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Clinical paper

Psychological wellbeing in survivors of cardiac arrest, and its relationship to neurocognitive function[☆]

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ABSTRACT

Objective: To characterise psychological wellbeing in survivors of out-of-hospital cardiac arrest (OHCA), and examine its relationship to cognitive function.

Patients: Forty-one highly functioning cardiac arrest survivors were drawn from the follow-up cohort of a randomised controlled trial of initial airway management in OHCA (ISRCTN:18528625).

Design: Psychological wellbeing was assessed with a self-report questionnaire (the Depression Anxiety and Stress Scale; DASS) and cognitive function was examined using the Delayed Matching to Samples (DMS) test from the Cambridge Neuropsychological Test Automated Battery (CANTAB).

Results: Mean anxiety levels were significantly higher in this patient group than normative data drawn from the general population ($p = 0.046$). Multiple regression analyses showed that cognitive function, measured by the DMS, did not predict any of the DASS scales.

Conclusions: Anxiety plays an important role in determining perceived QoL in high functioning survivors, but psychological wellbeing is unrelated to cognitive function in this group. To achieve a comprehensive assessment of wellbeing, resuscitation research should consider outcomes beyond neurological function alone.

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Introduction

Q3 Overall survival rates from out-of-hospital cardiac arrest (OHCA) are low, but those who do recover are often judged to have a favourable outcome.¹ The International Liaison Committee on Resuscitation recommends that epidemiological data define the neurological function of OHCA survivors using the Cerebral Performance Category (CPC) scale.² However the CPC scale is a very coarse measure of function; it lacks the sensitivity needed to detect subtle differences in neurological impairment among survivors.³

Q4 Hypoxic brain injury is a common consequence of cardiac arrest, due to the brain's vulnerability to an interrupted circulation.⁴ Memory is the most commonly reported disturbance in OHCA

survivors,⁵ which has been related to the particular sensitivity of the hippocampus and medial temporal lobe to hypoxia.⁶

Studies have found significant relationships between complaints of cognitive dysfunction and self-reported health-related quality-of-life (HRQoL).⁷ However, a good survival outcome should not be defined by the presence or absence of impairment, but by “a state of complete physical, mental and social well-being”.⁸ Resuscitation research is beginning to adopt this multifaceted definition of survival outcomes with HRQoL assessments in OHCA.⁹ However, current measures are weighted towards physical functioning,¹⁰ and often fail to evaluate emotional distress. Indeed, Elliott and colleagues state that despite what was reportedly a good HRQoL, “a substantial burden of morbidity exists in the survivor population”.⁹

The psychological aftermath of OHCA has not been adequately researched. A recent review stated that research is hindered by a lack of methodological consensus, yet the prevalence of depression and anxiety in cardiac arrest survivors could be as high as 45% and 61% respectively.¹¹ The use of non-specific clinical scales that employ normative cut-offs,¹¹ and a failure to evaluate the impact

[☆] Spanish abstract to follow at a later date.

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of stress on survivors,¹² have limited the potential to comprehensively characterise post-arrest wellbeing. The Depression, Anxiety and Stress Scale addresses these problems,¹³ and was therefore used in this research.

The aim of this study was to characterise psychological wellbeing in high-functioning survivors of out-of-hospital cardiac arrest (OHCA), and examine its relationship to cognitive function. Our primary hypothesis was that OHCA survivors would report poorer psychological wellbeing than normal populations. As previous research has found that post-arrest cognitive deficits impact perceived quality-of-life (QoL),⁷ our secondary hypothesis was that cognitive function, measured by memory performance, would predict wellbeing in cardiac arrest survivors.

Methods

Patients were drawn from the 3-month follow-up assessment of REVIVE-Airways; a randomised trial of alternative initial airway management strategies in adult non-traumatic out of hospital cardiac arrest (OHCA).¹⁴ Approval was obtained from the Cambridge Central NHS Research Ethics Committee.

Adult (18 years and older) OHCA survivors, with capacity to give informed consent at discharge from hospital, were included in the REVIVE-Airways follow-up assessment. Forty-nine patients were eligible for inclusion. Seven declined participation, and one patient with a pre-existing neurological deficit was excluded from the study.

Patients were assessed using the Depression, Anxiety and Stress Scale (DASS),¹³ and the Delayed Matching to Samples (DMS) test from the Cambridge Neuropsychological Test Automated Battery (CANTAB) assessment.¹⁵ They also completed the Mini Mental State Examination (MMSE).¹⁶ Further details of these are given in the Supplemental Appendix A.

