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National Trends in Pulmonary Embolism Hospitalization Rates and Outcomes for Adults 65 Years of Age in the United States (1999–2010)

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Abstract

Little is known about national trends of pulmonary embolism (PE) hospitalizations and outcomes among older adults in the context of recent diagnostic and therapeutic advances. Therefore, we conducted a retrospective cohort study of 100% Medicare fee-for-service beneficiaries hospitalized between 1999 and 2010 with a principal discharge diagnosis code for PE. The adjusted PE hospitalization rate increased from 129/100,000 person-years in 1999 to 302/100,000 person-years in 2010, a relative increase of 134% ($P<0.001$). Black patients had the highest rate of increase (174–548/100,000 person-years) among all age-sex-race categories. The mean (SD) length-of-hospital-stay decreased from 7.6 (5.7) days in 1999 to 5.8 (4.4) days in 2010, and the proportion of patients discharged to home decreased from 51.1% (95%CI: 50.5–51.6) to 44.1% (95%CI: 43.7–44.6), while more patients were discharged with home health care and to skilled

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nursing facilities. The in-hospital mortality rate decreased from 8.3% (95%CI: 8.0–8.6) in 1999 to 4.4% (95%CI: 4.2–4.5) in 2010, as did adjusted 30-day (from 12.3% (95%CI: 11.9–12.6) to 9.1% (95%CI: 8.5–9.7)) and 6-month mortality rates (from 23.0% (95%CI: 22.5–23.4) to 19.6% (95%CI: 18.8–20.5)). There were no significant racial differences in mortality rates by 2010. There was no change in the adjusted 30-day all-cause readmission rate from 1999 to 2010. In conclusion, PE hospitalization rates increased substantially from 1999 to 2010, with a higher rate for Black patients. All mortality rates declined but remained high. The rise in hospitalization rates and continued high mortality and readmission rates confirm the significant burden of PE for older adults.

Keywords

Pulmonary embolism; hospitalization; Medicare; outcomes research

Pulmonary embolism (PE) is among the most treatable and preventable causes of death.^{1,2} Several recent diagnostic and therapeutic advancements have broadened the range of options for prophylaxis, diagnosis, and management for PE in the past decade. For instance, prophylaxis initiatives have been advocated by several workgroups to address the growing public health concern of PE and deep vein thrombosis (DVT).^{3,4} Additionally, the recognition of the growing public health problem prompted the US Surgeon General to issue a Call to Action to prevent venous thromboembolism (VTE, comprising DVT and PE) in 2008.⁵ Moreover, computed tomographic pulmonary angiography (CTPA) is a widespread and sensitive diagnostic tool that has the capability to detect small peripheral emboli or asymptomatic PE, and is now the first-line imaging test for acute PE.^{6,7} Further, treatment options in both the home and outpatient settings are available for low-risk PE patients.^{8,9} Although PE affects all age groups, studies have suggested that the burden of PE is particularly high in older adults.^{2,10} This is concerning because hospital admission may place older adults at greater risk of adverse events and iatrogenic disease, including psychomotor and social consequences.¹¹ Despite these recent diagnostic and therapeutic advances in PE treatment and prevention, little is known regarding the national trends of PE among older adults. Therefore, we aimed to identify secular trends in PE hospitalizations and outcomes, including in-hospital, 30-day, and 6-month mortality, 30-day readmission, length of stay, and discharge disposition using a 100% sample of Medicare beneficiaries from 1999 to 2010. We also analyzed hospitalization, mortality and readmission trends in demographic subgroups to uncover disparities in PE burden.

METHODS

We identified 100% of Medicare fee-for-service beneficiaries (≥ 65 years) using 1999 to 2010 inpatient claims data from the Centers for Medicare & Medicaid Services (CMS) who had participated for at least 1 month in fee-for-service and resided and were hospitalized for PE from 1/1/1999 to 12/31/2010 in the United States. Hospitalizations for PE were defined as discharged from an acute-care hospital for a principal discharge diagnosis of PE according to the following ICD-9-CM codes: 415.11 (Iatrogenic PE and infarction), 415.13 (Saddle embolus of pulmonary artery), and 415.19 (Other PE and infarction). These ICD-9-

CM codes are consistent with those used in previous studies^{12–14} and have been shown to have high sensitivity and specificity (positive predictive value: 96–98%).¹⁵ ICD-9-CM codes in the secondary position were not used in the primary analyses due to low positive predictive value.¹⁵ Institutional review board approval was obtained through the Yale University Human Investigation Committee.

