2015 Cardiac Arrest

A STATISTICAL ANALYSIS OF CARDIAC ARREST IN THE MCLEAN COUNTY AREA EMS SYSTEM

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Methods of Analysis

Utilizing NEMSIS 2.2.4 reported data as reported to the Illinois Department of Public Health for calendar year 2015 the EMS System utilized Microsoft Excel to pull various statistics and demographics as they related to cardiac arrest.

Patient records were included in the analysis if the selection by the EMS provider in response to the question of cardiac arrest was “yes prior to EMS arrival”. Patients who went into cardiac arrest after an EMS provider was on scene was excluded from the sample.

Limitations of Data

In numerous areas of interest there was a lack of data input by EMS providers. In other cases, there was a value of not applicable, not available, or not recorded selected. This is large in part due to the lack of choices available for some data points. This is an issue that should be addressed in the new NEMSIS dataset that will be released and hopefully implemented by all EMS affiliates in calendar year 2017. Data for calendar year 2016 should be available sometime in early 2017 as the dataset which is utilized by the EMS system for this analysis is not available until the year has closed.

Geographical Area Covered

The majority of deidentified patient records come from the City of Bloomington and the Town of Normal. There are other geographical areas involved with some being outside McLean County as the EMS system is responsible for agencies spanning Mclean, Tazwell, Woodford, Dewitt, and Putnam counties. As Bloomington and Normal are the heaviest utilizers of EMS services it was not feasible nor beneficial to provide a geographical breakdown as the values for all other localities would be statistically insignificant at this time and therefore a system wide analysis was selected. A list of all agencies represented are listed in appendix A

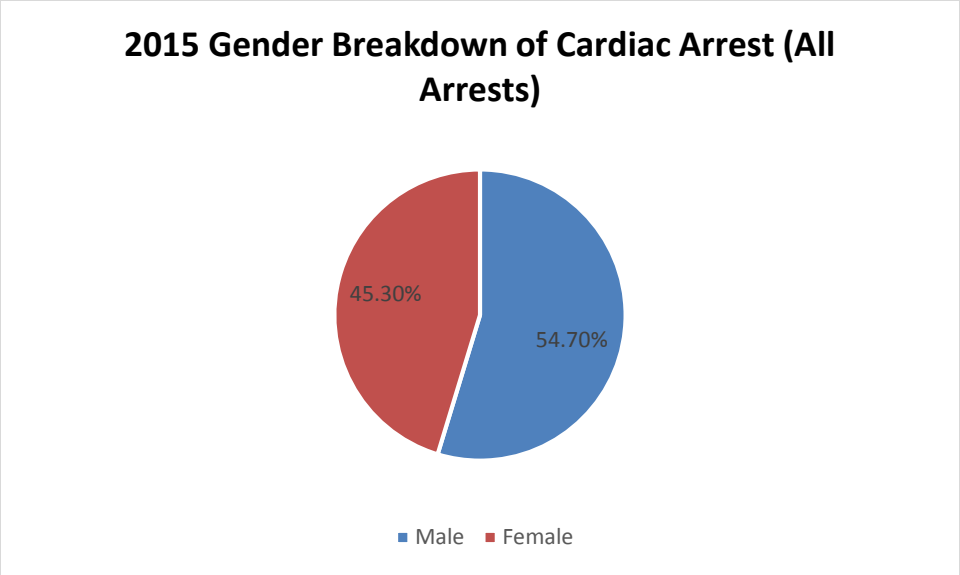
Basic Information

Number of cardiac arrests prior to EMS arrival for 2015: **117**

Number of cardiac arrests that occurred prior to EMS arrival and were documented as being witnessed by a bystander**: 22**

Demographics

In reviewing the gender break down of pre-hospital cardiac arrest it appears that there is a gender disproportion of males who are afflicted with out of hospital cardiac arrest. Graph 1.1 delineates the gender breakdown pertaining to out of hospital cardiac arrest.



