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ORIGINAL RESEARCH

Association of Socioeconomic Disadvantage With Mortality and Readmissions Among Older Adults Hospitalized for Pulmonary Embolism in the United States

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BACKGROUND: In the United States, hospitalizations for pulmonary embolism (PE) are increasing among older adults insured by Medicare. Although efforts to reduce health disparities have intensified, it remains unclear whether clinical outcomes differ between socioeconomically disadvantaged and nondisadvantaged Medicare beneficiaries hospitalized with PE.

METHODS AND RESULTS: In this study, there were 53 386 Medicare fee-for-service beneficiaries age ≥65 years hospitalized for PE between October 2015 and January 2017. Of these, 5494 (10.3%) were socioeconomically disadvantaged and 47 892 (89.7%) were nondisadvantaged. Socioeconomically disadvantaged adults were of similar age as nondisadvantaged adults (77.1 versus 77.0), more likely to be female (68.5% versus 54.2%), and less likely to receive advanced therapies (11.0% versus 12.1%). After adjustment for demographics, 90-day all-cause mortality rates were similar between disadvantaged and nondisadvantaged adults. In contrast, 1-year mortality rates were higher among socioeconomically disadvantaged adults (hazard ratio [HR], 1.16; 95% CI, 1.10–1.22), although these differences were partially attenuated after additional adjustments for comorbidities and PE severity (HR, 1.09; 95% CI, 1.02–1.16). Risk-adjusted 30-day and 90-day all-cause readmission rates were substantially higher among socioeconomically disadvantaged patients (30-day HR, 1.14 [95% CI, 1.06–1.22]; 90-day HR, 1.18 [95% CI, 1.12–1.25]). In addition, 90-day readmissions attributed to PE, deep vein thrombosis, and/or bleeding were higher among socioeconomically disadvantaged patients (HR, 1.16; 95% CI, 1.02–1.32).

CONCLUSIONS: Socioeconomically disadvantaged older adults hospitalized with PE have higher 1-year mortality rates compared with their nondisadvantaged counterparts. Nearly 1 in 3 socioeconomically disadvantaged older adults was readmitted within 90 days of a hospitalization for PE. Targeted strategies are needed to improve transitional and ambulatory care for this vulnerable population.

Key Words: healthcare disparities ■ mortality ■ pulmonary embolism ■ readmissions ■ socioeconomic disadvantage

Life expectancy in the United States has decreased and all-cause mortality has increased since 2015. The causes include not only drug overdoses and suicides but also cardiovascular and pulmonary diseases.[1] Increased all-cause mortality is mirrored by the rise in death rates from pulmonary embolism (PE). After 2006, PE-related mortality increased among young and middle-aged adults in the United States.

The risk of developing PE increases with age, and the number of hospitalizations for PE has increased

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CLINICAL PERSPECTIVE

What Is New?

- In the United States, hospitalizations for pulmonary embolism (PE) are increasing among older adults, but it remains unclear whether clinical outcomes differ between socioeconomically disadvantaged and nondisadvantaged patients.
- In this national study of Medicare patients hospitalized with PE, risk-adjusted 90-day mortality rates were similar—but mortality at 1 year higher—among socioeconomically disadvantaged patients compared with their nondisadvantaged counterparts.
- Socioeconomically disadvantaged patients with PE had markedly higher 30-day and 90-day all-cause readmission rates as well as higher 90-day readmission rates attributed to PE, deep vein thrombosis, and/or bleeding.

What Are the Clinical Implications?

- Our findings indicate that significant disparities in clinical outcomes exist between socioeconomically disadvantaged and nondisadvantaged patients with PE.
- To reduce readmissions and mortality among socioeconomically disadvantaged patients with PE, targeted resources and innovative interventions are needed to improve the transitional and ambulatory care for this vulnerable population.

during the past 2 decades among older adults insured by Medicare in the United States.[2] Medicare is a government program that provides health insurance to the majority of individuals age ≥65 years (>40 million).[3] A subgroup of the Medicare population at particularly high risk for poor outcomes is socioeconomically disadvantaged individuals who are dually enrolled in Medicaid because of poverty.[4] In addition to having a higher burden of chronic illness, socioeconomically disadvantaged (dually enrolled) patients face unique challenges in daily life. These include residence in more deprived neighborhoods, unstable housing, greater exposure to environmental hazards, and less access to health care.[5,6] It is unknown, however, whether clinical outcomes differ for this low-income group compared with nondisadvantaged patients after a hospitalization for PE. One possibility is that socioeconomically disadvantaged patients receive lower quality of care during hospitalization for PE or face barriers in adhering to medical therapy or accessing ambulatory care after discharge and consequently experience worse outcomes.[7] Alternatively, these individuals may have similar outcomes after PE compared with their more affluent counterparts, as recent policy initiatives have focused on improving the delivery of inpatient and ambulatory care for this population.[8,9]