The demographic and clinical characteristics of patients hospitalized with PE were examined across years and stratified according to demographic factors of age (65–74, 75–84 and 85 years or older), sex, and race (White, Black, and Other). Race was determined using patient-reported data from the Social Security Administration, as indicated in the Medicare Denominator File. We selected 21 clinical comorbidities based on the method used by CMS for profiling hospitals for cardiovascular conditions,¹⁶ which are included in Table 1. Comorbidities from diagnosis codes consisted of principal and secondary diagnosis codes of all hospitalizations for any cause up to 12 months before the index PE hospitalization, as well as those found in the index admission, which were not a complication of PE.

Our outcomes included PE-specific hospitalization, all-cause mortality, and all-cause readmission rates. We calculated the PE hospitalization rate separately for each year by dividing the number of PE hospitalizations (numerator) by the corresponding person-years of fee-for-service Medicare beneficiaries for that year (denominator). Person-years were calculated for each beneficiary to account for new enrollment, disenrollment, or death during an index year. Mortality outcomes included in-hospital 30-day, and 6-month mortality rates, calculated from the date of index PE admission. To calculate 30-day all-cause readmission, we identified all rehospitalizations for any cause occurring within 30 days from the date of discharge. In addition, we calculated the length of stay based on admission and discharge dates. For mortality, readmission, length of stay, and major discharge disposition analyses, we restricted our sample to unique patients. Specifically, if a patient had more than one admission in a given year, one hospitalization was selected at random as to minimize sample selection bias.

We used the Cochran-Armitage test to evaluate the statistical significance of trends in patient characteristics and outcomes across years. We fitted a linear mixed-effects model with a Poisson link function and state-specific random intercepts to assess the annual trends in hospitalization rates for PE, adjusted for age, sex, and race. We fitted a linear mixed-effects model with a logit link function and hospital-specific random intercepts to assess annual trends in the rate of 30-day and 6-month mortality, adjusted for age, sex, race and comorbidities. Change in 30-day readmission was assessed using a Cox proportional hazards model with death as a censoring event, and was also adjusted for age, sex, race and comorbidities. The proportional hazards assumption was satisfied, demonstrating the adequacy of the Cox regression model.¹⁷ We incorporated analysis of trends for the outcomes by including indicator variables representing each year in the models. Using the baseline year (1999) as the referent, we calculated the adjusted incidence rate ratio (IRR) for hospitalization and adjusted odds ratio (OR) for mortality and hazard ratios (HR) for readmission outcomes. ORs were converted to risk ratio estimates,¹⁸ and were then multiplied for each year by the outcome rate in the baseline year to calculate the risk-adjusted mortality and readmission rates across years. All analyses were performed with

SAS, version 9.3 64-bit (SAS Institute, Cary, North Carolina). All statistical tests were 2-sided at a significance level of $p < 0.05$.

RESULTS

We identified 380,427,267 beneficiary records, representing 80,248,916 unique beneficiaries aged 65 years of age or older from 1999 to 2010 of which 545,243 were hospitalized for PE between January 1, 1999 and December 31, 2010. Detailed characteristics of patients hospitalized for PE are reported in Table 1.

The crude hospitalization rate for PE was 129 per 100,000 person-years in 1999, and after adjusting for age, sex, and race, the overall hospitalization rate gradually increased to 302 per 100,000 person-years in 2010, a relative increase of 134.0% (p for trend < 0.001) (Table 2). The overall adjusted IRR for PE was 1.54 (95% CI, 1.51–1.57) in year 2010 relative to the baseline year 1999. There was a slight decline in PE hospitalizations in 2008 and 2009, but in 2010 the hospitalization rate continued to rise (Figure 1). The overall direction of change was consistent for all age, sex, and race strata using both adjusted and unadjusted analyses. Correspondingly, sensitivity analyses revealed that overall trends were similar for PE ICD-9-CM codes in both the principal and secondary positions.

In age-sex-adjusted analyses stratified by race, Black patients had the highest rate of increase of PE hospitalizations (Figure 1). For the sex subgroup, women and men had similar incidence of age-race-adjusted PE hospitalizations over the study period. In race-sex-adjusted analyses stratified by age, those aged 85 years or older (oldest old) had the highest rate and greatest relative increase of PE hospitalizations.