Graph 1.1 Gender Breakdown of Cardiac Arrest

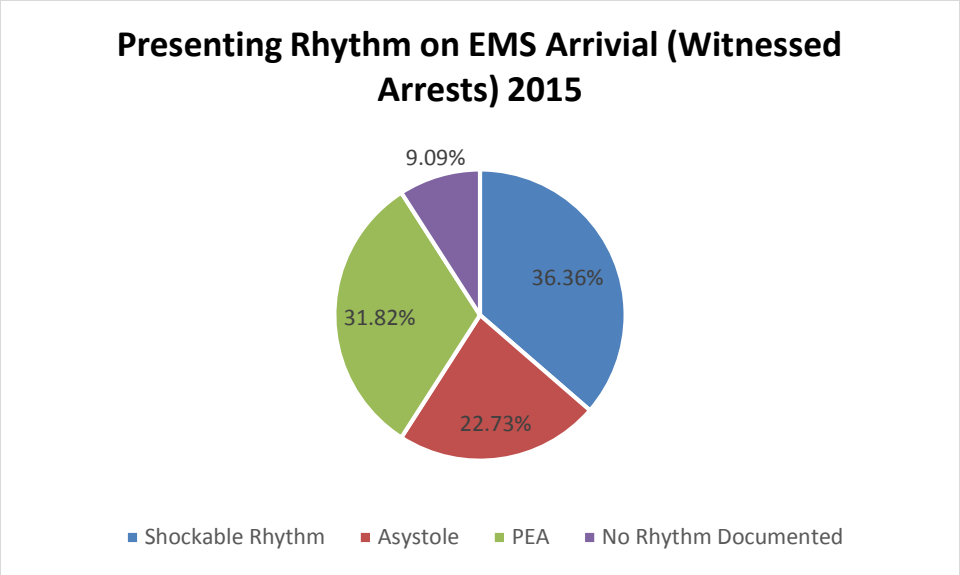
In regards to age the age of out of hospital cardiac arrest victims the table below shows the statistical break down in regards to age.

Statistical Descriptor	Applicable Age
Average Age of Cardiac Arrest	63 Years
90th Percentile Age of Cardiac Arrest	87 Years
50th Percentile Age of Cardiac Arrest	65 Years
25th Percentile Age of Cardiac Arrest	52 Years
10th Percentile Age of Cardiac Arrest	36 Years
Minimum Age of Cardiac Arrest	3 Years
Maximum Age of Cardiac Arrest	98 Years

Table 1.1 Age of Out of Hospital Cardiac Arrest

Presenting Cardiac Rhythm

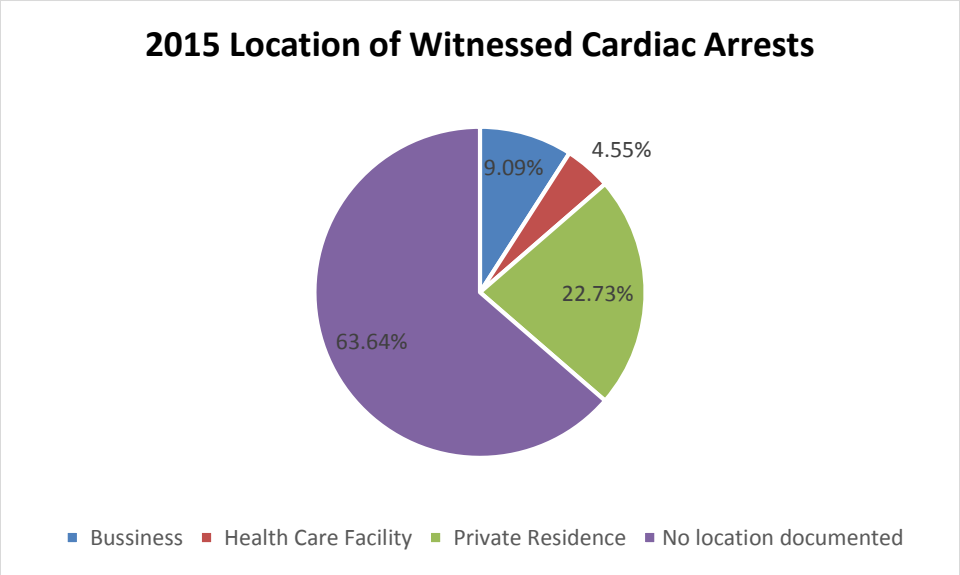
It is well known and documented that the patients initial presenting cardiac rhythm is one of the key indicators of survival. Early defibrillation of shockable rhythms is key. With each passing minute the likelihood of survival plummets. That is why public access defibrillation programs such as those championed by the Illinois Heart and Lung Foundation are so crucial. The below graph 1.2 shows the initial presenting rhythm that EMS providers encountered upon their arrival to the scene for witnessed cardiac arrests. For ease of data tabulation ventricular fibrillation and ventricular tachycardia were combined into one category “shockable rhythm” This allowed us to incorporate BLS AED information where BLS providers do not have the skills or training to interpret cardiac rhythms rather they rely on the AED to make the determination of shockable vs non shockable. Initial cardiac rhythm for unwitnessed arrests have not been calculated. Though if that is something that might be valuable it can certainly be accomplished.



