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Trends and Disparities in Palliative Care Encounters in Acute Heart Failure Admissions; Insight From National Inpatient Sample

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Abstract

Heart failure is a leading cause of readmissions in the United States, although treatment has come along away, palliative care is often not appropriately offered in advanced heart failure. The purpose of this study was to use a large database of national in-patient sample to find out the use of palliative care in acute heart failure admissions. Data from 2002 to 2017 was used for analysis. Simple linear regression was used for trend analysis over the years. Variables that were statistically significant in univariate analysis were used in single-step (entry method) multiple logistic analysis. The use of palliative care was found to be low at 4.1%, although recent trends have shown an increase (from 0.4% in 2002 to 6.2% in 2017). Women (0.3% in 2002 to 6.5% in 2017) and Caucasians (0.6% in 2002 to 6.9% in 2017) had a higher proportion of PC encounters as compared to men (0.5% in 2002 to 5.9% in 2017) and other racial minorities, increasing age (OR, 1.04[CI; 1.03–1.04], $p < 0.01$), female gender (OR, 1.03[CI; 1.02–1.03], $p < 0.01$), do not resuscitate status (OR, 10.62[CI; 10.53–10.70], $p < 0.01$), diabetes mellitus (OR, 1.10[CI; 1.01–1.11], $p < 0.01$), liver disease (OR, 1.63[CI; 1.60–1.66], $p < 0.01$), renal failure (OR, 1.40[CI; 1.39–1.41], $p < 0.01$), acute myocardial infarction (OR, 1.28[CI; 1.27–1.30], $p < 0.01$), and cardiogenic shock (OR, 2.89[CI; 2.84–2.93], $p < 0.01$) were associated with higher odds of having PC encounter. In conclusion, the use of palliative care has increased in the United States over the years, however, it is still low as compared to other high-income countries.

Keywords

Palliative care encounters; Acute heart failure; Racial disparities; National inpatient sample

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Declaration of competing interest

Author have no conflicts to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.carrev.2020.08.024.

1. Introduction

Heart failure (HF) affects almost 10% of the population above 75 years [1]. HF management has improved over the last three decades since numerous new trials have paved the way for better treatment strategies [1,2]. Patients with HF now live longer and hence, prevalence of HF has increased over the years [3]. Acute HF is the most common cause of readmission in adults over 65 years in high-income countries [4]. The burden of HF on our health system is going to increase going further [4,5]. Traditionally, associated with oncology patients, PC is appropriate for any end stage disease including advance HF. Therefore, in patients with end-stage diseases like advanced HF with limited treatment options, there has been a renewed focus on the quality of life through integrated palliative care (PC) that can address the psychological and physical discomfort of advanced heart failure. PC encounter is the first step towards progression to PC [6[. Previous studies have shown that PC utilization is low despite the increase in population of end stage HF [7,8]. Contemporary data on PC access is still lacking despite a recent increase in advanced HF patients and a renewed focus on PC. Racial and gender disparities in end of life care and hospice access has been previously identified [9], however, to what extent do such disparities exist in HF is not known. No prior studies exist on racial disparities in access to PC in hospital admissions due acute HF. In this study we have focused on recent trends in PC encounters in patients admitted with acute decompensated heart failure to hospitals in united states using a nationally representative data. We have also focused on disparities with respect to gender and race in PC encounters and finally we have looked at association between demographic variables, surrogates for intensive care, co-morbid conditions and PC encounters in patients admitted for acute HF.

2. Methods

2.1 Study data

The national Inpatient Sample (NIS) from 2002 to 2017 was used for data analysis. The NIS is a Federal-State-Industry partnership sponsored by the Agency for Healthcare Research and Quality (AHRQ). The NIS is derived from all States for national estimates of healthcare utilization, costs, and outcome [10]. As NIS is compiled annually; the data can be used for the analysis of trends over time. Our study did not require Institutional Review Board approval or informed consent given the de-identified nature of the NIS database.