Overall unadjusted in-hospital mortality rates declined from 8.3% (95% CI, 8.0–8.6%) in 1999 to 4.4% (95% CI, 4.2–4.6%) in 2010 (Table 3). Age-sex-race-comorbidity-adjusted 30-day mortality rate decreased from 12.3% (95% CI 11.9–12.6%) in 1999 to 9.1% (95% CI 8.5–9.7%) in 2010. Similarly, the adjusted 6-month mortality rate decreased from 23.0% (95% CI 22.5–23.4%) in 1999 to 19.6% (95% CI 18.8–20.5%) in 2010 (Figure 2). Unadjusted trends for 30-day and 6-month mortality were similar. The overall pattern of trends in 30-day and 6-month mortality from 1999 to 2010 was consistent for all adjusted race, sex, and age strata, with the exception of Other race, which did not begin to decline until 2004.

Across age, sex, and race subgroups, the oldest old had higher risk-adjusted 30-day and 6-month mortality rates compared with those aged 65–74 or 75–84, and men had slightly higher adjusted 30-day and 6-month mortality rates than women. While Black patients had higher 30-day and 6-month mortality than White or Other race patients, the rate of decline across the study period was the steepest among Black patients and there were no significant differences in racial outcomes by the end of the study period.

The mean (SD) length of stay for PE hospitalizations consistently decreased from 7.6 (5.7) days in 1999 to 5.8 (4.4) days in 2010, a relative decline of 23.7%. From 1999 to 2010, the proportion of patients discharged to home decreased from 51.1% (95% CI, 50.5–51.6) to 44.1% (95% CI, 43.7–44.6), with more patients discharged with home health care and to

intermediate care facility/skilled nursing facilities (ICF/SNF). There was no change in age-sex-race-comorbidity-adjusted 30-day all-cause readmission rates from 1999 to 2010 (Table 4). This finding was consistent for all adjusted race, sex, and age strata.

DISCUSSION

To our knowledge, this is the largest study to date that examined the recent trends in PE hospitalization rates and outcomes across the United States among older adults. From 1999 to 2010, we found a substantial increase in the hospitalization rates for PE and concomitant decline in in-hospital, as well as risk-adjusted 30-day and 6-month mortality rates, length of stay, proportion of patients discharged to home, and stable risk-adjusted 30-day readmission rates for Medicare beneficiaries. Although the mortality rates for PE have declined, the rise in hospitalization rates and still high mortality and readmission rates confirm the significant burden of PE for older adults.

We found that risk-adjusted rates of hospitalization for PE increased substantially over the study period, from 129 per 100,000 person-years in 1999 to 302 per 100,000 person-years in 2010. While other studies have observed a similarly high incidence of PE across all ages,^{14,19–21} ours is the first study to document recent nationwide hospitalization trends among older adults. Only two previous studies have used Medicare data to examine the incidence of PE among older adults from 1984 to 1991²² and 1986 to 1989,²³ and while the authors noted declines in hospitalizations, these studies reflect a different era of PE diagnosis and treatment.

While we observed a relative 134% increase in hospitalizations from 1999 to 2010, our findings indicate that both short- and long-term mortality outcomes for PE have declined across the study period. Overall demographic- and comorbidity-adjusted in-hospital, 30-day and 6-month mortality declined from 1999 to 2010. One rationale that may explain secular trends in increasing hospitalizations and decreasing mortality may be the use of computed tomographic pulmonary angiography (CTPA), a diagnostic technology that was introduced at the start of our study period, and has evolved into the standard of care for confirming a diagnosis of PE, particularly in moderate- to high-risk patients.^{6,7} However, the high sensitivity of CTPA may also result in the detection of small and subsegmental emboli that if left untreated would not cause symptoms or death.²⁰ Yet, while we observed a high incidence of PE, we noted a strong signal in the direction of reduced in-hospital, 30-day, and 6-month mortality rates. This suggests that improved survival among Medicare beneficiaries may be at least partly attributable to the successful detection and treatment of clinically important emboli in recent years. However, another interpretation of our data demonstrates that the number of deaths at 30-days has remained relatively stable since 2003, while the adjusted 30-day mortality rate has declined by over 2.0 percentage points. This may, in turn, suggest a “dilution effect” whereby more sensitive diagnostic technology has captured a larger pool of lower-risk patients, which could reduce the 30-day mortality rate but have no affect on the number of deaths. Importantly, other factors may have a role in declining mortality rates, including prevention efforts for event recurrence and medication adherence,^{3–5} and more widespread and effective use of VTE prophylaxis²⁴ and advanced

therapies.²⁵ Although we were unable to identify the causes of declined mortality for PE hospitalizations, the predominant explanation is likely a combination of these factors.