Understanding whether patterns of care and outcomes differ between socioeconomically disadvantaged and nondisadvantaged older adults is important given that the clinical burden of PE is high and rising in this population and may inform strategies to improve care and reduce health disparities.[5] Therefore, in this national study of the Medicare population, we aimed to answer 3 questions. First, how do the characteristics of socioeconomically disadvantaged and nondisadvantaged older adults hospitalized for PE compare? Second, do advanced treatment patterns for PE during a hospital stay differ between these groups? Third, are mortality and readmission rates higher among socioeconomically disadvantaged patients hospitalized for PE compared with their more affluent counterparts?

METHODS

Because of the sensitive nature of the data collected for this study, requests to access the data set from qualified researchers trained in human subject confidentiality protocols may be sent to the Centers for Medicare and Medicaid Services Research Data Assistance Center at Resdac@umn.edu.

Study Population

The Medicare Provider Analysis and Review files, which contain information for 100% of Medicare fee-for-service beneficiaries using hospital inpatient services in the United States, were used to identify Medicare fee-for-service beneficiaries aged ≥65 years hospitalized at an acute care hospital for PE between October 2015 to January 2017. Validated *International Classification of Diseases, Tenth Revision, Clinical Modification* (*ICD-10-CM*) codes were used to identify beneficiaries with a primary discharge diagnosis of PE.[10,11] We excluded patients who were discharged against medical advice, enrolled in Medicare fee-for-service for <1 year before the index hospitalization, or were not enrolled in the Medicare fee-for-service plan for at least 30 days after discharge (absent death). Transfers to other hospitals were linked to a single index hospitalization. If a patient had >1 hospitalization for PE during the study period, we randomly selected 1 hospitalization.

Patient characteristics, including age, sex, and race/ethnicity, were identified using the Medicare denominator files. Race/ethnicity information was self-reported at the time of Medicare enrollment. Clinical comorbidities were defined using Centers for Medicare and Medicaid Services hierarchical condition categories based on Medicare claims up to 1 year before hospitalization.[12] Severity of PE was based on the presence of cor pulmonale with the diagnosis of PE.[13]

The race/ethnicity of all patients was classified based on self-reports at the time of Medicare enrollment in the categories specified by Medicare. Race/ethnicity was included as a covariate in the analysis because it is associated with mortality.[14]

Socioeconomic Disadvantage

Medicare fee-for-service beneficiaries were considered socioeconomically disadvantaged if they were also enrolled ("dually enrolled") in Medicaid as a result of poverty for at least 1 month, consistent with prior studies.[4,15] The poverty standard for Medicaid eligibility among Medicare patients age ≥65 years is set federally.[16]

Outcomes

The primary outcomes were 90-day and 1-year all-cause mortality rates and 30-day and 90-day all-cause readmission rates. We also evaluated 30-day and 90-day readmission rates attributed to PE, deep vein thrombosis (DVT), and/or bleeding.[17] In addition, we examined advanced procedure rates for PE. To identify patients who received advanced therapies for PE, we used procedure codes for systemic intravenous thrombolysis, ultrasound-guided thrombolysis, surgical embolectomy, and inferior vena cava filter placement (Table S1).

Statistical Analysis

We calculated hospitalization rates for PE among Medicare fee-for-service patients using beneficiary-years of enrollment in fee-for-service as a denominator. To characterize geographic variation in hospitalization rates, we used a Poisson link function and county-specific random intercepts to model the number of hospitalizations as a function of patients' age, sex, and race.

We then compared baseline characteristics (demographics, comorbidities) of socioeconomically disadvantaged and nondisadvantaged patients hospitalized with PE, and calculated the standardized mean differences for characteristics between these two groups. To evaluate the association between socioeconomic disadvantage and all-cause mortality after a PE hospitalization, we fit a Cox proportional hazards model with random hospital intercepts to model mortality as a function of patient-level socioeconomic disadvantage. Specifically, we fit the model in the following sequence: (1) unadjusted, (2) adjusted for patient demographics (age, sex, race), and (3) adjusted for patient demographics, clinical comorbidities, and severity of PE. This allowed us to examine the extent to which each patient factor explained the relationship between socioeconomic disadvantage and mortality. We also performed these analyses to examine the relationship between socioeconomic disadvantage and all-cause readmissions and accounted for the competing risk of death.