2.2 Study design and data selection

NIS data from January 2002 to December 2017 was analyzed using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) and ICD-10 codes. Patients under 18 years were excluded. Inclusion criteria included patients with acute HF (428.21, 428.31, 428.41 & I50.21, I50.23, I50.31, I50.33, I50.41, I50.43) in any diagnosis code. The use of PC encounter was determined by using all diagnostic field for relevant codes (V66.7 and Z51.5). These diagnostic codes have high specificity (98%) and positive predicted value (98%) in identifying PC encounters [7,11]. Discharge weight provided was used for analysis after 2011 and trend weight provided was used for analysis before 2012.

2.3 Study endpoints

Primary endpoints for study were predictors of palliative encounters and trends in utilization of palliative encounters with emphasis on gender, racial and, ethnic disparities in palliative care encounters.

2.4 Statistical analysis

For univariable analysis, descriptive statistics were presented as frequencies with percentages for categorical variables and as means with standard deviations for continuous variables.

Baseline characteristics were compared using a Pearson chi square test and independent samples *t*-test for continuous variables. Trend analysis over the years was done. Simple linear regression (linear trend model) was used to predict trends over the years. Pairwise deletion was done to address the missing data in certain variables. Significant missing data was present in race, insurance payee, income and cost (>5%).

Multivariable analysis was done by constructing a binary logistic regression model for predictors of PC encounter using variables in Table 1. All statistical analyses were performed using Statistical Package for Social Science (SPSS) version 26 (IBM Corp.).

3. Results

A total of 13,894,004 discharge encounters were recorded from 2002 to 2017. Out of these, 571,310 (4.1%) had a PC encounter. The median age was 75 years (interquartile range [IQR, 64–84]). The median age for discharges with PC encounters was higher than those without (75 years [IQR, 63–84] vs 82 years [IQR, 73–88]). Discharges with PC encounters had a greater proportion of patients ≥85 (41.2% vs 22.6%). Discharges with PC encounters had higher mortality (38.4% vs 3.5%) though mortality was substantially high even in discharges without PC encounters as well. Demographic and other baseline characters are given in Table 1.

Discharges with PC encounters were more likely to be discharged to a nursing home as compared to those without (54.3% vs 29.3%) and less likely to be discharged home (45.7% vs 70.7%). Do not resuscitate (DNR) status was more often found in discharges with PC encounters as compared to those without one (54.2% vs 7.4%). Most of the comorbidities like anemia, chronic obstructive pulmonary disease (COPD), coagulopathy, pulmonary circulation disorders, renal failure were more common in discharges with a PC encounters as compared to those without a PC encounter.

On multivariable analysis increasing age (OR, 1.036 [95% CI, 1.035–1.037], $p < 0.01$), female gender (OR, 1.026 [95% CI, 1.019–1.034], $p < 0.01$), DNR status (OR, 10.615 [95% CI, 10.530–10.700], $p < 0.01$), COPD (OR, 1.099 [95% CI, 1.09–1.107], $p < 0.01$), diabetes mellitus(OR, 1.100 [95% CI, 1.089–1.111], $p < 0.01$), liver disease (OR, 1.633 [95% CI, 1.604–1.663], $p < 0.01$), renal failure (OR, 1.403 [95% CI, 1.393–1.414], $p < 0.01$), weight loss (OR, 1.759 [95% CI, 1.741–1.777], $p < 0.01$) and cardiogenic shock (OR, 2.887 [95% CI, 2.836–2.938], $p < 0.01$) were associated with higher odds of having PC encounter (Table

1). Similarly, teaching hospital (OR, 2.003 [95% CI, 1.973–2.033], $p < 0.01$), larger size hospital (OR, 1.210 [95% CI, 1.197–1.223], $p < 0.01$), West census region (OR, 1.731 [95% CI, 1.711–1.753], $p < 0.01$) had higher odds of having a PC encounter. African Americans (OR, 0.866 [95% CI, 0.856–0.877], $p < 0.01$), Hispanics (OR, 0.831 [95% CI, 0.817–0.844], $p < 0.01$) and Asians (OR, 0.810 [95% CI, 0.789–0.832], $p < 0.01$) were less likely to have a PC encounter as compared to Caucasians.

