

INTRODUCTION

- Focused cardiac ultrasound (FOCUS) allows trained critical care physicians to assess and manage patients experiencing cardiac arrest, treating reversible causes of physiological instability.
- While cardiopulmonary resuscitation (CPR) is performed, FOCUS allows identification of the provoking event.
- American Heart Association guidelines suggest FOCUS can be useful in identifying a possible cause of pulseless electrical activity (PEA) arrest.
- By incorporating FOCUS into the pulse check, it allows physicians to distinguish cardiac motion and potential reversible causes of PEA.

AIM

- Assess the feasibility for trained physicians to perform FOCUS and EASy-ALS.
- Identify possible reversible cause of pulseless electrical activity (PEA).
- Determine outcome of patients who undergo ALS protocol (survival to discharge).

METHOD

- Anesthesiology attendings and (PGY)-3 residents at our institution undergo a 4-day web-based course in FOCUS provided by the Society of Critical Care Medicine (SCCM).
- Residents complete 20 FOCUS studies under the direct supervision of a FOCUS-credential attending physician.
- Residents also complete team-based simulation consists of 5 PEA arrest scenarios where FOCUS was performed during the 10-second pulse check; the importance of not exceeding 10 seconds was emphasized.
- Residents then were allowed to perform EASy-ALS on patients experiencing cardiac arrest without direct supervision.
- Each study is performed during the pulse check while chest compressions are paused, results and images are recorded for later review to assess quality and incidence of findings (Figures 1-3).