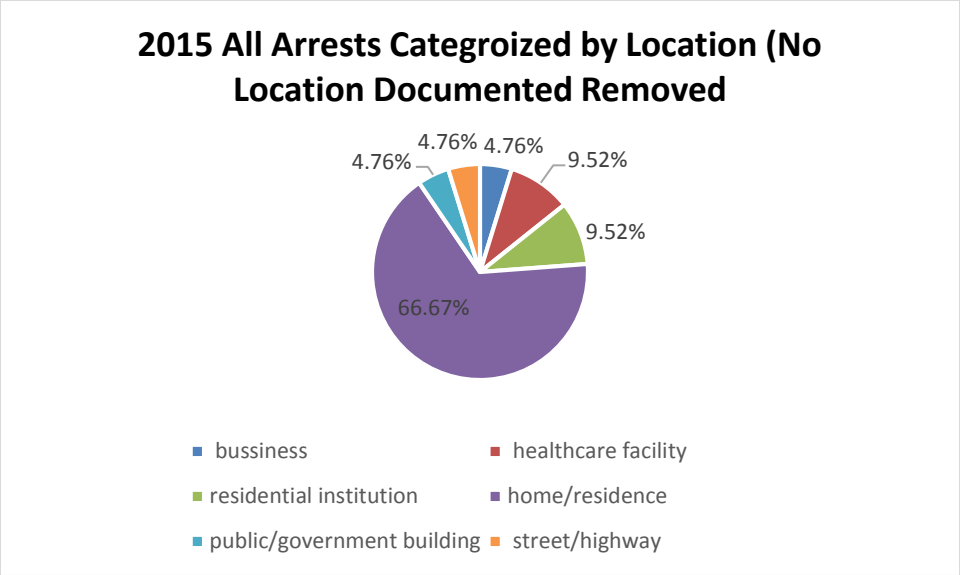
Graph 2.1 Initial Rhythm of Witnessed Cardiac Arrests

Location of Cardiac Arrests

Unfortunately, this is one area where the tabulated data is incomplete largely due to the limitations that were outlined in the limitations section of this document. The reviewers have taken as many steps as possible to make the graphs below statistically significant while maintaining data validity and reliability. From review of the data it is apparent that the majority of out of hospital cardiac arrest occurs in the home or a private residence. This is problematic as often times theses arrests are unwitnessed and by the time that they are discovered the time of viability for treatment has passed.