Over the years the use of PC encounters has increased from 0.4% in 2002 to 6.2% in 2017 ($P < 0.01$) [Fig. 1]. The increase was seen in all races, both men and women. Women (0.3% in 2002 to 6.5% in 2017) and Caucasians (0.6% in 2002 to 6.9% in 2017) had a higher proportion of PC encounters as compared to men and other racial minorities (Fig. 2).

4. Discussion

Advanced HF is one of the leading terminal conditions in the United States. This study demonstrates that the use of PC is still very low at around 6.2% in 2017, although there is an increase recent trend (0.4% in 2002). Prevalence was low even for discharge encounters with high comorbidities. Belonging to racial and ethnic minority predict lower odds of having a PC encounter.

HF is the leading cause of readmission in elderly patients [1]. These readmissions have tremendous physical and psychological effects on patients. Acute HF hospitalizations provides a unique opportunity for physicians and the patients to reflect upon their current goals of care. PC availability provides this opportunity to the patient. Previously, Mandawat et al. [7] in a study in Veteran's Affairs Healthcare noticed there was increase in trends in PC encounters. Alqahtani et al. [8] using the same database as ours showed a similar small increase in uptake till 2014. Our cohort extends this till 2017 and shows a rapid increase from 2014 to 2017. This shows that recently there has been better availability of PC services. Only 61.6% of the patients who received PC encounters were discharged alive from the hospital. Patients who end up having a PC encounter had very high inpatient mortality pointing towards terminal condition [12]. Warraich et al. [13] from the HF Medicare patients registry showed a similar low hospice discharge rate, though the trend seems to be increasing. However, overall, the utilization of PC remains low as compared to other high-income countries. Studies outside the United States, especially in Scandinavian countries show a much higher trend of PC and end of life discussions. Pivodic, Lara et al. found Palliative care services offered to 29% of patients in the Netherlands, 39% in Italy, 45% in Spain, and 47% in Belgium [14,15].

There are many reasons for the low utilization of PC including reluctance by patients, families, and clinicians to accept that the patient is in the end-stage of illness [16,17]. Our study also showed that patients with DNR status, elderly, and having multiple comorbidities are more likely to have a PC encounters (Table 1). DNR status patients were ten times more likely to have a PC encounter, this may suggest hesitancy on part of physicians to address the goals of care, until the very end when the care is futile [6,18,19]. This would also explain the very high in-patient mortality rates in patients who end up having a PC encounter and escalation of care before the end of life discussion [20].

Patients' cultural, religious, and/or ethnic backgrounds may also play a role use of hospice services [21]. Ethnic and racial disparities in the use of palliative care are not well understood. Previously, studies have shown greater preference for life-sustaining therapies among African Americans and Hispanics compared to Caucasians [9,22]. While previous research for the reasons behind this are lacking, potential reasons could include organizational barriers like lack of communication skills, language barriers, interpreters, and education [23]. Research is needed to understand the disparities in palliative care.

Going forward, several avenues of improvement exist in the provision of PC encounters to patients with HF exacerbation admitted to the hospitals. Administrative barriers like delay hospice referrals needs to be addressed. Centers for Medicare and Medicaid Services (CMS) is the largest payer for hospice care. To access this end-of-life care benefit, CMS requires certification of a terminal prognosis by a patient's treating physician and a hospice medical director, which itself is limiting factor given the uncertainty in the estimation of survival in most patients [24,25]. Since 2012, several associations such as the American Academy of Hospice and Palliative Medicine, Hospice and Palliative Nurses Association have led the campaign “Choosing Wisely” to initiate greater discussion of hospice care in patients with terminal conditions requiring recurrent admissions and Intensive care [26]. The focus is on quality of life rather than unnecessary aggressive care. The federal government through the “Bipartisan Budget Act of 2018” allowed broader availability of hospice care by allowing physician assistants to provide independent hospice care where needed [27]. Availability of dedicated PC teams, skill enhancement among physicians, residents and specialty HF management teams have shown to improve delivery of PC, further improvements are needed in this area [28-31].

