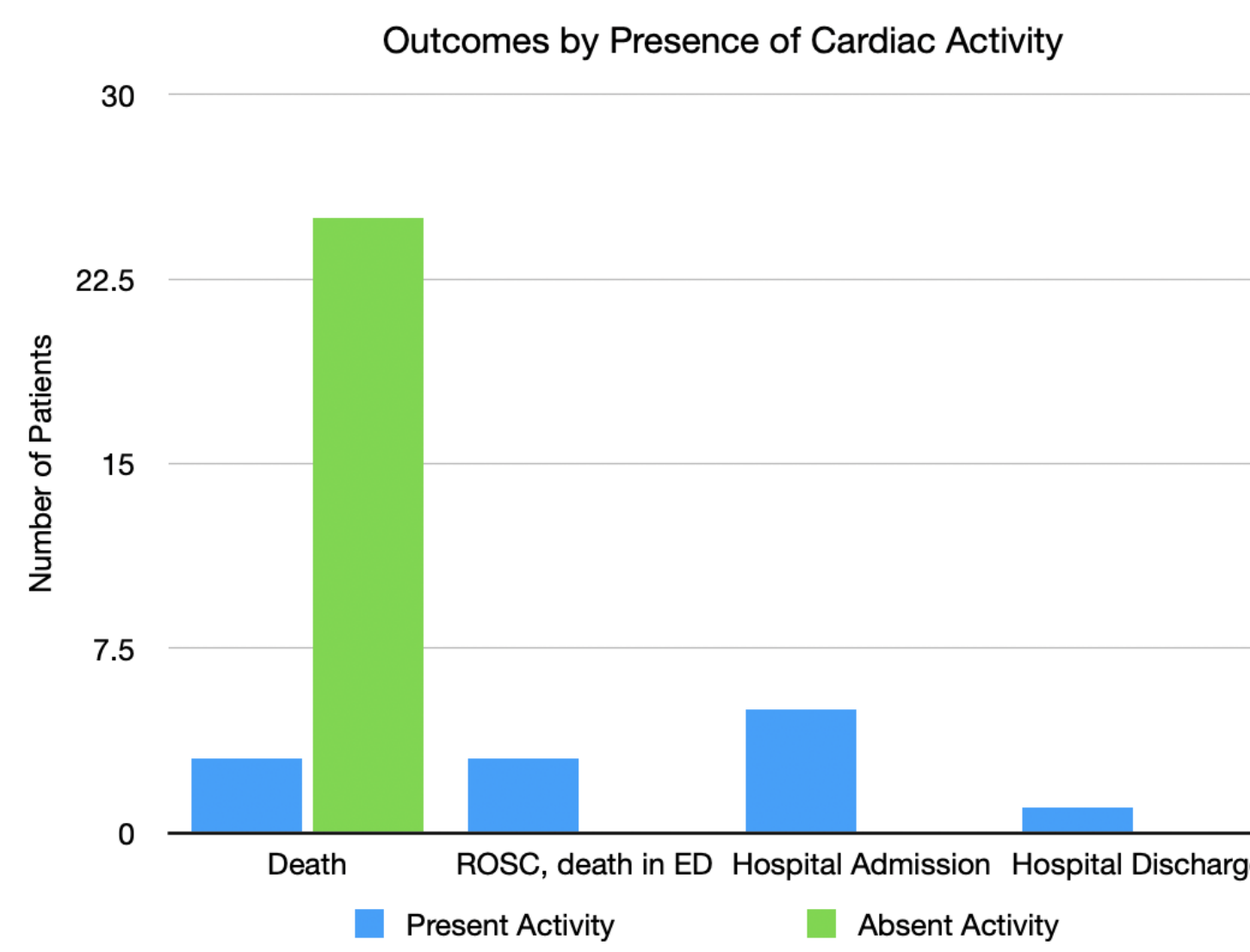


Figure 4

Conclusion

- The use of cardiac ultrasound during resuscitation can be helpful in identifying opportunities for defibrillation that are otherwise missed based on cardiac rhythm checks per ACLS guidelines. All patients with ROSC in the ED had some degree of cardiac activity on US; therefore, early recognition of cardiac activity may be associated with better outcomes.
- Limitations: Small sample size may skew analysis. Bias may be present in retroactive interpretations as there is more time to replay and closely examine the clips which is not a similar environment that the performing physicians are in.
- Further studies with a larger sample size can try to discern between organized vs disorganized cardiac activity.

References

1. Tsao CW, Aday AW, Almarzooq ZI, Anderson CA, Arora P, Avery CL, Baker-Smith CM, Beaton AZ, Boehme AK, Buxton AE, Commodore-Mensah Y. Heart disease and stroke statistics—2023 update: a report from the American Heart Association. *Circulation*. 2023 Feb 21;147(8):e93-621. Table 19-5 and 19-6.
2. Sasson C, Rogers MA, Dahl J, Kellermann AL. Predictors of survival from out-of-hospital cardiac arrest: a systematic review and meta-analysis. *Circ Cardiovasc Qual Outcomes*. 2010 Jan;3(1):63-81.
3. Bhandari S, Doan J, Blackwood J, Coult J, Kudenchuk P, Sherman L, Rea T, Kwok H. Rhythm profiles and survival after out-of-hospital ventricular fibrillation cardiac arrest. *Resuscitation*. 2018 Apr;125:22-27. doi: 10.1016/j.resuscitation.2018.01.037.
4. Gaspari R, Weekes A, Adhikari S, Noble VE, Nomura JT, Theodoro D, Woo M, Atkinson P, Blehar D, Brown SM, Caffery T, Douglass E, Fraser J, Haines C, Lam S, Lanspa M, Lewis M, Liebmann O, Limkakeng A, Lopez F, Platz E, Mendoza M, Minnigan H, Moore C, Novik J, Rang L, Scruggs W, Raio C. Emergency department point-of-care ultrasound in out-of-hospital and in-ED cardiac arrest. *Resuscitation*. 2016 Dec

*This data was collected as part of the multi center REASON 3 Trial. This analysis only applies to SBUH enrolled patients.