Additional Analysis

As a sensitivity analysis, we performed an inverse probability–weighted propensity score analysis to compare the primary outcomes between socioeconomically disadvantaged and nondisadvantaged groups.[18–20] The propensity score represented the likelihood of being socioeconomically disadvantaged given the demographics and comorbidities of the patient and was used to generate event rates through inverse probability weighting that would have been observed if this group had the same demographics and case mix as the nondisadvantaged group. To obtain the propensity score, we fitted a logistic model with the socioeconomic disadvantage group as an outcome and all patient characteristics included in the aforementioned primary Cox models as covariates.[18,21]

Statistical tests were 2-sided at a significance level of 0.05. Analyses were performed using SAS version 9.4 64-bit (SAS Institute Inc., Cary, NC). Institutional review board approval, including waiver of the requirement for participant informed consent, was provided by Beth Israel Deaconess Medical Center.

RESULTS

Overall, there were 53 386 unique Medicare patients age ≥65 years (mean [SD] age, 77.0 [8.1] years; 55.7% female) who were hospitalized for PE during the study period (Table 1). Of these patients, 5494 were socioeconomically disadvantaged and 47 892 were nondisadvantaged. Socioeconomically disadvantaged patients, compared with nondisadvantaged patients, were of a similar age (77.1 [8.5] versus 77.0 [8.1] years), more likely to be female (68.5% versus 54.2%), and more likely to be Black (24.8% versus 10.3%). In addition, socioeconomically disadvantaged patients had a greater burden of clinical comorbidities, including atherosclerosis (15.3% versus 11.2%), hypertension (34.6% versus 26.2%), diabetes mellitus (18.8% versus 11.9%), and peripheral vascular disease (13.9% versus 10.4%). Rates of severe PE were similar between these groups (4.8% versus 5.2%). Standardized differences for these characteristics are shown in Table 1.

Hospitalizations for PE

The overall age, sex, and race standardized total number of PE hospitalizations was 153 per 100 000 beneficiary-years. There was marked geographic variation in PE hospitalizations among Medicare

Table 1. Characteristics of Older Adults Hospitalized for PE in the United States

	Overall	Socioeconomically Disadvantaged	Nondisadvantaged	Standardized Difference*
Total, N	53 386	5494	47 892	
Age, y, mean (SD)	77.0 (8.1)	77.1 (8.5)	77.0 (8.1)	0.004
Female	55.7	68.5	54.2	0.30
Race/ethnicity				
White	84.5	65.4	86.7	−0.51
Black	11.8	24.8	10.3	0.39
Other	3.7	9.8	3.0	0.28
Clinical comorbidities				
History of CHF	12.8	19.7	12.0	0.21
Prior MI	2.6	3.8	2.5	0.074
Unstable angina	1.9	2.5	1.8	0.050
Chronic atherosclerosis	12.9	16.7	12.5	0.121
Cardiopulmonary/respiratory	11.0	16.3	10.4	0.174
Hypertension	29.7	38.1	28.7	0.201
Stroke	2.8	4.0	2.6	0.078
Cerebrovascular disease	4.0	5.0	3.9	0.056
Renal failure	15.1	19.5	14.6	0.133
COPD	12.5	20.3	11.6	0.238
Pneumonia	10.4	15.7	9.8	0.177
Protein calorie malnutrition	4.8	6.8	4.6	0.093
Dementia	7.4	12.9	6.8	0.206
Functional disability	3.8	6.1	3.5	0.119
Peripheral vascular disease	13.5	18.0	13.0	0.138
Metastatic cancer	11.9	11.8	11.9	0.138
Trauma in past year	7.5	9.6	7.2	0.084
Major psychiatric disorder	2.5	5.4	2.1	0.172
Chronic liver disease	2.8	4.1	2.7	0.076
Depression	5.7	8.4	5.4	0.118
Diabetes mellitus	13.3	20.1	12.6	0.205
Parkinson's disease/Huntington's disease	1.2	1.5	1.1	0.033
Anemias	16.4	19.7	16.1	0.095
Asthma	3.0	4.9	2.8	0.11
Severe PE†	5.2	4.8	5.2	−0.025
Disposition				
Home	50.1	35.3	51.8	−0.338
Home with services	18.6	20.6	18.4	0.058
Skilled nursing or intermediate care facility	18.1	29.3	16.8	0.298
Length of stay, d, mean (SD)	5 (5.1)	5 (5.5)	5 (5.1)	0.094

Percentages are shown unless otherwise indicated. The observed rates of each outcome are shown. CHF indicates congestive heart failure; COPD, chronic obstructive pulmonary disease; IVC, inferior vena cava; MI, myocardial infarction; PE, pulmonary embolism; and SD, standard deviation.

