Drug Abuse Paradox Seen in Out-of-Hospital Cardiac Arrest Data

Alexandra Maryashina[1], Amanda Broderick[1] and Jordan Williams[1]
James Wu, MD[1,2]

[1]Department of Surgery, Division of Cardiothoracic Surgery, Lehigh Valley Health Network
[2]Research Scholar Program Mentor

Abstract

This study aimed to determine OHCA baseline characteristics, cardiopulmonary resuscitation variables and survival-to-discharge rates for drug abusers and then compare them to those for patients without drug abuse disorders. It was a retrospective study involving 250 patients aged 18 to 70 years treated for OHCA of non-traumatic origin at the Lehigh Valley Health Network between January 2012 and May 2015. Although more drug abusers presented with unwitnessed OHCA and PEA/asystole initial rhythms, their survival-to-discharge rate was higher than that of non-drug abusers. This difference in outcomes between drug abusers and non-drug abusers may be due to a shorter CPR duration, a younger average age and lower rates of prior cardiac history among drug abusers. This study warrants further research into implementing more aggressive treatments for OHCA patients with drug abuse disorder at the Lehigh Valley Health Network.

Introduction

Out-of-hospital cardiac arrest (OHCA) is the largest cause of natural death in the U.S[1]. It is responsible for more than 350,000 deaths in the country per year — about one every minute, and many of the affected individuals are in their productive years[2]. As a result, OHCA remains a major public health burden. Despite numerous important improvements in cardiopulmonary resuscitation (CPR) over the past decades, survival-to-discharge rates after OHCA remain low, and are often reported to be between 5% and 10%[3-4]. Many factors including age, initial cardiac rhythm, duration of resuscitation, the time interval from collapse to resuscitation, and cause of the arrest may be related to the outcome[3].

Illicit drug use is often considered in defining cardiac arrest risk[5]. However, limited research has been undertaken to examine the baseline characteristics and cardiopulmonary resuscitation variables for drug abusers with OHCA. We therefore wished to determine OHCA baseline characteristics and cardiopulmonary resuscitation variables for drug abusers and compare them to those for patients without drug abuse disorders. To accomplish this, we conducted a retrospective chart review of patients who presented at the Lehigh Valley Health Network from January 2012 to May 2015 with OHCA. We also compared survival-to-discharge rates after OHCA for drug abusers and non-drug abusers. This analysis can highlight areas of potential improvements in quality of patient care at the Lehigh Valley Health Network.

Methods

This was a retrospective study involving 250 patients aged 18 to 70 years treated for OHCA at the Lehigh Valley Health Network between January 2012 and May 2015. This study was approved by the Lehigh Valley Health Network Institutional Review Board.

Patients with OHCA were eligible for the study if the following criteria were met: (a) aged 18–70 years; (b) non-traumatic origin of the arrest; (c) arrest in the absence of a written do-not-resuscitate (DNR) order.

All OHCA patients were identified from preexisting cardiac arrest database at the Lehigh Valley Health Network, which contained date of the cardiac arrest, patients' age, gender and arrest outcomes data. Missing clinical and demographic data were obtained by reviewing individual electronic medical records and cardiopulmonary

resuscitation protocols. We abstracted the following information from patient charts: demographics, prior medical history, social history, prior surgeries, cause of the cardiac arrest, whether the arrest was witnessed or not, initial cardiac rhythm, whether there was a return of spontaneous circulation (ROSC) for greater than 20 minutes or not, and a total CPR duration, which was calculated by the summation of pre-hospital CPR and in-hospital CPR durations. In addition, we reviewed admission notes for prior history of drug abuse disorders and positive urine drug screen (UDS) indicating higher likelihood of active drug abuse. Prior medical history obtained from individual electronic medical records included preexisting hypertension, hyperlipidemia, coronary artery disease (CAD), chronic obstructive pulmonary disease (COPD), prior myocardial infarctions, diabetes mellitus, obesity and prior cerebrovascular accidents. We calculated body mass index (BMI) from height and weight data obtained from the admission notes. Ultimately, all the data were entered into the database (Microsoft Excel) to compile and condense relevant information for each patient in our study. All included patients were used for each analysis.

