

Endovascular resuscitation in out-of-hospital cardiac arrest: The tip of the SPEAR

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Background

Out of hospital cardiac arrest (OHCA) continues to be associated with **dismal (<10%) survival** in the United Kingdom. Despite evidence linking optimisation of **coronary perfusion pressure** with increased **return of spontaneous circulation (ROSC)**, few data exist describing **in-vivo haemodynamics** during prehospital advanced life support. Since September 2021, East Anglian Air Ambulance (EAAA) has utilised ultrasound guided **percutaneous femoral access** to **optimise OHCA management**. This programme is termed **SPEAR - Specialist Percutaneous Endovascular Aortic Resuscitation**.

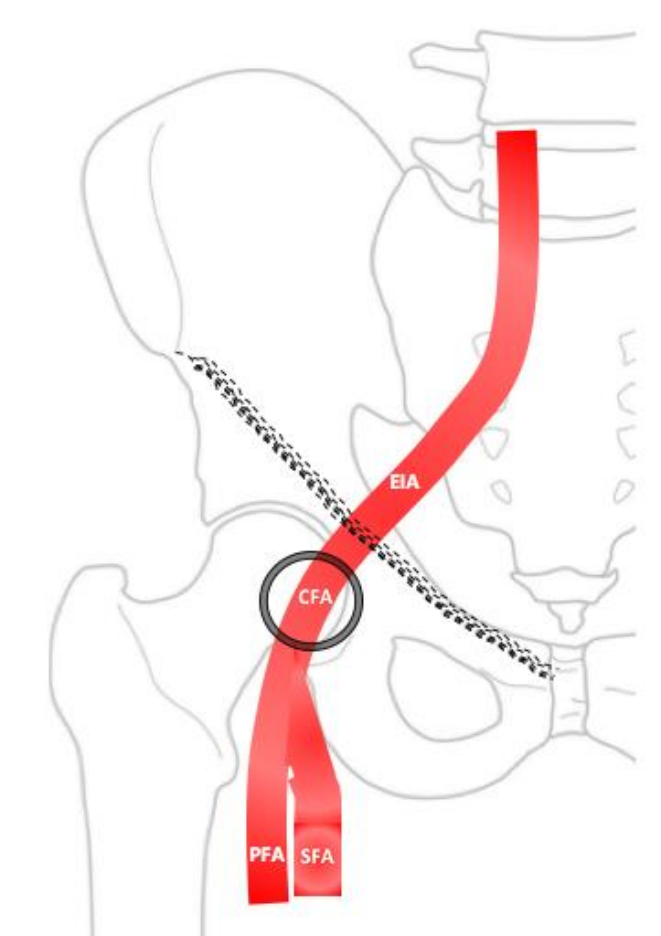
Methods

The EAAA SPEAR programme utilises a 4Fr Micro Access Kit (MAK) for common femoral arterial access, under ultrasound guidance using the Butterfly iQ device. Observations are recorded on scene using the ZollX Series monitor and interrogated at 30 second intervals retrospectively. Artefactual invasive blood pressure values (>50% baseline and/or SBP >300mmHg) are filtered automatically and expert beat-to-beat review is conducted for accuracy.