*Significance is defined as standardized difference >0.10.

†Severe PE was identified based on the presence of cor pulmonale.

beneficiaries at the county level, ranging from 102 to 172 hospitalizations per 100 000 person-years of fee-for-service enrollment (Figure 1). The age, sex, and race standardized PE hospitalization rate for socioeconomically disadvantaged patients was 151 per 100 000 beneficiary-years and for nondisadvantaged patients was 155 per 100 000 beneficiary-years.

Advanced Therapies for PE

Overall observed advanced therapy use was lower among socioeconomically disadvantaged patients than among nondisadvantaged patients (11.0% versus 12.1%; *P*=0.02; Table 2). These patterns persisted after accounting for demographics, comorbidities, and PE severity (hazard ratio [HR], 0.90; 95% CI, 0.82–0.98).

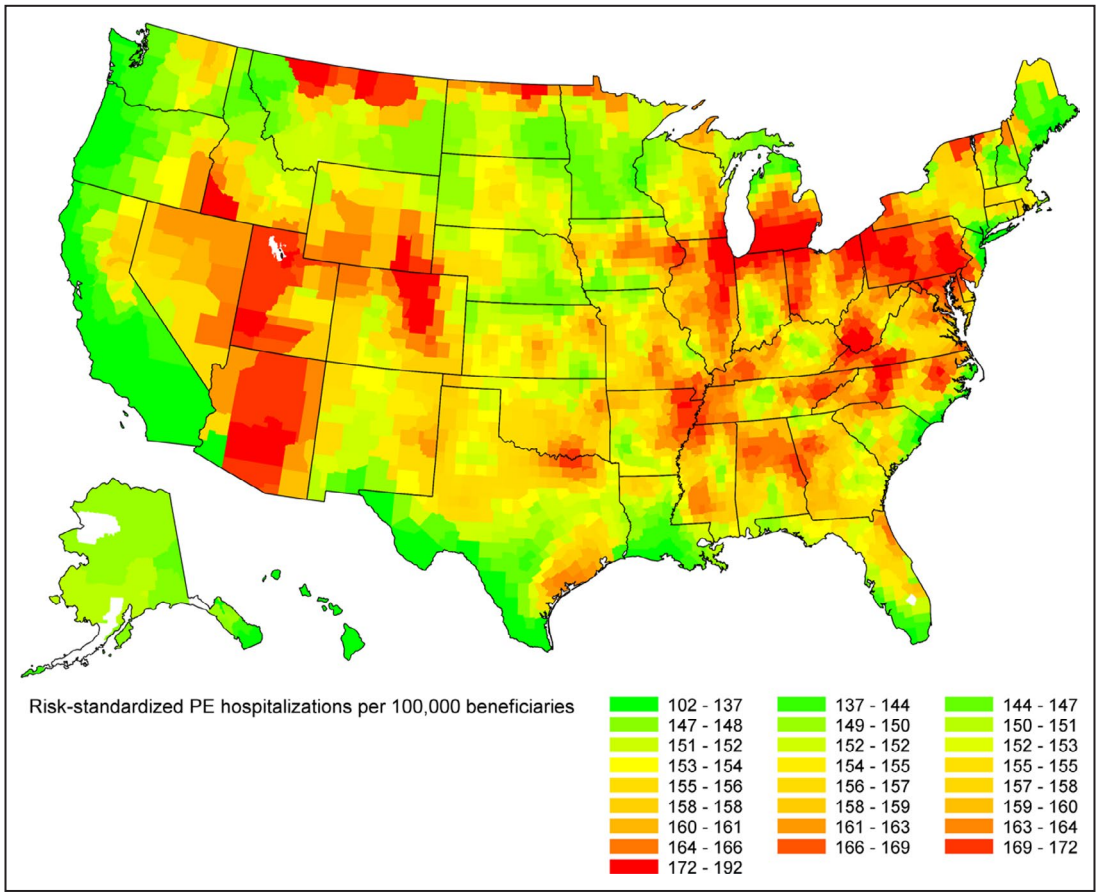

Figure 1. Geographic variation in hospitalization rates for PE among Medicare beneficiaries in the United States age ≥65 years.
County-level variation in age, sex, and race standardized hospitalizations for PE per 100 000 person-years of Medicare fee-for-service enrollment among all Medicare beneficiaries are shown. PE indicates pulmonary embolism.