This study uses NIS which has several limitations. The NIS is an administrative claim-based database that uses ICD-9-CM and ICD-10-CM codes for diagnosis and reimbursement that may be subject to error. Validity studies for ICD-9-CM and ICD-10-CM codes are limited. One such study showed sensitivity of 84% (95% CI: 72–92) and specificity was 98% (95% CI: 86–99) for palliative care encounter [11]. NIS collects data on in-patient discharges and each admission is registered as an independent event. Readmissions cannot be tracked. NIS samples are not designed to follow patients longitudinally, so long-term outcomes could not be assessed from the present dataset.

In conclusion, recently there has been an increase trend in PC encounters in heart failure admissions, however, the use of PC is still low. Further prospective interventional studies might provide insight into tools to address low utilization of PC encounters.

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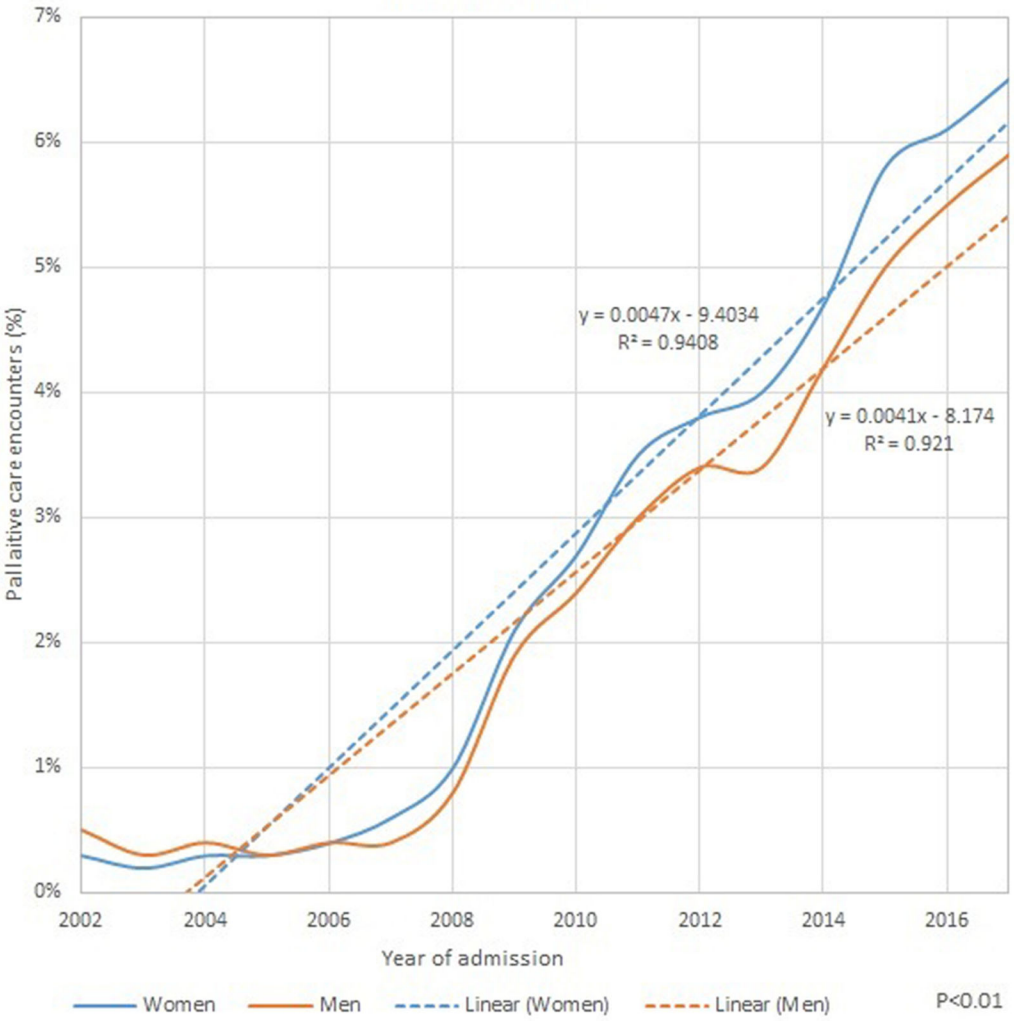

Fig. 1.
Gender trends in palliative care encounters in acute heart failure admissions.