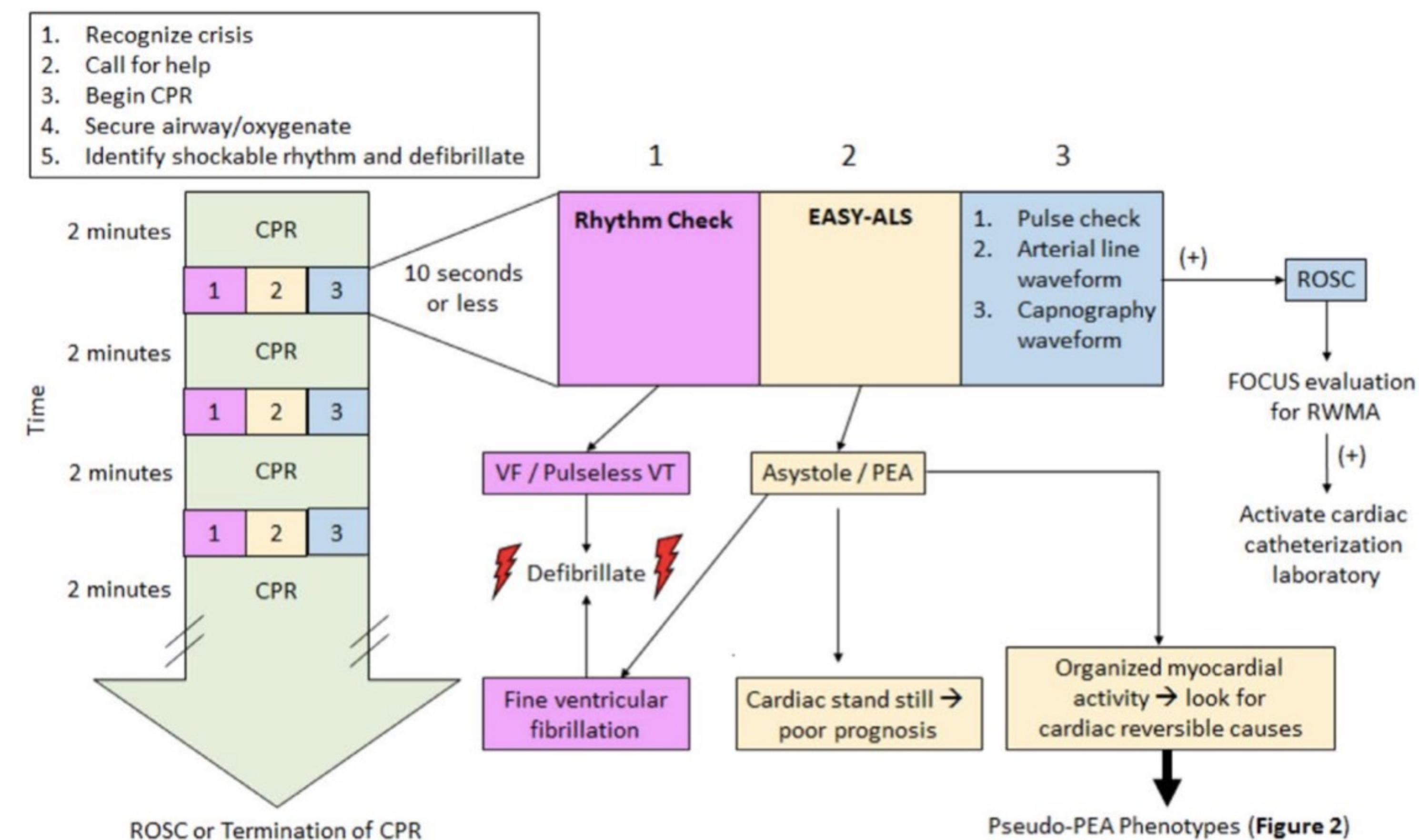


Figure 1. Algorithm for use of EASy-ALS. This algorithm incorporates FOCUS into the ≤10-s pulse/rhythm check of CPR. A systematic approach allows identification of a shockable rhythm if present and completion of EASy-ALS to search for a cardiac cause of the event without holding chest compressions for >10 s. (Courtesy of N. Bughrara, MD, Albany, NY.) CPR indicates cardiopulmonary resuscitation; EASy-ALS, echocardiographic assessment using subcostal-only view in advanced cardiac life support; FOCUS, focused cardiac ultrasound; PEA, pulseless electrical activity; ROSC, return of spontaneous circulation; RWMA, regional wall motion abnormality; VF, ventricular fibrillation; VT, ventricular tachycardia.

