



## Clinical Paper

# Level of consciousness on admission to a Heart Attack Centre is a predictor of survival from out-of-hospital cardiac arrest<sup>☆</sup>



Charles D. Deakin<sup>a,b,\*</sup>, Rachael Fothergill<sup>c</sup>, Fionna Moore<sup>d</sup>, Lynne Watson<sup>c</sup>, Mark Whitbread<sup>e</sup>

<sup>a</sup> Clinical Directorate, South Central Ambulance Service, Southern House, Otterbourne SO21 2RU, United Kingdom

<sup>b</sup> Integrative Physiology and Critical Illness Group, Clinical and Experimental Sciences, University of Southampton, University Hospital Southampton NHS Foundation Trust, Southampton SO16 6YD, United Kingdom

<sup>c</sup> Clinical Audit and Research Unit, London Ambulance Service NHS Trust, 8-20 Pocock Street, London SE1 0BW, United Kingdom

<sup>d</sup> London Ambulance Service NHS Trust HQ, 220 Waterloo Road, London SE1 8SD, United Kingdom

<sup>e</sup> Medical Directorate, London Ambulance Service NHS Trust, 8-20 Pocock Street, London SE1 0BW, United Kingdom

## ARTICLE INFO

## Article history:

Received 23 November 2013

Received in revised form 20 February 2014

Accepted 21 February 2014

## Keywords:

Cardiac arrest

Survival

Outcome

Return of spontaneous circulation

Ambulance

Out-of-hospital

Level of consciousness

## ABSTRACT

**Introduction:** The relationship between the neurological status at the time of handover from the ambulance crew to a Heart Attack Centre (HAC) in patients who have achieved return of spontaneous circulation (ROSC) and subsequent outcome, in the context of current treatment standards, is unknown.

**Methods:** A retrospective review of all patients treated by London Ambulance Service (LAS) from 1<sup>st</sup> April 2011 to 31<sup>st</sup> March 2013 admitted to a HAC in Greater London was undertaken. Neurological status (A - alert; V - responding to voice; P - responding to pain; U - unresponsive) recorded by the ambulance crew on handover was compared with length of hospital stay and survival to hospital discharge.

**Results:** A total of 475 sequential adult cardiac arrests of presumed cardiac origin, achieving ROSC on admission to a HAC were identified. Outcome data was available for 452 patients, of whom 253 (56.0%) survived to discharge. Level of consciousness on admission to the HAC was a predictor of duration of hospital stay ( $P < 0.0001$ ) and survival to hospital discharge ( $P < 0.0001$ ). Of those presenting with a shockable rhythm, 32.3% (120/371) were 'A' or 'V', compared with 9.1% (9/99) of those with non-shockable rhythms ( $P < 0.001$ ).

**Conclusion:** Patients with shockable rhythms achieving ROSC are more likely to be conscious (A or V) compared with those with non-shockable rhythms. Most patients who are conscious on admission to the HAC will survive, compared with approximately half of those who are unconscious (P or U), suggesting that critical care is generally appropriate at all levels of consciousness if ROSC has been achieved.

© 2014 Elsevier Ireland Ltd. All rights reserved.

## 1. Introduction

Cardiac arrest is associated with a period of impaired cerebral perfusion, invariably resulting in some degree of neurological insult in all but the briefest of cardiac arrests. This is particularly true for out-of-hospital cardiac arrests (OHCA), where the often unwitnessed nature of the event, the frequent lack of bystander cardiopulmonary resuscitation (CPR), and the relatively long

ambulance response times, contribute to significant periods of cerebral hypoxia.

The majority of patients who survive to leave hospital have achieved return of spontaneous circulation (ROSC) by the time they arrive in the Emergency Department (ED),<sup>1</sup> but many of these will have failed to regain consciousness at this stage. In patients who achieve ROSC, the speed and time course of neurological recovery is variable. Of those resuscitated from OHCA, significant neurological injury is common, initially presenting as an impaired level of consciousness and ultimately accounting for two thirds of deaths after admission to ICU, irrespective of the use of therapeutic hypothermia.<sup>2-4</sup> The presence of consciousness on admission to hospital and the speed at which consciousness returns following cardiac arrest has been shown to be an indicator of neurological survival following OHCA.<sup>5</sup> Brainstem reflexes return first, then the motor response to pain and, finally, cortical activity and consciousness.<sup>6</sup>

<sup>☆</sup> A Spanish translated version of the summary of this article appears as Appendix in the final online version at <http://dx.doi.org/10.1016/j.resuscitation.2014.02.020>.

\* Corresponding author at: Integrative Physiology and Critical Illness Group, Clinical and Experimental Sciences, University of Southampton, University Hospital Southampton NHS Foundation Trust, Southampton SO16 6YD, United Kingdom.

E-mail address: [charlesdeakin@doctors.org.uk](mailto:charlesdeakin@doctors.org.uk) (C.D. Deakin).

Most studies examining the relationship between level of consciousness post-ROSC and subsequent survival do not do so until at least 24 h have elapsed. At this stage, a significant proportion of patients will have died and the remainder are likely to be intubated and sedated, which precludes neurological assessment at this stage.

