London Ambulance Service NHS Trust

Cardiac Arrest Annual Report: 2006/07

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Introduction

During the period 1st April 2006 to 31st March 2007, the London Ambulance Service NHS Trust (LAS) attended 9790 out-of-hospital cardiac arrests. Information relating to each of these patients was collected and analysed by the Clinical Audit & Research Unit. The information was obtained from Patient Report Forms (PRFs), Mobile Data Terminals (MDTs), FR2 defibrillator data files and Emergency Operations Centre (EOC) records. All patients who were taken to hospital with ongoing resuscitation efforts were traced and their outcomes collected from A&E hospital records and from a national patient tracing database. This report presents figures for the LAS as a whole.

Cause of Arrest

Of the 9790 cardiac arrests attended by the LAS, 5639 (58%) were beyond any resuscitation attempt. LAS crews attempted to resuscitate 4151 (42%) patients. 3280 (34%) of patients had a cardiac arrest of a presumed cardiac cause, 264 (3%) were related to a trauma and 607 (6%) were due to another non-cardiac cause (e.g. terminal illness, respiratory disease or drug overdose).

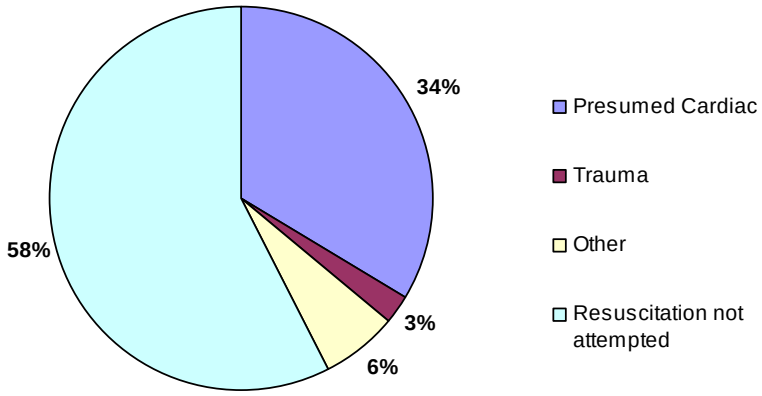


Figure 1. Cause of Arrest

Please Note: the remainder of this report focuses only on patients who were resuscitated following a cardiac arrest of a presumed cardiac cause (n=3280).

Patient Profile

The average age of the cardiac arrest patient was 67 years (ranging from 0 to 102 years). The majority of patients were male (64%; n=2112) and were, on average, 7 years younger than females (72 vs. 65 years).

Date of Arrest

Cardiac arrests occurred most frequently on a Saturday (15%; n=503). 11% (n=366) of all arrests took place during January.

Location of Arrest

Most cardiac arrests (76%; n=2493) occurred in a private, residential location; 67% of these occurred in the home and 9% in a care home facility. The largest single location for a public cardiac arrest was the street (10%; n=321).

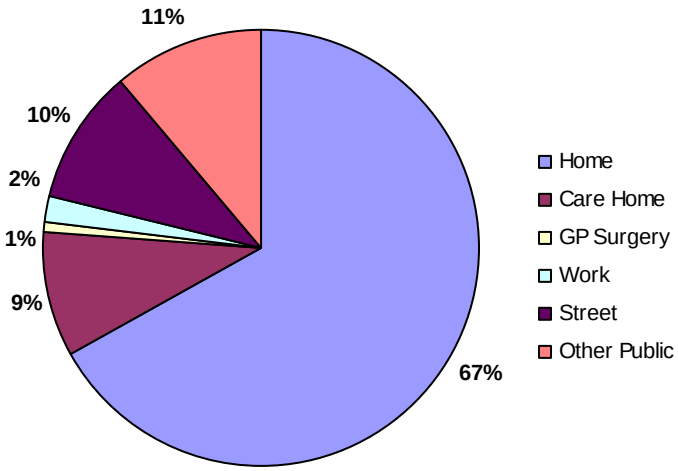


Figure 2. Location of cardiac arrest

Witnessed Arrest

The majority (44%; n=1439) of cardiac arrests were witnessed (seen or heard) by a bystander. A further 14% (n=455) were witnessed by LAS crews. More arrests were witnessed by a bystander when the patient collapsed in a public rather than a private location (56% vs. 40%).