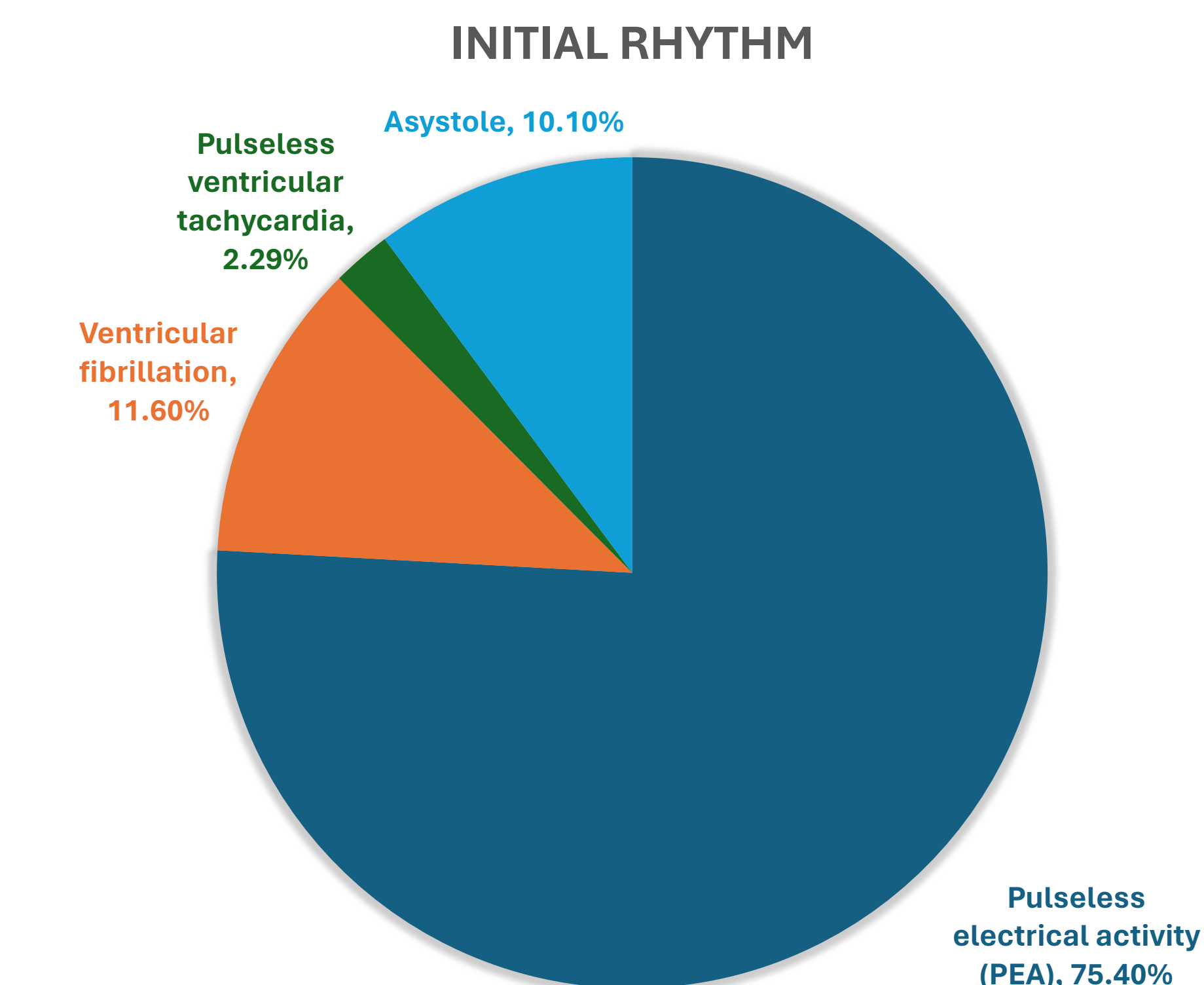


Figure 2 : Initial Rhythm at the start of the Echocardiogram. In 80 cases, the initial rhythm of each patient was charted. The most common was pulseless electrical activity (PEA), followed ventricular fibrillation, asystole, and lastly pulseless ventricular tachycardia.