Regional variation in the use of advanced therapies for disadvantaged compared with nondisadvantaged patients is shown in Figure 2. Socioeconomically disadvantaged patients were less likely to receive advanced therapies in the South and Northeast regions.

All-Cause Mortality

Socioeconomically disadvantaged patients, compared with nondisadvantaged patients, had similar observed in-hospital (3.7% versus 3.8% [*P*=0.66]; HR, 0.95; 95% CI, 0.83–1.09) and 90-day (16.6% versus 15.8% [*P*=0.10]; HR, 1.05; 95% CI, 0.98–1.12) mortality rates, but higher 1-year mortality rates (30.5% versus 25.9% [*P*<0.001]; HR, 1.18; 95% CI, 1.12–1.24; Table 2). After accounting for patient demographics (age, sex, race/ethnicity), in-hospital (adjusted HR, 0.89; 95% CI, 0.77–1.03) and 90-day mortality rates (adjusted HR, 1.02; 95% CI, 0.95–1.10) remained similar between these groups (Figure 3), but 1-year mortality rates were higher among socioeconomically disadvantaged patients (adjusted HR, 1.16; 95% CI, 1.10-1.22). After additional adjustment for clinical comorbidities and PE severity, 1-year mortality remained significantly higher among disadvantaged patients (adjusted HR, 1.09; 95% CI, 1.02–1.16).

All-Cause Readmissions

Observed 30-day (18.1% versus 13.7% [*P*<0.001]; HR, 1.35; 95% CI, 1.26–1.45) and 90-day readmission rates (32.4% versus 24.1% [*P*<0.001]; HR, 1.40; 95% CI, 1.33–1.47) were higher among socioeconomically disadvantaged patients than among nondisadvantaged patients (Table 2). These patterns remained similar after adjusting for patient demographics (30-day adjusted HR, 1.30 [95% CI, 1.21–1.39]; 90-day adjusted HR, 1.35 [95% CI, 1.28–1.42]) and were only partially attenuated after the inclusion of clinical comorbidities and PE severity (30-day adjusted HR, 1.14 [95% CI, 1.06–1.22]; 90-day adjusted HR, 1.18 [95% CI, 1.12–1.25]; Figure 3). The top 5 most common reasons for 30-day and 90-day readmissions after discharge for each group are shown in Table S2.

Table 2. Observed Procedure, Mortality, and Readmission Rates Among Older Adults Hospitalized for Pulmonary Embolism in the United States

	Overall, %	Socioeconomically Disadvantaged, %	Nondisadvantaged, %	*P* Value
Advanced therapy				
Overall	12.0	11.0	12.1	0.02
IV thrombolysis	4.3	3.6	4.4	0.01
Ultrasound-guided thrombolysis	0.49	0.40	0.50	0.33
Surgical embolectomy	0.14	0.15	0.14	0.97
IVC filter placement	8.6	8.2	8.7	0.21
Mortality				
In hospital	3.8	3.7	3.8	0.66
90-d	15.9	16.6	15.8	0.10
1-y	26.3	30.5	25.9	<0.001
Readmission				
30-d	14.1	18.1	13.7	<0.001
90-d	25.0	32.4	24.1	<0.001

Abbreviations: IV indicates intravenous; and IVC, inferior vena cava.

Cause-Specific Readmissions

Observed 30-day (3.3% versus 2.6% [*P*<0.001]; HR, 1.26; 95% CI, 1.08–1.48) and 90-day readmission rates (5.6% versus 4.3% [*P*<0.001]; HR, 1.30; 95% CI, 1.15–1.48) attributed to PE, DVT, and/or bleeding were higher among socioeconomically disadvantaged patients than among nondisadvantaged patients (Table S3). After adjustment for patient