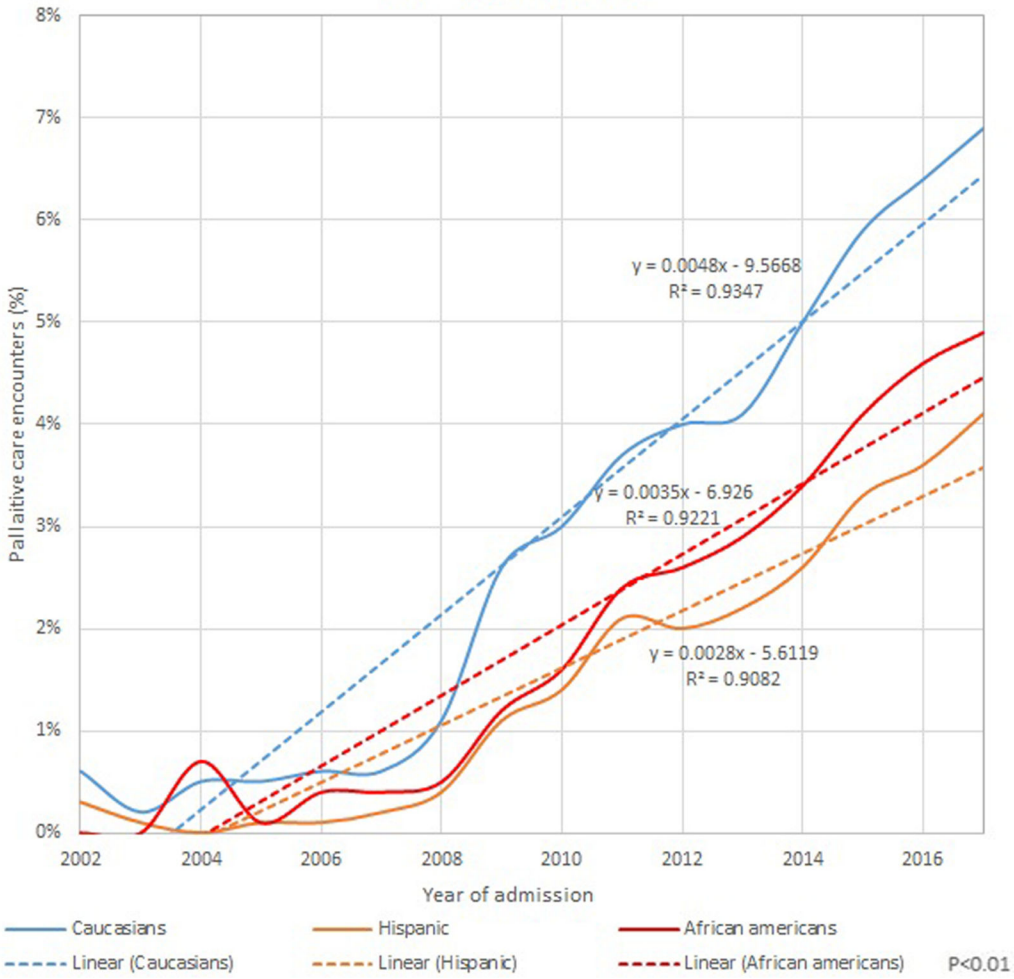

Fig. 2.

Ethnic and racial trends in palliative care encounters in acute heart failure admissions.

Table 1

Baseline characters of study cohort and predictors of palliative encounter.