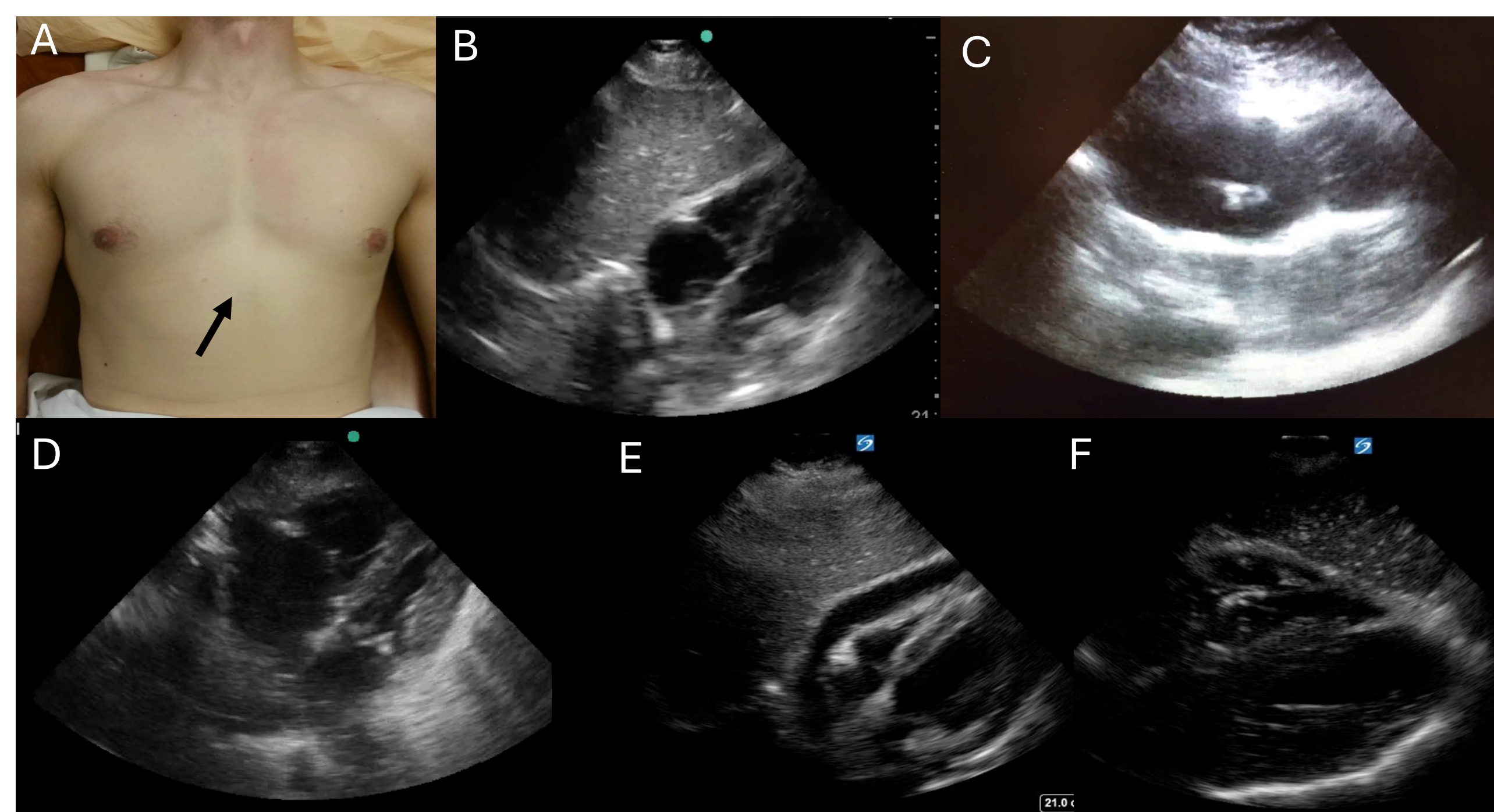


Figure 3: A compilation of resident-obtained subcostal echocardiogram images corresponding to various pathologies; (A) probe placement for subcostal view (arrow), (B) normal heart, (C) clot in right atrium , (D) right ventricular syndrome, (E) pericardial effusion, (F) left ventricular failure

RESULTS

- Using FOCUS, we confirmed that 62.3% of arrests were identified as PEA, 13.10% as pseudo-PEA, 11.6% as ventricular fibrillation, 10.10% as asystole, and 2.29% as pulseless ventricular tachycardia.
- Ultrasound was performed pre-code (n= 4), during code (n=36), and immediately post-code (n=19).
- Image quality was good 73.7% of the time, adequate 14.5%, poor 3.9%, and not obtained 7.9%.
- The most frequently seen cardiac phenotypes were RV dilation and hypertrophy (19.7%), normal end diastolic ventricular cavity sizes and contractility (14.5%), diastolic dysfunction (13.2%), systolic dysfunction (11.8%), and pump failure (10.5%).
- 4 cases showed hypovolemia, 1 case showed pericardial effusion, and 7 cases had cardiac standstill.
- ROSC was achieved in 78.9% of cases, where 36.4% of the total cases survived to hospital discharge.

CONCLUSION

It is feasible and useful for trained physicians to perform FOCUS and EASy-ALS as a helpful diagnostic tool to evaluate patient management. Residents and anesthesiologists reliably obtain adequate diagnostic images before, during, and after episodes of cardiac arrest, which help manage potentially reversible causes of cardiac arrest.

REFERENCES

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