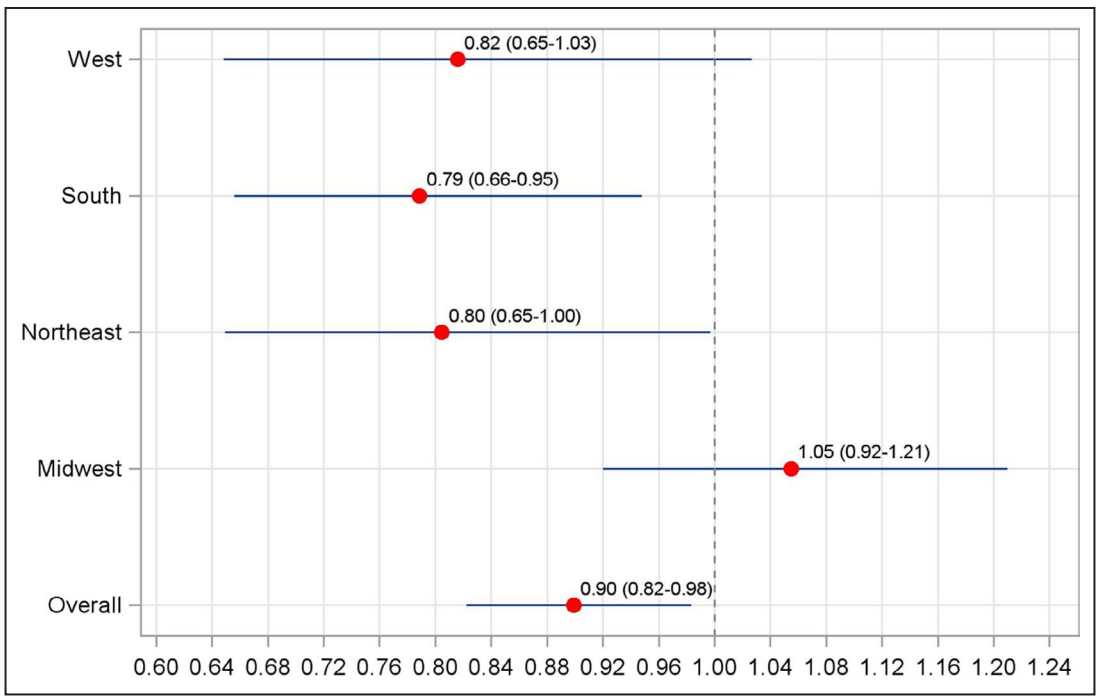

Figure 2. Regional variation in the use of advanced therapies for pulmonary embolism among socioeconomically disadvantaged vs nondisadvantaged patients.
The likelihood of receiving an advanced therapy for pulmonary embolism (thrombolysis, ultrasound-guided thrombolysis, surgical embolectomy, inferior vena cava filter) among socioeconomically disadvantaged patients compared with nondisadvantaged patients (reference group) is shown by US region. Hazard ratios have been adjusted for age, sex, race/ethnicity, clinical comorbidities, and pulmonary embolism severity. The numbers of patients with pulmonary embolism by region were the following: West, 8778; South, 13 038; Northeast, 9640; Midwest, 21 683.