Bystander CPR

CPR was attempted by bystanders in over a third (35%; n=1139) of cases and was more frequent when the arrest was bystander witnessed rather than unwitnessed (59% vs. 37%). More bystanders initiated CPR when the arrest occurred in a public place compared to those that happened in private (49% vs. 30%).

Public Access / Community Defibrillation

Twenty-two patients were defibrillated prior to arrival of the LAS by someone trained as part of the LAS's Community Defibrillation Programme. Ten of these patients (45%) survived to hospital discharge. Details of all 22 cases are reported below:

Patient Profile	
Average age	62 (19-86) years
Gender	Male (82%); Female (18%)
Event Information	
Incident location	London Heathrow Airport (50%; n=11) Underground/Mainline train station (27%; n=6) Coach Station (9%; n=2); Other (14%; n=3)
Bystander witnessed	86% (n=19)
Bystander CPR	73% (n=16)
Average number of shocks	3 (1-11) shocks
Return of Spontaneous Circulation (ROSC)*	68% (n=15)
Survival Status	
Patient outcome	Survived to hospital discharge (45%; n=10) Died in hospital (55%; n=12)

**ROSC status was not available from the PRF for 2 patients.*

Initial Presenting Rhythm

Almost half of all patients (44%; n=1456) were in Asystole on arrival of the ambulance crew. Just under a quarter (24%; n=783) had an initial presenting rhythm of Ventricular Fibrillation (VF) or Ventricular Tachycardia (VT).

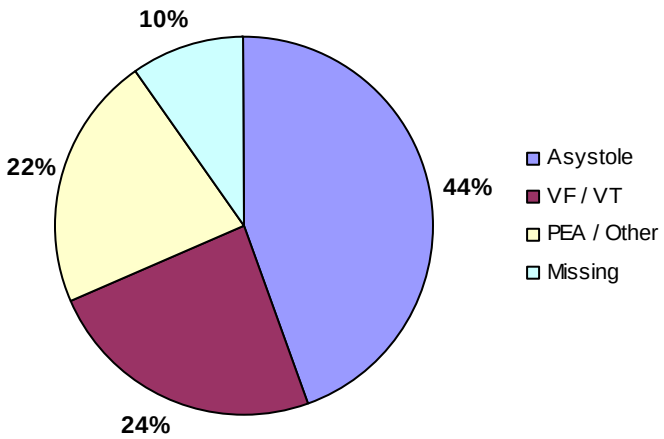


Figure 3. Initial presenting rhythm

Response Times

Ambulance response intervals are shown below. The majority of response times were obtained from vehicle MDTs. The average 999 call to arrival on scene time has decreased by 1 minute since 2005/06, whereas the average 999 call to arrival at hospital time has increased by 4 minutes.

Time Interval	Average Time (minutes)	Range (minutes)
999 call* - Arrival on scene	6	0-38
999 call* - 1st LAS Defibrillation**	9	0-27
Arrival at scene - 1st LAS Defibrillation**	3.5	0-19
999 call* - Arrival at hospital	43	5-195
Job cycle***	95	24-308

**Time when the incident location and the patient's chief complaint were obtained (ORCON time).*

*** Includes only those patients with a non-crew witnessed arrest and an initial rhythm of VF/VT.*

**** 999 call - Green Time.*

Return of Spontaneous Circulation

One fifth (20%; n=662) of patients had a return of spontaneous circulation (ROSC) at some point during their treatment by the LAS. The majority of these patients (73%) had a crew or bystander witnessed arrest. ROSC was most prevalent in 20-29 year olds. It is also interesting to note the high rate of ROSC amongst older patients.

