# Cardiac Arrest Outcomes at Ascension Genesys Hospital

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## Introduction

National data from 2014-2017 showed that the national average of mortality rate for a patient who experienced a cardiac arrest and underwent resuscitation was 75.2%. The national rate for return of spontaneous circulation (ROSC) following an arrest from 2014-2017 was 72%. Current ACLS guidelines do not recommend the use of Sodium Bicarbonate, Calcium Chloride, or Magnesium Sulfate in the resuscitative efforts when someone experiences a cardiac arrest because they have not definitively proven to improve overall survival after cardiac arrest.[1]

There is some support in the literature for the use of these non-recommended medications to help treat the reversible causes of arrest.[2-5] There have been numerous studies looking at the efficacy of these medications in obtaining ROSC and overall mortality rate.[6-9] However, there is no clear consensus as differing results were found, and the studies were retrospective in nature with small sample sizes.

The overall goal of this research was to determine if the rates of ROSC and mortality at Ascension Genesys Hospital differ from the national average, and to see if our use of sodium bicarbonate, calcium chloride, or magnesium sulfate significantly positive or negatively impacts our rates.

## Hypothesis

Ascension Genesys Hospital will have slightly better ROSC and mortality rates than the national average, but there will not be any significant difference based on the use of non-ACLS medications.

## Methods

The study population included patients 18 years and older of all ethnic backgrounds and both genders who had a cardiac arrest at Ascension Genesys Hospital between 1/1/2018 and 12/31/2019 (a 2 year period). Cardiothoracic surgery patients were excluded because the Code Blue is typically run by the cardiothoracic surgeon and not by the residency programs or house staff, and may reflect different patterns of intervention.

Data for all those with a Code Blue order set ordered or an ICD 10 code of cardiac arrest (I46.9) in the hospital EMR was obtained from the IT department. All of this information was then verified with the code blue sheets housed in the quality department. Those sheets were also used to identify patients that were missed from the data collection and their demographic information added to the spreadsheet. Review of “Code Blue Notes” within the EMR were used to help fill in incomplete data from the code blue sheets. There were a small number of instances where some data points were not able to be found using either the code blue sheets or the general miscellaneous notes.

## Results

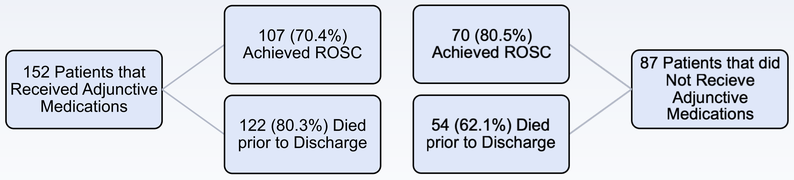
Of the 310 total arrests, ROSC was achieved 224 (72.3%) times. Of the 310 total arrests, death prior to discharge was observed 75.5% (n=234) times.

Of the 239 unique patients, 177 (74.1%) achieved ROSC. There were 176 (73.6%) patients who died prior to discharge. Overall, 63 patients (26.4%) survived and were discharged from the hospital.

There were 107 (70.4%) patients that achieved ROSC out of the 152 that received adjunctive medications. There were 70 (80.5%) patients that achieved ROSC out of the 87 patients who were not administered meds. There is a difference that is approaching significance between ROSC achieved and whether or not the patient received adjunct medications (p=0.09).

There were 122 (80.3% of 176 total patients that died prior to discharge) patients who received meds and died prior to discharge. There were 54 (62.1% of 176 total patients that died prior to discharge) patients who did not receive meds and died prior to discharge. There is a significant association between administration of adjunctive meds and death prior to discharge (p=0.002).

| | Total Patients | Received any Adjunctive Med | Received Mg | Received Ca | Received HCO3 | ROSC |
|---|---|---|---|---|---|---|
| 1st Arrest | 239 (100%) | 152 (63.6%) | 78 (32.6%) | 84 (35.1%) | 129 (54%) | 177 (74.1%) |
| 2nd Arrest | 44 (18.4%) | 26 (59.1%) | 9 (20.5%) | 14 (31.8%) | 23 (52.3%) | 31 (70.5%) |
| 3rd Arrest | 21 (8.8%) | 11 (52.4%) | 7 (33.3%) | 6 (28.6%) | 8 (38.1%) | 13 (61.9%) |
| 4th Arrest | 6 (2.5%) | 2 (33.3%) | 0 (0%) | 1 (16.7%) | 2 (33.3%) | 3 (50.0%) |
| 5th Arrest | 1 (0.4%) | 1 (100%) | 1 (100%) | 1 (100%) | 1 (100%) | 1 (100%) |




## Discussion

Comparing the percentages, while although very slightly better, showed no significant difference. At Ascension Genesys the mortality rate over a 2-year period was 73.6%, compared to 75.2% for the national average from 2014-2017. In those same time periods, the rate of ROSC in any given cardiac arrest at Genesys was 72.3%, compared to the national average of 72%. This means that while ROSC is being achieved the majority of the time from the resuscitative efforts of the code team, most of those patients end up passing away before being discharged during that admission.

There is a difference approaching significance between ROSC achieved and whether or not the patient received adjunct medications. There is a significant association between administration of adjunctive meds and death prior to discharge. Important variables that were not accounted for in this study were the type of arrest and length of the arrest. There were several arrests that presented as pulseless ventricular tachycardia, and at first pulse check (2 mins), the patient received unsynchronized cardioversion and immediately ROSC was achieved. For arrests like these there is not much time to give the standard ACLS medications, let alone the adjunctive medications that were studied.

If the standard medications in the ACLS algorithm are not providing any benefit and the patient is going to be pronounced soon, many physicians will give whatever medications they think may be beneficial (trying to treat the reversible causes of an arrest) as a last-ditch effort to try and save the patient. Therefore, this very well could affect the rates of ROSC for patients who receive these adjunctive medications since they are used when a patient is close to death already. Many patients who have persistent absence of a pulse during resuscitative efforts are less likely to have ROSC and therefore less likely to survive.[10-11] So, by giving these adjunctive medications to patients with prolonged arrests, who are already unlikely to survive, very well could alter the significance of the results.

## Conclusion

While there is likely a significant association between giving these adjunctive medications and rates of ROSC and mortality, whether or not this association is causative remains to be seen. Further studies on this topic would need to account for these variables to determine if their impact is causative on the rates of ROSC and mortality or just an association seen with prolonged arrests that already have low survival rates.

## References