Variable no. (%)	Univariate analysis			Multiple variable analysis		
	No palliative encounter (13,322,694)	Palliative encounter (571,310)	*p* value	Odds ratio	95% confidence interval	*p* value
Age (median [IQR]) years	75(63–84)	82(73–88)	<0.01	1.036	1.035–1.037	<0.01
Age < 65	3,567,240(26.8)	68,530(12.0)	<0.01	Reference		
65–84	6,746,143(50.6)	267,196(46.8)	<0.01	1.009	0.990–1.030	0.35
≥85	3,009,311(22.6)	235,584(41.2)	<0.01	1.450	1.411–1.490	<0.01
Died	464,715(3.5)	219,143(38.4)	<0.01	17.221	17.116–17.326	<0.01
Disposition of surviving patients						
Home discharge	9,084,764(70.7)	159,712(45.7)	<0.01	Reference		
Facility discharge	3,765,692(29.3)	189,810(54.3)		1.817	1.803–1.831	<0.01
Female	6,651,767(49.9)	299,437(52.4)	<0.01	1.026	1.019–1.034	<0.01
Race						
Caucasian	8,792,353(71.1)	430,930(79.7)	<0.01	Reference		
African American	2,151,685(17.4)	57,395(10.6)		0.866	0.856–0.877	<0.01
Hispanics	847,020(6.8)	28,907(5.3)		0.831	0.817–0.844	<0.01
Asian or Pacific Islander	228,121(1.8)	10,850(2.0)		0.810	0.789–0.832	<0.01
Native American	65,761(0.5)	1919(0.4)		0.689	0.645–0.735	<0.01
Other	283,452(2.3)	10,488(1.9)		1.025	1.016–1.033	<0.01
Do not resuscitate (DNR) order	991,369(7.4)	309,829(54.2)	<0.01	10.615	10.530–10.700	<0.01
Admission is weekend	3,091,450(23.2)	139,347(24.4)	<0.01	0.650	0.639–0.662	<0.01
Elective admission	911,327(6.9)	31,488(5.5)	<0.01	0.866	0.856–0.877	<0.01
Co-morbidities						
Chronic pulmonary disease	4,890,852(36.7)	207,981(36.4)	0.70	1.099	1.09–1.107	<0.01
Coagulopathy	1,009,399(7.6)	78,703(13.8)	<0.01	1.204	1.191–1.218	<0.01
Diabetes (complicated)	2,196,877(16.5)	92,679(16.2)	<0.01	1.100	1.089–1.111	<0.01
Hypertension	8,264,006(62.1)	329,382(57.7)	<0.01	0.737	0.731–0.742	<0.01
Hypothyroidism	2,246,615(16.9)	111,838(19.6)	<0.01	1.022	1.013–1.031	0.02
Liver disease	428,701(3.2)	25,514(4.5)	<0.01	1.633	1.604–1.663	<0.01
Lymphoma	136,976(1.0)	9798(1.7)	<0.01	1.519	1.477–1.562	<0.01
Metastatic cancer	150,308(1.1)	22,988(4.0)	<0.01	3.931	3.859–4.005	<0.01
Obesity	2,685,452(20.2)	70,147(12.3)	<0.01	0.790	0.781–0.799	<0.01
Paralysis	329,038(2.5)	26,264(4.6)	<0.01	1.425	1.399–1.452	<0.01
Solid tumor with no metastasis	251,126(1.9)	21,418(3.7)	<0.01	1.962	1.926–1.999	<0.01
Pulmonary circulation disorder	517,120(3.9)	36,929(6.5)	<0.01	0.993	0.977–1.010	0.44
Peripheral vascular disorders	1,702,396(12.8)	80,308(14.1)	<0.01	1.028	1.017–1.039	<0.01
Peptic ulcer disease	38,460(0.3)	2767(0.5)	<0.01	1.143	1.084–1.205	<0.01
Renal failure	5,279,507(39.6)	271,324(47.5)	<0.01	1.403	1.393–1.414	<0.01
Weight loss	886,537(6.7)	97,215(17.0)	<0.01	1.759	1.741–1.777	<0.01