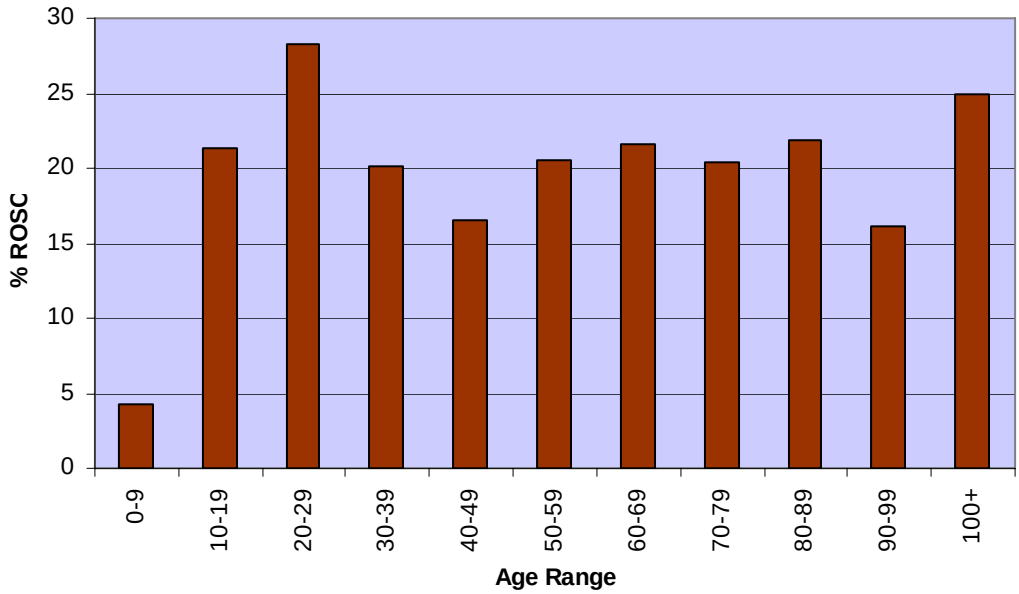


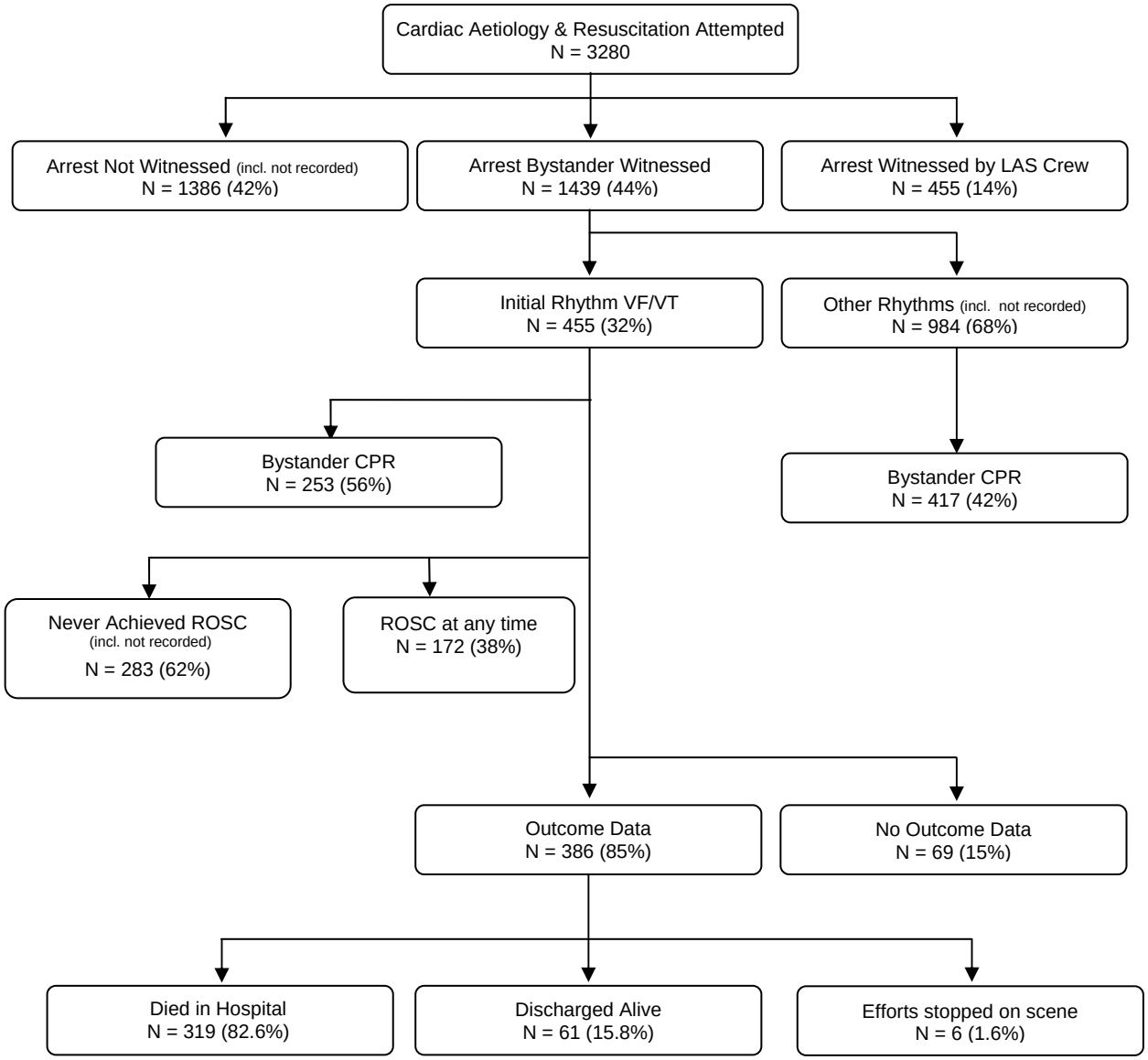
Figure 4. ROSC by age group

Survival Calculations

The LAS calculates two survival figures: an Utstein survival rate and an overall survival rate.

Utstein Survival Rate

The Utstein survival calculation[1] is an internationally validated method for calculating out-of-hospital cardiac arrest survival rates that enables comparisons between services. The Utstein calculation is the number of patients discharged alive divided by the number of persons who had resuscitation attempted following a cardiac arrest of a presumed cardiac aetiology, where the arrest was bystander witnessed and the initial rhythm was VF or VT. Patients for whom outcome records could not be traced (n=69) were excluded from the survival analysis. Therefore, the valid denominator for the 2006/07 Utstein survival calculation was 386. The LAS Utstein survival rate for 2006/07 was 15.8%.