In terms of demographic subgroups, Black patients and the oldest old were disproportionately hospitalized and had the greatest relative increase in hospitalizations over the study period. In 1999, Black patients had approximately 15% higher incidence of hospitalization for PE compared with White patients, and the difference more than doubled to 30% by 2010. While our data indicated that race-related health disparities exist for Black patients, not all studies have found a discrepancy between racial incidences of PE hospitalizations, particularly among younger cohorts of patients.^{19,26} Potential explanations for our observed disparity in hospitalizations for Black compared to White patients may be due to higher prevalence of comorbidities such as obesity and conditions related to hypercoagulable state,²⁷ biological and genotype differences,²⁷ or factors related to limited access to quality medical care, including poor discharge planning, lack of insurance coverage, and underinsured status.²⁸

In terms of the sex and race trends for adjusted 30-day and 6-month mortality, the disparity between men and women and White and Black patients diminished across the study period, and in the most recent years nearly all rates were equal. This recent observation is particularly noteworthy, in that older studies that assessed trends of PE mortality noted similar declines in all ages, but significant racial differences still remained.¹² Administrative data do not identify the reasons for the narrowing of these disparities, but demonstrate important areas for future investigation and may suggest recent quality of care improvements that had previously been thought unachievable.

Following hospitalization, the proportion of patients discharged to home decreased from 51% to 44%, which was counterbalanced by the proportion of patients who were discharged to home health care and ICF/SNF from 1999 to 2010, an observation that coincides with national trends.²⁹ This finding may be explained by recent evidence that has suggested that select low-risk PE patients may utilize outpatient care, including newer modalities of subcutaneous heparin delivery and oral anticoagulation therapy, as a safe and effective alternative to inpatient treatment.^{8,9} Interestingly, despite a decrease in the length of stay, adjusted 30-day readmission rates remained fairly stable over the study period. Our observed all-cause 30-day readmission rate of 15.1% in 2010 is consistent with a study that examined 186 Pennsylvania hospitals (14.3%), and our findings correspond to theirs in that Black patients may be at increased risk of readmission compared with White or Other race patients.³⁰ Further investigation is warranted to examine predictors of these trends, and to assess the proportion of readmissions that are attributable to recurrence, bleeding or other complications.

The results of this study must be interpreted in the context of the following limitations. First, we excluded patients enrolled in Medicare managed care programs, and patients less than 65 years of age; consequently we are unable to comment on hospitalization trends or outcomes in these populations. However, our results are highly applicable because our sample comprised 100% of Medicare fee-for-service beneficiaries, and the majority of patients admitted to the hospital for a PE are older adults.^{2,10} Second, we used ICD-9-CM codes to

identify our patient sample, rather than clinical criteria, which may have led to inaccuracies in hospital coding procedures, potentially leading to false-negative findings and an underestimate of the true hospitalization rate of PE in older adults. However, the sensitivity and specificity of diagnostic codes for principal discharge diagnosis of PE are high, as compared to objectively documented disease based on medical chart review criteria.¹⁵ Third, our data did not provide the opportunity to classify disease severity, yet older adults may have more severe disease as the clinical presentation of PE can be subtle or atypical in this population.

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Figure 1.
Rates of Adjusted Hospitalization for Pulmonary Embolism by Overall and Race Subgroup, 1999 to 2010.

Figure 2.
Rates of Mortality and Readmission for Pulmonary Embolism, 1999 to 2010.

Table 1

Characteristics of Patients Hospitalized for PE (Principal Discharge Diagnosis), 1999 to 2010.