Results from first 100 SPEAR cases

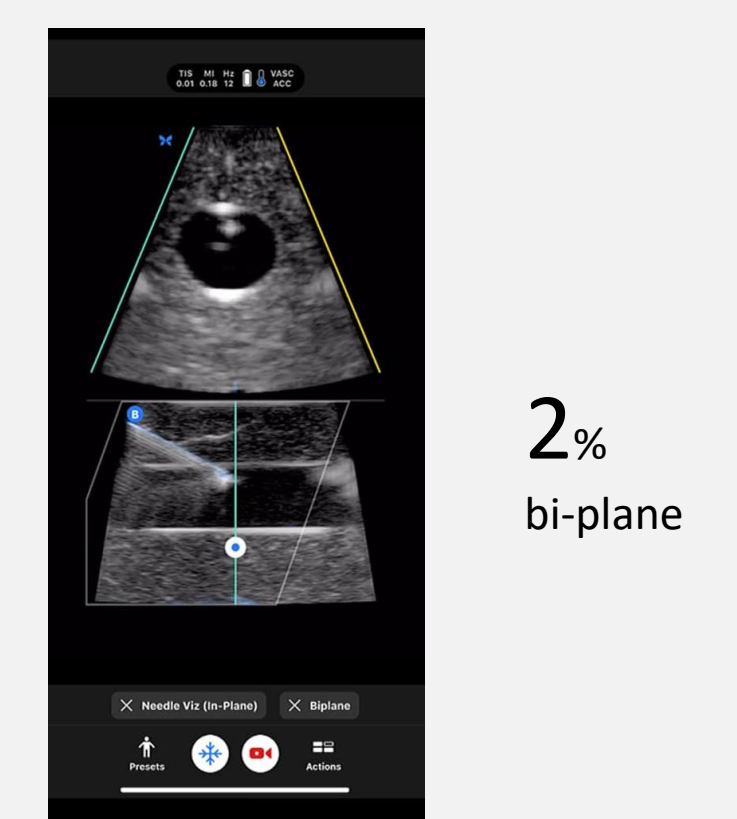
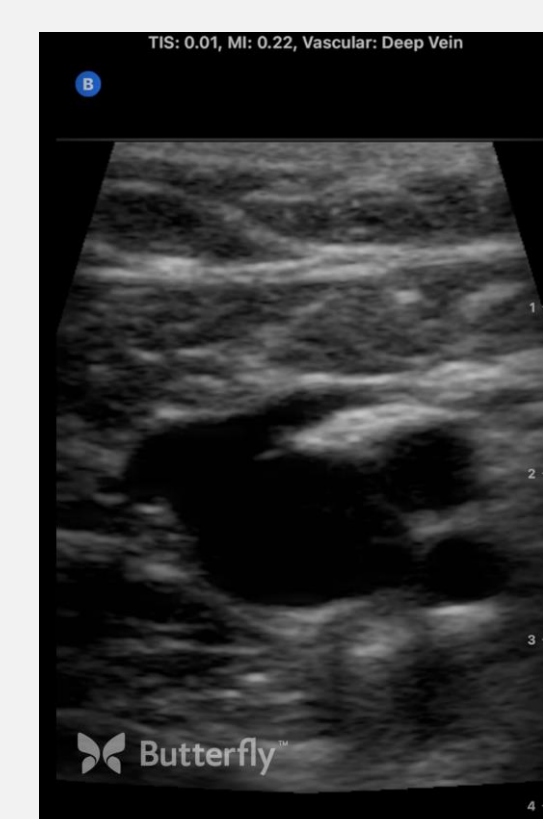


Mean age: **51** years
Range: **11 - 83** years



Right CFA in 56% of cases

Ultrasound use



Haemodynamic highlights

Summary of observations (n = 1,067) from preliminary sample of patients

	CPR ONGOING: NO ROSC n = 73			CPR ONGOING: ROSC n = 21			POST- ROSC n = 1,067		
	DBP	MAP	SBP	DBP	MAP	SBP	DBP	MAP	SBP
Min	9	18	14	23	5	39			
Quartile 1	13	90	19	53	50	95			
Median	15	35	121	25	39	64	64	82	117
Quartile 3	17	146	35	115	77	146			
Max	31	209	54	153	136	240			

Conclusion

For the **first time in a UK cohort** of adult patients receiving prehospital resuscitation by physician-led teams, we have demonstrated that ultrasound-guided **femoral arterial access** is **achievable** in patients in the setting of ongoing cardiac arrest.

Invasive pressures can assist with: **optimising the resuscitation attempt, detecting return of circulation, and targeting post-resuscitation care.**

Interestingly there is an **association** between a **higher aortic diastolic** blood pressure and **ROSC**, and more work is planned in this field.

EAAA OHCA SPEAR Flowchart V3

Phase	Time	Actions
Rapid assessment phase	2 mins	Confirm OHCA, brief circumstances and no flow time Identify a TL, encourage use of EEAH OHCA checklist Identify an extrication plan
	3 mins	Ensure qCPR in progress Manual CPR ✓ no pauses > 10 s ✓ rate 100-120 ✓ depth ~ 5 cm ✓ full recoil mCPR ✓ 30:2 ratio ✓ LUCAS suction cup position checked ✓ mCPR generating brachial pulse
SPEAR Phase	7 mins	Confirm PEA/VF/VT rhythm iGel/ETT in situ etCO ₂ > 2.0 kPa Prepare and drape both groins Insert 4Fr MAK+/-HVA and 8Fr venous sheath under USS Transduce arterial line and Ax for ROSC/low flow state
	15 mins	No ROSC: ALS Continue bolus adrenaline 1mg/4 mins Optimise LUCAS Assess for ROSC using IBP every 2 mins If VF/VT give 5g MgSO ⁴ ROSC/Low flow state: Maintain DAoBP >40mmHg using 0.1-2mcg/kg/min adrenaline infusion
ROSC/Tpt Phase	15-20 mins	Secure sheaths and package PHEA if required Maintain IVI and IABP monitoring 12 Lead ECG recorded Do NOT delay transport for POCUS/Echo Consider destination based on EAAA OHCA Triage Tool



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Scan the QR code for a link to EAAA SPEAR HEMS Course



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