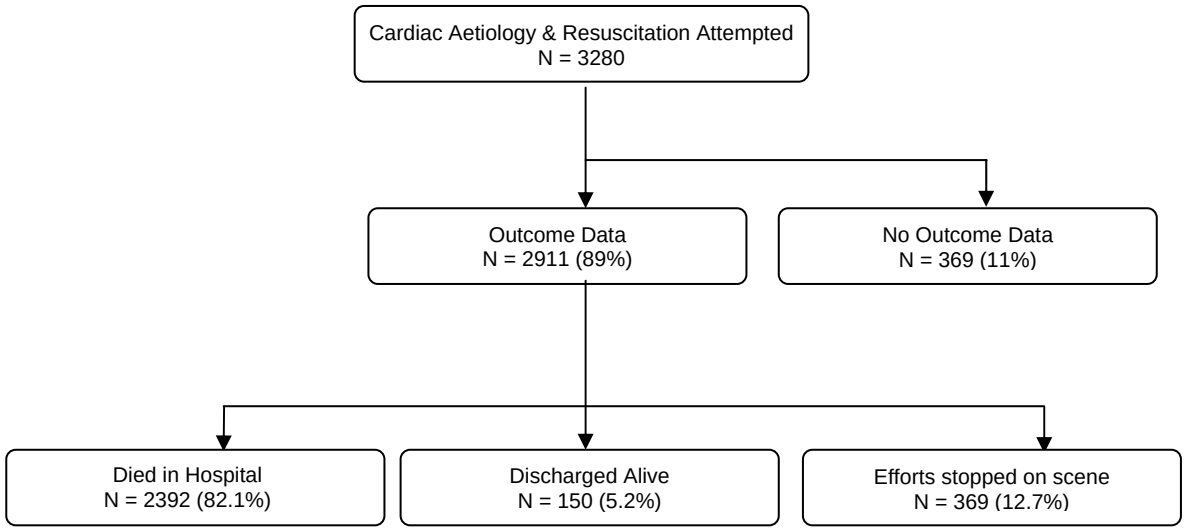


Utstein Survival Rate: (61/386) = 15.8%

[1] *Cummins RO, Chamberlain DA, Abramson NS et al. Recommended Guidelines for Uniform Reporting of Data from Out-Of-Hospital Cardiac Arrest: The Utstein Style. Annals of Emergency Medicine, 1991; 20: 861-873.*

Overall Survival Rate

The overall survival rate is based on all patients who had resuscitation commenced by the LAS following an out-of-hospital cardiac arrest of a presumed cardiac cause. The overall survival rate for 2006/07 was 5.2%.



Overall Survival Rate: (150/2911) = 5.2%

Conclusion

The LAS's Utstein cardiac arrest survival rate has increased four-fold over the previous seven years (from 4.2% in 1999), and improved by almost 5% in the last year alone. This means that three in every twenty people we resuscitate following a bystander witnessed cardiac arrest (with an initial rhythm of VF) are leaving hospital alive. Interestingly, the overall survival rate has not significantly changed from last year (5.3% in 2005/06). This suggests that the factors contributing to our survival improvement are largely impacting upon patients who present with an arrest rhythm of VF/VT following a bystander witnessed arrest of a cardiac-related cause.

Two factors known to influence survival are bystander intervention (CPR) and a witnessed collapse. However, compared to the previous year's cardiac arrest annual report, both the rates of bystander CPR and the numbers of witnessed arrests have decreased (39% vs. 35% and 46% vs. 44% respectively). An initial arrest rhythm of VF/VT is also known to be associated with a better chance of survival. However, the number of patients in VF/VT on arrival of our crews was also seen to decrease during 2006/07 to 24%, down from 27% in 2005/06. These findings suggest that the observed Utstein survival increase of almost 5% since last year is largely being influenced by additional, alternative factors. So, what has improved since last year and is likely to have contributed to the enhanced survival rate?

Firstly, we arrived at our cardiac arrest patients more quickly - an average of one minute faster than in 2005/06. The impact of public access defibrillation has also increased - survival rates for patients defibrillated prior to the arrival of the LAS by someone trained as part of the LAS's Community Defibrillation Programme have risen by 7% - from 38% in 2005/06 to 45% in 2006/07. In addition to this, just prior to the start of the 2006/07 period, updated resuscitation guidelines were rolled out across the Service and all crews received associated resuscitation training. Furthermore, we have seen better quality chest compressions being delivered by our crews over the past year. Improvements in the level of PRF documentation and FR2 data card submissions across the Service have enabled us to capture more robust data on our cardiac arrest patients and find out what happened to them. This is further enhanced by the continued co-operation of our receiving A&E hospitals in providing us with patient outcomes. Finally, the LAS has a number of cardiac research projects currently underway at many Complexes and at the Emergency Operations Centre, and preliminary analysis suggests that these are having a positive impact on survival.