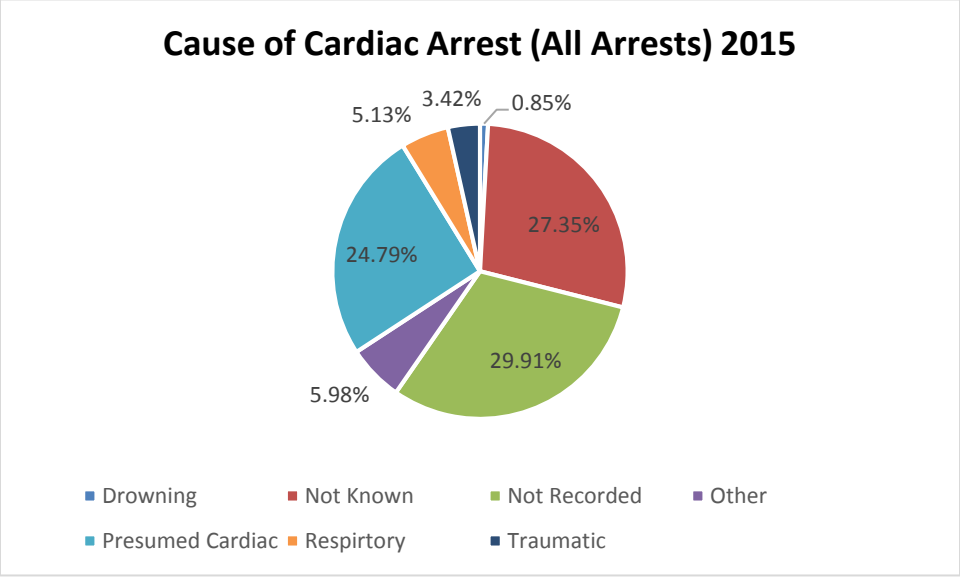
Graph 3.1 Location of Witnessed Cardiac Arrest



Graph 4.1 2015 All Arrests by Location

Presumed Cause of Cardiac Arrest

Once again there is a large section of data that is mission or incomplete. However, the below graph does provide for some perspective as to the proportionate causes of cardiac arrest in the out of hospital environment.



Graph 5.1 2015 All Arrests by Presumed Cause

With the growing opioid epidemic there has been an interest taken lately in identifying whether there were drug or alcohol indicators present on scenes of cardiac arrest. For 2015 there were drug or alcohol indicators charted on EMS run reports only 2.56% of the time.

Bystander Involvement

It is clear that early bystander intervention of bystander CPR or defibrillation is crucial to the survival and recovery of any victim of out of hospital cardiac arrest. This is one are that our local community has area to improve. Efforts such as public availability of defibrillators, and community wide CPR training should continue this is a number that will continue to be evaluated. The EMS System will continue to encourage providers to document bystander involvement so that we can accurately capture this data.

Prior Aid	% of Arrests Performed
Bystander CPR	11.11%
Bystander AED Usage	3.42%

Table 2.1 Documented Bystander Intervention (All Arrests 2015)

Law Enforcement Involvement

With the introduction of AED's to law enforcement personnel there was a desire to review EMS reports for law enforcement involvement in out of hospital cardiac arrest. For 2015 there were two documented instance of officers performing CPR and two instances of an AED being utilized or at least present at patient side.

Outcome Information

This is one area that the EMS System is trying to make strides in identification of. Unfortunately, with so many different documentation software's in both the pre-hospital and hospital environment there is no current cost efficient way to be able to link the two. All data correlation for final outcome has to be done by hand. The only meaningful outcome information that is currently automated in the EMS reporting process is the ROSC rate for victims of cardiac arrest. Currently and for the 2015 data the EMS System defined ROSC as the meaningful return of a palpable pulse for greater than 30 seconds.

% of Witnessed Cardiac Arrests Achieving ROSC	**31.82%**
% of All Cardiac Arrests Achieving ROSC	**16.24%**

Table 3.1 2015 EMS ROSC Rates

Appendix A

Agencies with Data Represented

- **Putnam County EMS (McNabb, IL)**
- **El Paso Emergency Squad**
- **Congerville Fire Department**
- **Minier Rescue Squad**
- **Mackinaw Rescue Squad**
- **Armington Fire Department**
- **Hopedale Rescue Squad**
- **Normal Fire Department**
- **Carlock Fire Department**
- **Dewitt County EMS**
- **Bloomington Fire Department**
- **Heyworth Ambulance**
- **Lexington Ambulance**
- **Leroy Emergency Ambulance Service**
- **Downs Fire Department**
- **Allin Township Fire (Stanford)**
- **Danvers Fire Department**
- **Eastern McLean County Ambulance Association (Colfax)**
- **Mt. Hope Funks Grove (McLean)**
- **Bloomington Township Fire**
- **Dale Township Fire Protection (Covell)**
- **Hudson Community Fire Protection District**