Variable no. (%)	Univariate analysis			Multiple variable analysis		
	No palliative encounter (13,322,694)	Palliative encounter (571,310)	*p* value	Odds ratio	95% confidence interval	*p* value
Valvular disease	921,488(6.9)	67,518(11.8)	<0.01	1.056	1.043–1.070	<0.01
Smoking	1,522,646(11.4)	37,339(6.5)	<0.01	0.968	0.954–0.983	<0.01
Prior stroke	1,473,340(11.1)	76,207(13.3)	<0.01	1.179	1.167–1.192	<0.01
Prior defib	1,045,707(7.8)	41,846(7.3)	<0.01	1.483	1.463–1.503	<0.01
Prior pacer	1,081,096(8.1)	47,892(8.4)	<0.01	0.938	0.927–0.950	<0.01
Prior CABG *	1,803,817(13.5)	67,705(11.9)	<0.01	0.934	0.923–0.945	<0.01
Acute MI †	1,568,964(11.8)	97,489(17.1)	<0.01	1.281	1.267–1.295	<0.01
Prior PCI ‡	1,370,265(10.3)	45,761(8.0)	<0.01	0.927	0.915–0.940	<0.01
Cardiogenic shock	341,034(2.6)	55,742(9.8)	<0.01	2.887	2.836–2.938	<0.01
Vasopressors use	119,637(0.9)	21,771(3.8)	<0.01	1.491	1.451–1.533	<0.01
IABP ¶	123,723(0.9)	7956(1.4)	<0.01	0.509	0.486–0.533	<0.01
Percutaneous VADs §	22,845(0.2)	2736(0.5)	<0.01	1.189	1.087–1.301	<0.01
Vent	911,944(6.8)	107,815 (18.9)	<0.01	1.206	1.189–1.223	<0.01
Primary payee						
Medicare	10,097,397(75.9)	476,073(83.5)	<0.01	Reference		
Medicaid	1,050,480(7.9)	23,074(4.0)		1.228	1.203–1.253	<0.01
Private	1,565,544(11.8)	51,269(9.0)		1.039	1.024–1.054	<0.01
Self	349,238(2.6)	5991(1.1)		0.901	0.866–0.936	0.61
Hospital location						
Rural	1,454,982(10.9)	40,651(7.1)	<0.01	Reference		
Urban non-teaching	4,533,146(34.0)	165,457(29.0)		1.298	1.278–1.319	<0.01
Urban teaching	7,334,567(55.1)	365,203(63.9)		2.003	1.973–2.033	<0.01
Bed size of the hospital						
Small	2,001,113(15.0)	79,084(13.8)	<0.01	Reference		
Medium	3,663,127(27.5)	154,280(27.0)		1.112	1.100–1.125	<0.01
Large	7,658,454(57.5)	337,946(59.2)		1.210	1.197–1.223	<0.01
Region						
Northeast	2,829,969(21.2)	105,860(18.5)	<0.01	Reference		
Midwest	3,246,402(24.4)	147,013(25.7)		1.535	1.518–1.553	<0.01
South	5,183,348(38.9)	205,756(36.0)		1.627	1.610–1.644	<0.01
West	2,062,976(15.5)	112,681(19.7)		1.731	1.711–1.753	<0.01
Median income						
0–25th	4,156,918(31.8)	141,990(25.2)	<0.01	Reference		
26–50th	3,476,886(26.6)	148,683(26.4)		1.107	1.096–1.119	<0.01
51–75th	3,027,978(23.2)	144,314(25.6)		1.117	1.106–1.129	<0.01
76–100th	2,405,337(18.4)	127,823(22.7)		1.123	1.111–1.1360	<0.01

* Coronary artery bypass surgery.

† Myocardial infarction.

‡Percutaneous coronary intervention.

§Ventricular assist device.

¶Intra-aortic balloon pump.