The High Cost of Death after Acute Myocardial Infarctions: Results from a National US Hospital Database

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Introduction

- An estimated 605,000 acute myocardial infarctions (AMI) occur each year. [1]
- Prior research has found healthcare resource use substantially increased when death occurs. [2,3]
- However, there is little research quantifying the difference in the cost of an AMI hospitalization that results in death versus survival.
- The objective of the study was to describe the differences in costs and length of stay (LOS) among patients hospitalized with AMI, comparing those who survived versus died.

Methods

- Data were obtained from the 2019 Agency for Healthcare Quality and Research (AHRQ) Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS).
- All emergent admissions with a principal diagnosis of AMI were included in the analysis. AMI was defined using International Classification of Diseases, 10th Revision (ICD-10) codes.
- Patients were stratified based on their discharge status (survived or died).
- The primary outcomes of interest were total hospitalization cost and length of stay (LOS).
- Mann-Whitney U and Chi-square tests were used to assess differences in continuous and categorical data, respectively.
- Propensity matching without replacement was used, and an exact match for age, sex, race, and cardiogenic shock were used to control for patient differences between the survived and died cohorts.
- GLM models with a gamma distribution and log link were used to estimate the associations between the survived and died cohorts using patient characteristics that remained statistically significant after matching for the primary outcomes.
- Sub-analyses performed for diabetic and obese populations.

Table 1. Patient Characteristics and Outcomes

	Propensity Matched Population				
	Survived		Died		P Value
Population	4,559	100%	4,559	100%	
Age	73.70	12.00	73.70	12.00	1.000
Female	1,879	41.22%	1,879	41.22%	1.000
Race / Ethnicity					
White	3,375	74.03%	3,375	74.03%	
Black	434	9.52%	434	9.52%	
Hispanic	396	8.69%	396	8.69%	
Asian or Pacific Islander	175	3.84%	175	3.84%	
Native American	30	0.66%	30	0.66%	
Other	149	3.27%	149	3.27%	1.000
Payer					
Medicare	3,259	71.48 %	3,357	73.63%	
Medicaid	289	6.34 %	272	5.97%	
Private	751	16.47%	646	14.17%	
Self-Pay	98	2.15%	168	3.69%	
Other	124	2.72%	114	2.50%	<0.001
Cardiogenic Shock	334	7.33%	334	7.33%	1.000
Comorbid Conditions					
COPD	1026	23.50%	1106	24.26%	0.051
Diabetes w/ Complications	1179	25.86%	1509	33.10%	<0.001
Diabetes w/ No Complications	683	14.98%	472	10.35%	<0.001
Drug Abuse	74	1.62%	83	1.82%	0.520
Hypertension, Complicated	2,210	48.48%	2,741	60.12%	<0.001
Hypertension, Uncomplicated	1,617	35.47%	868	19.04%	<0.001
Hypothyroidism	640	14.04 %	579	12.70%	0.061
Obesity	757	16.60%	696	15.27%	0.081
Peripheral Artery Disease	547	12.00%	739	16.21%	<0.001
Outcomes					
Total Cost of Visit	$25,266	$27,973	$37,634	$49,909	<0.001
Length of Stay, days	4.92	6.15	5.26	7.81	<0.001

Results

- In 2019, there were 112,772 AMI hospitalizations (unweighted) and 4,755 (4.2%) died.
- Table 1 provides the patient characteristics for the propensity matched population.
  - Those that died had a higher overall cost of $12,368; p <0.001 and LOS 0.68 days; p <0.001 compared to those that survived.
- Contact the author for the patient characteristics for the obese and diabetic populations.

Figure 1. Results of AMI Cost Models

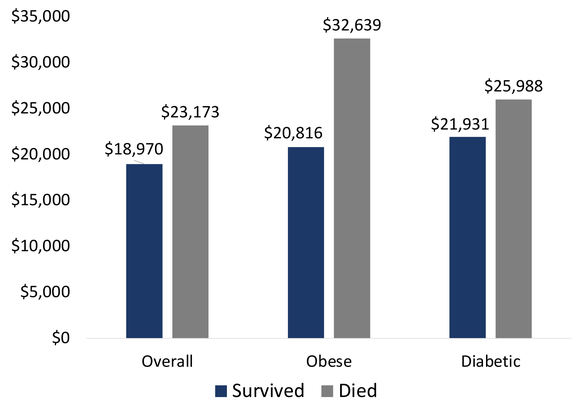
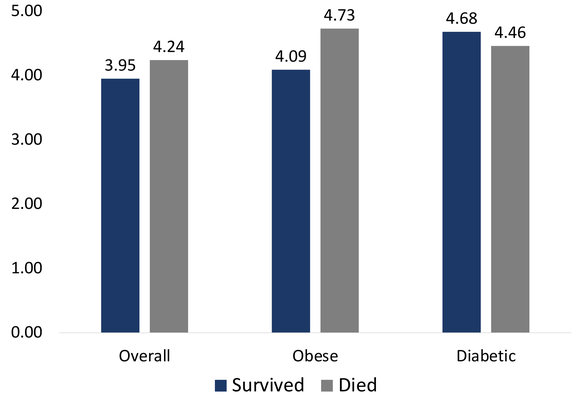


Figure 2. Results of AMI Length of Stay Models



Results (cont.)

- Figure 1 provides the results of the GLM regression models.
  - Those that died had a higher overall cost of $4,203; p <0.001 compared to those that survived.
  - Obese patients that died had a higher overall cost of $11,823; p <0.001 compared to those that survived.
  - Diabetic patients that died had a higher overall cost of $4,057; p <0.001 compared to those that survived.
- Figure 2 provides the results of the GLM regression models.
  - Those that died had a higher overall LOS of 0.29 days; p <0.001 compared to those that survived.
  - Obese patients that died had a higher overall LOS of 0.64 days; p <0.001 compared to those that survived.
  - Diabetic patients that died had a lower overall LOS of -0.22 days; p <0.001 compared to those that survived.
- We estimated (using NIS weights) that the total cost of dying in the hospital is $100 million more than surviving, and those who died incurred more than 6,900 additional days in the hospital.

Conclusion

- Our results quantified the difference in resource utilization in emergent AMI patients who died.
- The results suggests that economic evaluations of cardiovascular interventions that do not include the cost of dying may underestimate the benefits of the intervention.

References

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