Cost-Utility Analysis of the BCIS Conveyance Algorithm for Out-of-Hospital Cardiac Arrest Patients

Vasileios Kontogiannis, MSc[1], **Eoin Moloney, Msc[1]**, Guilherme Movio, Dr.[2], Uzma Sajjad, Dr.[2], Rupert Simpson, Dr.[2], Maria Maccaroni, Dr.[2], Thomas R. Keeble, Dr.[2], Mehdi Javanbakht, MSc, PhD[1]

1- Optimax Access, Southampton, United Kingdom, 2- Essex Cardiothoracic Centre, Mid and South Essex NHS Trust, Essex, United Kingdom.

EE310

INTRODUCTION

- Out-of-Hospital Cardiac Arrest (OHCA) poses a significant challenge to healthcare systems, with high mortality rates and substantial intensive care costs.
- Patients presenting with an initial shockable rhythm are more likely to have a cardiac aetiology and may benefit most from direct transport to specialist centres.
- Outcomes following OHCA vary widely, partly due to differences in access to specialist cardiac and neurocritical care.
- The **British Cardiovascular Intervention Society (BCIS) conveyance algorithm** prioritises direct transfer of patients with an initial shockable rhythm to specialist cardiac arrest centres (CACs) to support access to advanced cardiac intervention, neurocritical care, and structured rehabilitation.
- Early observational studies suggest that rhythm-based triage to CACs is feasible and may improve survival and offer clinical benefit in selected patients [1], however evidence regarding cost-effectiveness remains limited.

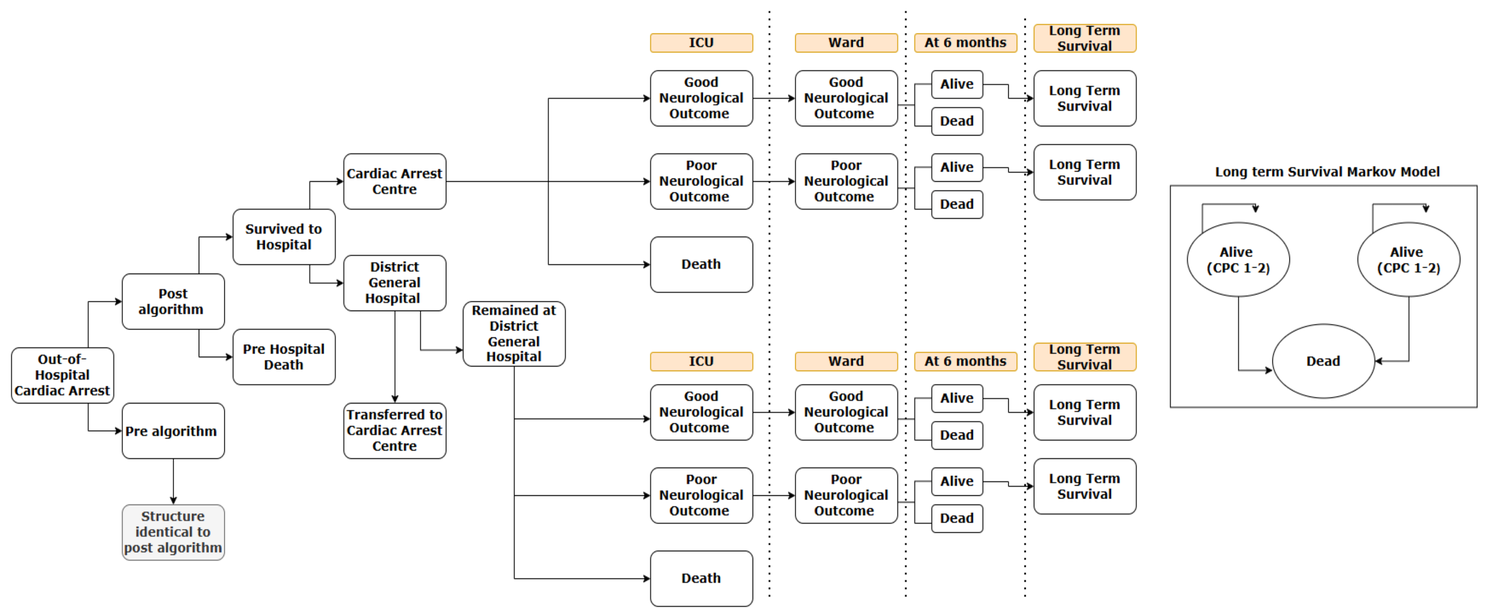
OBJECTIVES

- This study aimed to **evaluate the cost-effectiveness of implementing the BCIS OHCA conveyance algorithm** in a large regional population, to inform National Health Service (NHS) policy on optimising patient outcomes and resource allocation.
- Specifically, the analysis used a hybrid decision-analytic framework combining short-term (decision tree) and long-term (Markov) components to estimate lifetime costs and health outcomes associated with the algorithm versus standard of care (SoC).

METHODS

- A hybrid decision-analytic model was developed to assess the cost-effectiveness of the BCIS OHCA conveyance algorithm versus SoC over a lifetime horizon. Under SoC, patients were transported either to the nearest Emergency Department (ED) or to the CAC, while under the BCIS algorithm, conveyance followed the protocol's criteria.
  - **Short-term component:** A decision tree representing the initial hospital phase (admission to 6 months), capturing initial conveyance, secondary transfers, and neurological outcomes (Cerebral Performance Category [CPC] 1–5).
  - **Long-term component:** A Markov model simulating lifetime transitions between three health states—alive with good outcome (CPC 1–2), alive with poor outcome (CPC 3–4), or dead (CPC 5).
- The base-case population included a hypothetical cohort of 9,000 OHCA patients with return of spontaneous circulation (mean age 65 years). Clinical inputs were drawn primarily from Simpson et al. (2025), a 12-month pilot study in Essex, UK [1].
- Outcomes included total healthcare costs, life years (LYs), and incremental cost per quality-adjusted life year (QALY) gained, from a UK NHS and Personal Social Services (PSS) perspective.