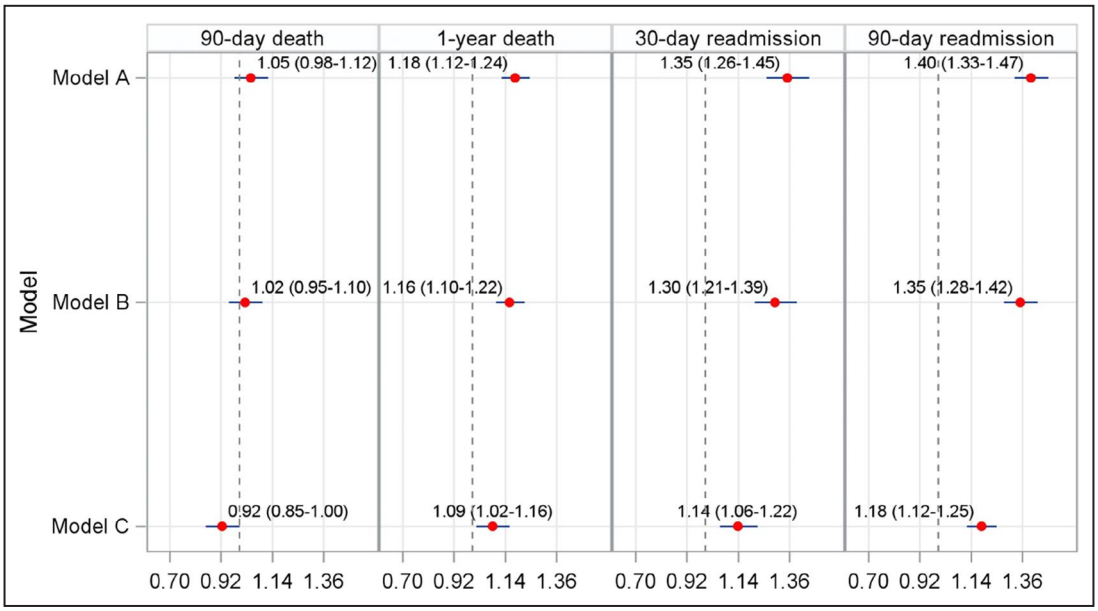

Figure 3. Mortality and readmissions among socioeconomically disadvantaged vs nondisadvantaged older adults hospitalized with pulmonary embolism in the United States.
Unadjusted and multivariable adjusted hazard ratios with 95% CIs for mortality and readmission after pulmonary embolism hospitalization among socioeconomically disadvantaged patients. The reference group is nondisadvantaged patients hospitalized for pulmonary embolism. Model A is unadjusted; model B is adjusted for age, sex, and race/ethnicity; and model C is adjusted for age, sex, race/ethnicity, clinical comorbidities, and pulmonary embolism severity.

demographics, clinical comorbidities, and PE severity, the association for 30-day readmission rates was attenuated (adjusted HR, 1.16; 95% CI, 0.99–1.38) but persisted for 90-day readmission rates (adjusted HR, 1.16; 95% CI, 1.02–1.32).

Additional Analysis

As a sensitivity analysis, we also compared clinical outcomes using an inverse probability–weighted propensity score approach. Our findings were similar to the main analysis. Socioeconomically disadvantaged patients with PE experienced higher 1-year all-cause mortality rates (HR, 1.12; 95% CI, 1.06–1.18) and higher 90-day all-cause readmission rates (HR, 1.25; 95% CI, 1.18–1.32).

DISCUSSION

In this study of older adults hospitalized for PE in the United States, we observed differences in clinical outcomes between socioeconomically disadvantaged and nondisadvantaged patients. Although both groups experienced similar in-hospital and 90-day mortality rates, socioeconomically disadvantaged patients had higher 1-year all-cause mortality rates and higher 30-day and 90-day all-cause readmission rates compared with their nondisadvantaged counterparts. Nearly 1 in 3 socioeconomically disadvantaged patients was readmitted within 90 days of discharge after a PE hospitalization. In addition, 90-day readmission rates specifically caused by PE, DVT, and/or bleeding were higher among socioeconomically disadvantaged patients.

There has been growing concern about the health and vulnerability of low-income populations in the United States given recent evidence of widening disparities.[4] Our finding that short-term mortality rates were similar between disadvantaged and nondisadvantaged older adults with PE is reassuring as it suggests that the quality of care may not markedly differ between these groups during an acute hospitalization. However, the high 1-year mortality rates that we observed among socioeconomically disadvantaged patients with PE compared with nondisadvantaged patients are concerning and suggest that factors beyond hospital walls may influence their long-term outcomes.

Among older adults, 30-day and 90-day readmission rates after a PE hospitalization were significantly higher among socioeconomically disadvantaged patients than their more affluent counterparts. Nearly 1 in 3 disadvantaged patients was readmitted within 90 days of hospitalization. This rate makes readmission for PE the second largest cause of rehospitalization for cardiovascular disease in the United States, with heart failure remaining the most frequent.[13,20] Our finding that 90-day readmissions attributed to PE, DVT, and/or bleeding were higher among socioeconomically

disadvantaged individuals suggests the importance of improving transitions of care from the inpatient to outpatient setting for adults with PE as well as care coordination and postdischarge care (eg, early outpatient follow-up) during the most vulnerable period after hospitalization. Transitional care initiatives that are locally developed to meet the unique needs of healthcare systems[22,23]—and specifically target low-income populations—may be required to reduce readmission rates after PE hospitalizations.

Socioeconomically disadvantaged adults are exposed to unique risk factors and chronic environmental stressors and face other challenges that may affect their health after a hospitalization for PE, such as unstable housing, inadequate social support, and poor medical literacy.[24] In addition, adults living in poverty often do not have reliable access to longitudinal outpatient care and face barriers in filling prescriptions for critically important fundamental medications such as oral anticoagulants.[25] Low-income neighborhoods, for example, are more likely to have limited stocks of medications or to be "pharmacy deserts."[26] These same neighborhoods have "food deserts," with limited access to fresh fruit and vegetables and an overabundance of carbohydrates. Together, these individual, neighborhood, and healthcare system–related factors likely contribute to the worse readmission rates and long-term mortality rates among low-income older adults with PE.