The larger studies reporting outcome after ROSC according to early neurological status were mostly in the pre-therapeutic hypothermia era and have generally limited their denominator to 'conscious' or 'unconscious'. In a study of 1310 patients admitted alive following OHCA, the patient being conscious on admission to hospital was an independent predictor of survival (OR 6.43, 95% CI 3.61 to 11.45).<sup>7</sup> In patients suffering in-hospital cardiac arrest, multivariate analysis also showed increased mortality in patients who remained unconscious after resuscitation.<sup>8</sup> Studies documenting the presence of a more specific motor response on admission from OHCA have shown that its presence is a predictor of 'awakening' (comprehensible speech or following commands) in patients who were not awake on admission to hospital,<sup>9</sup> and its absence, a predictor of poor outcome (CPC 3–5).<sup>10</sup> Impaired motor responses (absent withdrawal response to pain or absent motor response) remain predictive of poor outcome in patients with an impaired level of consciousness at 24 h post-ROSC, where both were shown to be strongly predictive of death or poor neurological outcome.<sup>11</sup> At 48 h, the predictive value of the Glasgow coma (GCS) for awakening after OHCA has been demonstrated, where good neurological outcome was correctly predicted using a GCS of 10 or above and a poor outcome using a GCS of 4 or below as cutoff points.<sup>12</sup>

No study has examined the relationship of neurological status at the time of hospital handover from the ambulance crew in patients who have achieved ROSC in the context of current treatment standards. An impaired level of consciousness has significant implications, both clinical and financial, for ongoing management, including the need for intensive care management, the need to initiate therapeutic hypothermia<sup>13</sup> and the possible indications for immediate transfer to the catheter laboratory for PPCI.<sup>14</sup> An understanding of the relationship between neurological status on hospital admission and subsequent potential for recovery may also be useful in assessing the futility or not of possible therapeutic interventions and also providing a basis for assessing the potential for recovery when discussing the immediate situation with relatives and next-of-kin.

We therefore examined a sequential cohort of adult patients suffering OHCA of presumed cardiac origin, treated by London Ambulance Service (LAS) to establish what relationship, if any, exists between initial level of consciousness post-ROSC on admission to a HAC and subsequent survival to discharge.

## 2. Methods

### 2.1. Study design

A retrospective review of all patients attended and treated by London Ambulance Service (LAS) during a two-year period (1<sup>st</sup> April 2011–31<sup>st</sup> March 2013) was undertaken. All data were sourced from the LAS cardiac arrest registry. Ethical approval was not required for this review of audit data.

### 2.2. System overview

The LAS is the largest free ambulance service in the world, operating from 69 ambulance stations covering an area of 1579 km<sup>2</sup> (609 square miles) and serving a population of 8.2 million people. It has been LAS policy for the past 2½ years that patients with ST elevation following ROSC are conveyed to one of eight Heart Attack Centres (HACs) in the Greater London area. Heart Attack Centres

are a tertiary intervention centres that provide immediate primary angioplasty for patients with acute myocardial ischaemia, together with the necessary post-arrest care where necessary. Patients fulfilling appropriate criteria are taken directly to these centres, often bypassing local hospitals in order to provide them with definitive care as soon as possible. At least two vehicles are dispatched to cardiac arrests: an initial fast response vehicle (car/motorcycle/pedal cycle) is dispatched to ensure a rapid response, followed by an ambulance. All cardiac arrest calls are attended by crews who, as a minimum, are trained to Emergency Medical Technician standard, but almost all responses are also supported by paramedics trained in advanced life support.

### 2.3. Clinical care

At the time of the study, all LAS personnel practiced according to the Joint Royal Colleges Ambulance Liaison Committee Guidelines for Paramedic Practice 2010,<sup>15</sup> the resuscitation management recommendations of which are based on the current European Resuscitation Council guidelines.<sup>16</sup> Standard ALS therapy was administered, but pre-hospital cooling was not undertaken. Direct admission to the Catheter Laboratory in the HAC for primary percutaneous coronary intervention (PPCI; emergency coronary angiography with or without intervention) and subsequent neurological assessment at the time of handover by the ambulance crew generally occurred within 60 min of achieving ROSC; median time from emergency call to arrival at the HAC (ambulance logging as having arrived at the HAC) being 66 min.

In the UK, ambulance crew use a simple scoring method to assess the level of consciousness, termed 'AVPU',<sup>17</sup> where A=alert (spontaneously open eyes, responding to voice (although may be confused) and motor function), V=responding to verbal stimuli, P=responding to painful stimuli and U=unresponsive (no eye, voice or motor response to voice or pain).<sup>17,18</sup> All patients with ROSC are scored against this established scale by ambulance crews at the time of handover of the patient to hospital staff. Subsequent hospital records enable the survival of each patient to be determined and allow assessment of outcome according to neurological status on HAC admission.

### 2.4. The LAS cardiac arrest registry

All 10,000 annual cardiac arrests treated by LAS are recorded to a central cardiac arrest registry. Data is collated and stored in accordance with national Information Governance standards.

The database is populated from multiple sources including the LAS Emergency Operations Centre (emergency calls centre), data logged by dispatched vehicles, the patient clinical record, and data downloads from automated external defibrillators if available. Data is recorded according to the Utstein template and further information is added from hospital data when available, particularly survival to hospital discharge.

### 2.5. Study population

All adult ( $\geq 18$  years of age) out-of-hospital cardiac arrest patients who were conveyed directly to a HAC in London during a two year period (April 2011–March 2013), whose arrest was presumed to be cardiac in origin, where ROSC was achieved post-arrest and clear ST-elevation was subsequently visible on a 12 lead electrocardiogram (ECG).

Download English Version:

<https://daneshyari.com/en/article/5998469>

Download Persian Version:

<https://daneshyari.com/article/5998469>

[Daneshyari.com](https://daneshyari.com)