Figure 1. Economic model structure



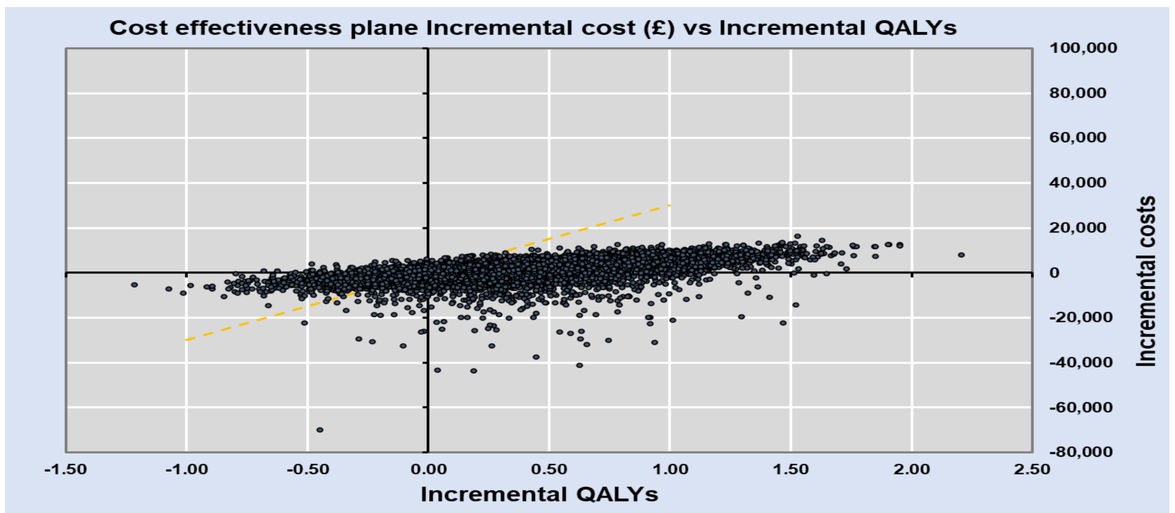
RESULTS

- In the base-case analysis, the BCIS conveyance algorithm was more effective (+ 0.43 QALYs) and associated with a small increase in cost (+ £1,244) compared with SoC, over a lifetime horizon; incremental cost-effectiveness ratio (ICER) of £2,926 per QALY gained.
- Cost differences between the two strategies were mainly driven by reductions in intensive care (–£714), hospital ward (–£396), post-assessment (–£30), and ambulance (–£22) costs in the BCIS group. These savings were partly offset by small increases in admission (+£4), neuroprognostication (+£11), and long-term care costs (+£400 within six months and +£1,991 thereafter).
- Probabilistic sensitivity analysis (PSA) demonstrated an 86.3% probability of cost-effectiveness at a £30,000 willingness-to-pay (WTP) threshold, and a 33.7% probability of being cost saving. Key drivers included the proportion of patients discharged from the Intensive Care Unit (ICU) with either good or poor neurological outcomes, and the proportion transferred to CACs.

Table 1. Base-case results

Outcome (per patient)	BCIS algorithm	SoC	Incremental
Total costs (£)	22,642	21,397	1,244
Life-years lived	3.16	2.60	0.57
QALYs lived	2.20	1.78	0.43
ICER (£)	2,926	-	-
NMB (£) (£30,000 WTP threshold)	11,514	-	-

Figure 2. Cost-effectiveness plane



DISCUSSION

- Although early defibrillation and reperfusion remain central to OHCA survival, recent European Resuscitation Council (ERC) and European Society of Cardiology (ESC) guidelines highlight the importance of specialist post-resuscitation care [2].
- The BCIS algorithm operationalises these recommendations by embedding rhythm-driven triage into pre-hospital decision-making.
- This selective approach aligns treatment with the likelihood of benefit, ensuring that limited CAC resources are directed toward patients most likely to respond.

CONCLUSION

- This model-based economic evaluation found that the BCIS OHCA conveyance algorithm is a cost-effective strategy compared with SoC, with an ICER of £2,926 per QALY gained.
- While clinical outcome benefits remain exploratory, the economic case for rhythm-based selective conveyance is strong, supporting further prospective evaluation across multiple NHS regions.

OPTiMAX access

Full poster → Scan QR
Live discussion → Booth #1125

References

1. Simpson RFG, Johnson T, Rees P, Glover G, Sajjad U, Fawaz S, et al. Expedited conveyance of out-of-hospital-cardiac arrest patients with STEMI and shockable rhythms to Cardiac Arrest Centres – A feasibility pilot study of the British Cardiovascular Intervention Society conveyance algorithm. Resuscitation 2025;207. https://doi.org/10.1016/J.RESUSCITATION.2025.110491.
2. Nolan JP, Sandroni C, Cariou A, Cronberg T, D'Arrigo S, Haywood K, et al. European Resuscitation Council and European Society of Intensive Care Medicine Guidelines 2025 Post-Resuscitation Care. Resuscitation 2025;215:110809. https://doi.org/10.1016/J.RESUSCITATION.2025.110809.