Notably, we found marked variation in hospitalization rates for PE across the United States, which likely reflects geographic differences in the burden of underlying risk factors (eg, obesity, tobacco use, cancer).[27–29] In addition, once hospitalized, socioeconomically disadvantaged adults were less likely to receive advanced therapies for PE in the South and Northeast United States, which may reflect regional differences in access to sites that offer these treatments. Although the overall rates of advanced procedure use were modestly lower among disadvantaged patients, this did not translate into worse short-term outcomes. It is possible that the variation in procedure use between these groups may have led to differences in other outcomes not captured in our study, such as functional status and quality of life. Alternatively, the lower rate of advanced therapies among disadvantaged patients may reflect the delivery of clinically appropriate care to this population.

This study has several limitations. First, socioeconomic disadvantage was determined based on whether patients were dually enrolled in both Medicare and Medicaid. Although Medicaid eligibility criteria (eg, income) vary among states, the poverty standard for Medicaid eligibility for Medicare patients age ≥65 years is set federally and thus is more comparable across states than are eligibility thresholds for individuals age <65 years. Second, this study primarily focused on older adults (≥65 years) enrolled in FFS Medicare and did not capture information about other payers. Third, information about the treatment of clinical comorbidities, prescriptions and adherence to anticoagulants for the treatment of PE, and other important outcomes (quality-of-life functional status, chronic thromboembolic pulmonary hypertension, postthrombotic syndrome) were not available. Understanding whether these patterns of care differ between disadvantaged and nondisadvantaged older adults is an important avenue for future research.

CONCLUSIONS

Socioeconomically disadvantaged older adults hospitalized with PE experienced similar short-term mortality rates but higher 1-year deaths rates than their more affluent counterparts. These patients were also more likely to be readmitted. Nearly 1 in 3 socioeconomically disadvantaged older adults was readmitted within 90 days of a hospitalization for PE, and these patients were more likely to be readmitted for PE, DVT, and/or bleeding than their nondisadvantaged counterparts. To reduce hospital readmissions and mortality in this vulnerable population, targeted resources and innovative interventions are needed to improve the transition from inpatient to outpatient care and to provide greater access to more integrated outpatient care.

ARTICLE INFORMATION

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Supplementary Material

Table S1-S3

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Supplemental Material

Table S1. Procedure Codes for Pulmonary Embolism Advanced Therapies.

	ICD-10 Procedure Codes
Thrombolysis	3E03017, 3E03317, 3E04017, 3E04317, 3E06017, 3E06317
Ultrasound-Guided Thrombolysis	6A75, 6A750, 6A750Z, 6A751, 6A751Z, 6A750Z6, 6A751Z6, 6A750Z7, 6A751Z7, 6A750ZZ, 6A751ZZ
Surgical Embolectomy	02CP0ZZ, 02CQ0ZZ, 02CR0ZZ
IVC Filter Placement	02HV0DZ, 02HV3DZ, 02HV4DZ, 06H00DZ, 06H03DZ, 06H04DZ

Table S2. Top 5 Causes of 30- and 90-day Readmissions among Socioeconomically Disadvantaged and Non-Disadvantaged Adults Hospitalized for Pulmonary Embolism.

30-Day Readmissions		90-Day Readmissions	
Socioeconomically Disadvantaged	**Non-Disadvantaged**	**Socioeconomically Disadvantaged**	**Non-Disadvantaged**
Sepsis	Sepsis	Sepsis	Sepsis
Pneumonia	Pneumonia	Pneumonia	Pneumonia
COPD	Acute kidney failure	COPD	Acute kidney failure
Pulmonary embolism	Gastrointestinal hemorrhage	Acute kidney failure	COPD
Gastrointestinal hemorrhage	Pulmonary embolism	Gastrointestinal hemorrhage	Pulmonary embolism

Table S3. Observed Cause-Specific 30- and 90-Day Readmission Rates Among Socioeconomically Disadvantaged and Non-Disadvantaged Adults Hospitalized with Pulmonary Embolism.

	Socioeconomically Disadvantaged	**Non-Disadvantaged**
30-Day Readmissions		
Bleeding	2.5 (2.09-2.95)	1.9 (1.80-2.06)
DVT	0.3 (0.12-0.40)	0.3 (0.27-0.38)
PE	0.6 (0.41-0.84)	0.4 (0.36-0.48)
PE/bleeding/DVT	3.3 (2.83-3.81)	2.6 (2.49-2.79)
90-Day Readmissions		
Bleeding	4.2 (3.65-4.77)	3.2 (2.99-3.32)
DVT	0.8 (0.50-0.99)	0.6 (0.53-0.68)
PE	0.9 (0.60-1.11)	0.7 (0.58-0.74)
PE/bleeding/DVT	5.6 (4.98-6.27)	4.3 (4.12-4.51)

Event rates (%) are shown with 95% confidence intervals