Data collection took place over one year, and all patients were assessed during a one-hour home visit conducted by the same investigator (SED) who was blinded to allocation in the REVIVE Airways study.

Data analysis

All analyses were completed using the SPSS Statistics package, Version 20.0. DASS normative data comparisons were those reported by Crawford and Henry.¹⁷

All DASS scales were found to be positively skewed, replicating previous findings.¹⁷ Skewed variables were subjected to a square root transformation to improve normality, linearity and homoscedasticity of residuals for regression analyses.¹⁸

Seven patients were excluded from the DMS analyses, and one from all DASS analyses due to insufficient data to allow accurate estimations on each scale.¹³

Results

The characteristics of the final sample of 41 patients are shown in Table 1. The majority of patients were assessed at 3 months

Table 1
Patient characteristics.

Patients	n = 41
Mean age in years (SD)	63 (12.50)
Number male (%)	31 (76)
Initial rhythm	
VF/pulseless VT (%)	26 (63)
PEA (%)	3 (7)
ASY (%)	0 (0)
Unknown (%)	12 (29)
Mean time to ROSC in minutes (SD) (n = 28)	9 (0.005)
Mean length of ICU stay in days (SD) (n = 28)	6 (6.76)
Mean length of hospital stay in days (SD) (n = 32)	13 (9.73)
Received therapeutic hypothermia (%) (n = 33)	21 (63.6%)
Received reperfusion therapy (%) (n = 28)	23 (82.1%)

SD – standard deviation; VF/pulseless VT – ventricular fibrillation/pulseless ventricular tachycardia; PEA – pulseless electric activity; ASY – asystole; ROSC – return of spontaneous circulation; ICU – intensive care unit. Time to ROSC is measured from the commencement of first cardio-pulmonary resuscitation attempt.

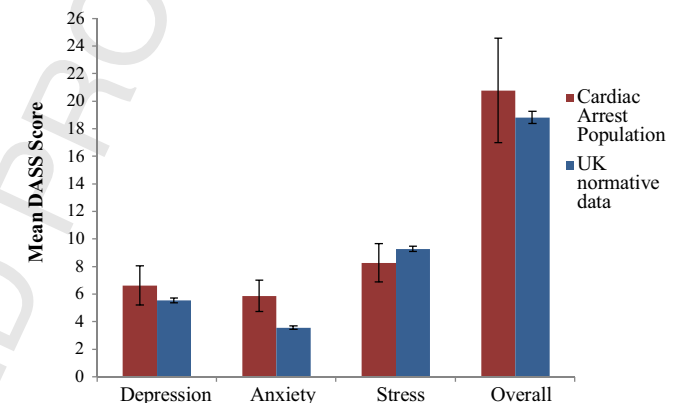


Fig. 1. Mean depression, anxiety, stress and overall DASS scores for survivors compared to United Kingdom (UK) normative data. Error bars denote one standard error.

post arrest (87.8%); four were assessed at 4 months, and one at 9 months. All patients were highly functioning, defined as Cerebral Performance Category 1 at follow-up. The mean Mini Mental State Examination (MMSE) score was 27.5 (SD = 2.37; n = 40).

Table 2 presents the means, medians, standard deviations and ranges for the DASS scores of all OHCA survivors. The means for OHCA survivors and normative data on each DASS scale are shown in Fig. 1. OHCA survivors tended to report higher levels of depression and anxiety, and lower levels of stress, than that of the normal population. However, independent samples t-tests showed that only the observed difference in anxiety between the OHCA survivors and normative data was significant ($p = 0.046$).

Hierarchical multiple regression analyses were performed on the entire patient population, controlling for the effect of age. Age was entered into the first step and all DMS variables were entered

Table 2
Summary of descriptive statistics of self-reported DASS scores.

	Percentage in each DASS category									
	N	Median	Mean ^a	SD ^a	Range	Normal	Mild	Moderate	Severe	Extremely severe
Depression	40	4.5	6.63	8.94	0–40	80	5	5	5	5
Anxiety	40	4.0	5.88	7.19	0–34	80	2.5	5	7.5	5
Stress	40	5.5	8.28	8.79	0–34	82.5	2.5	7.5	5	2.5
Overall	40	14.0	20.78	23.92	0–108					

^a Crawford and Henry¹⁷ reported normative mean (SD) depression score = 5.55 (7.48); anxiety = 3.56 (5.39); stress = 9.27 (8.04); overall = 18.38 (18.82).

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