Results and Discussion

Of the 250 OHCA patients that were eligible for the study only 28 (11%) survived at least 30 days following their arrest. Of the 50 drug abusers 6 survived (12%), while of the 200 non-drug abusers 22 survived (11%). Thus, the survival-to-discharge rate for drug abusers was higher than that for non-drug abusers.

The difference in outcomes between the two sets of patients may be due to a shorter CPR duration, a younger average age and lower rates of prior cardiac history among drug abusers. Indeed, the average age of drug abusers was 42 years, while the average age of non-drug abusers was 58 years. Previous studies have reported that the survival-to-discharge rate decreases when CPR duration exceeds 10–15 min[6]. Our results show that 11% of drug abusers underwent CPR for less than 15 minutes. In contrast, only 6% of non-drug abusers underwent CPR for less than 15 minutes. Moreover, 36% of drug abusers underwent CPR for more than 45 minutes, while among non-drug abusers this proportion was 46%.

Analysis of prior medical history has shown that on average drug abusers were healthier. Only 29% of drug abusers had had preexisting cardiac diseases before OHCA, while among non-drug abusers 49% had had preexisting cardiac diseases. Specifically, 21% of non-drug abusers had had previously experienced a myocardial infarction, while only 10% of drug abusers had had experienced it. 39% of non-drug abusers and only 15% of drug abusers had had a prior history of coronary artery disease (CAD). 75% of non-drug abusers and 40% of drug abusers had had a prior history of hypertension. 38% of non-drug abusers and 21% of drug abusers had had a prior history of hyperlipidemia. Ultimately, 15% of non-drug abusers and only 8% of drug abusers had had a prior history of chronic obstructive pulmonary disease (COPD). Only 10% of drug abusers had had previously undergone cardiac surgeries, and, in contrast, 30% of non-drug abusers had had previously undergone cardiac surgeries. Moreover, less drug abusers had diabetes mellitus (21%) than non-drug abusers (41%) and less drug abusers had had previously experienced cerebrovascular accident (CVA) (4%) than non-drug abusers (12%). Finally, less drug abusers were obese at admission (47%) than non-drug abusers (61%).

Gender ratios were found to be similar among drug abusers (68% of males) and non-drug abusers (66% of males) and gender did not seem to correlate with survival-to-discharge rates.

In previous studies the initial rhythm at arrest was consistently reported as an important factor for survival. Specifically, ventricular fibrillation (V-fib) and ventricular tachycardia (V-tach) as the initial cardiac rhythms were often associated with higher survival-to-discharge rates[7]. In our study the rate of pulseless electrical activity (PEA) as the initial cardiac rhythm at arrest between drug abusers and non-drug abusers was found to be similar (26% for both sets of patients). However, there was a significant difference in the rates of asystole and ventricular fibrillation (V-fib) or ventricular tachycardia (V-tach) as the initial cardiac rhythms at arrest between drug abusers and non-drug

abusers. More non-drug abusers (30%) than drug abusers (16%) had ventricular fibrillation (V-fib) or ventricular tachycardia (V-tach) as the initial cardiac rhythm.

In addition, non-drug abusers were less likely to have unwitnessed cardiac arrest (29%) than drug abusers (58%).

Conclusion

Although more drug abusers presented with unwitnessed OHCA and PEA/asystole initial rhythms, their survival-to-discharge rate was higher than that of non-drug abusers. This difference in survival-to-discharge rates between drug abusers and non-drug abusers may be due to a shorter CPR duration, a younger average age and lower rates of prior cardiac history among drug abusers. Introducing more aggressive treatments such as extracorporeal membrane oxygenation (ECMO) in the Lehigh Valley Health Network for patients with drug abuse history may be a promising way to increase the overall survival to discharge rates for OHCA.

The study has several data limitations. This report is a single center experience and the number of patients is relatively small. Nevertheless, the results of the study indicate that further research on more aggressive treatments for OHCA patients with drug abuse disorder is warranted.

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