	1999–2000	2001–2002	2003–2004	2005–2006	2007–2008	2009–2010
No. of patients	66 413	79 394	91 402	103 053	102 054	102 927
No. of deaths at 30-days (unadjusted)	8069	9091	10420	10563	10461	10241
Age, mean (SD) (years)	77.7 (7.3)	77.7 (7.3)	78.0 (7.5)	78.1 (7.5)	78.3 (7.7)	78.1 (7.8)
Women	63.8%	63.2%	61.3%	60.2%	59.5%	58.7%
White	87.3%	86.6%	85.5%	85.4%	85.4%	85.0%
Black	10.3%	10.6%	11.7%	11.8%	11.6%	12.1%
Other race ^a	2.5%	2.7%	2.8%	2.8%	3.0%	2.9%
Hypertension	53.5%	58.2%	62.5%	63.7%	67.3%	68.4%
Atherosclerosis	29.7%	30.1%	30.3%	29.7%	29.4%	28.2%
COPD	27.4%	28.1%	29.1%	29.8%	28.0%	26.0%
Cancer	21.9%	22.9%	23.7%	23.0%	22.6%	21.8%
Diabetes mellitus	19.0%	20.2%	22.3%	22.9%	23.4%	23.9%
Heart Failure	16.1%	15.6%	16.3%	15.6%	14.8%	13.8%
Peripheral vascular disease	11.9%	11.5%	11.1%	10.7%	10.5%	9.7%
Cerebrovascular disease other than stroke	5.3%	5.1%	4.8%	4.3%	4.4%	4.2%
Unstable angina	4.0%	3.5%	2.9%	2.4%	1.9%	1.7%
Stroke	3.9%	3.5%	3.5%	3.2%	3.2%	3.0%
Prior myocardial infarction	3.2%	3.4%	3.2%	3.0%	2.9%	3.0%
Trauma in past year	10.1%	10.4%	10.9%	10.8%	10.8%	9.9%
Dementia	10.4%	11.4%	13.1%	13.6%	14.5%	14.5%
Malnutrition	4.5%	4.4%	5.0%	5.5%	6.7%	8.3%
Functional disability	4.3%	4.1%	4.1%	3.6%	3.9%	4.1%
Pneumonia	17.2%	18.2%	19.7%	20.3%	21.7%	22.1%
Depression	7.3%	8.9%	9.9%	10.3%	10.4%	10.1%
Respiratory failure	4.4%	4.5%	4.9%	5.9%	7.9%	8.2%
Renal failure	3.7%	4.7%	6.2%	8.7%	11.3%	13.0%

	1999–2000	2001–2002	2003–2004	2005–2006	2007–2008	2009–2010
Major psychiatric disorder	2.8%	2.7%	3.0%	2.9%	3.2%	3.2%
Liver disease	0.6%	0.6%	0.8%	0.7%	0.8%	0.8%

Abbreviations: COPD, chronic obstructive pulmonary disease; CHF, congestive heart failure. Note: characteristics of patients are grouped in 2-year intervals for ease of presentation.

^aOther race includes Hispanic, Asian, North American Native, or other not specified.

Table 2

Hospitalization Rates for Pulmonary Embolism in Medicare Fee-for-Service Beneficiaries, 1999 to 2010.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Relative Difference (%) ^b
Person-years	26 479 079	26 768 087	27 553 904	28 345 999	28 821 487	29 109 293	29 157 293	28 452 501	27 899 732	27 675 586	27 343 436	27 696 576	4.6
Rates per 100 000 person-years													
Adjusted Overall ^a													
Age (years)													
65–74	102	111	131	145	151	164	185	205	199	188	190	213	108.0
75–84	155	169	191	222	244	275	323	361	376	352	348	382	146.1
85	169	182	216	250	292	360	396	433	477	464	442	484	186.4
Sex													
Men	116	123	143	167	192	218	253	286	298	274	273	310	167.2
Women	137	152	176	200	211	234	264	290	293	280	275	299	118.2
Race													
White	129	142	162	183	197	220	250	277	286	269	268	293	127.1
Black	174	181	204	273	317	387	434	496	503	479	486	548	214.8
Other	59	47	74	67	76	82	109	101	134	109	105	112	90.4

^aAdjusted for age, sex, and race.

^bRelative difference from 1999 to 2010.

Mortality Outcomes of Pulmonary Embolism in Medicare Fee-for-Service Beneficiaries, 1999 to 2010

Table 3

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Relative Difference (%) ^c
30-day Mortality Rates													
%													
Adjusted Overall ^a	12.3	12.1	11.9	11.4	11.5	11.2	10.3	9.6	9.6	9.8	9.5	9.1	-26.0
Age (years)													
65–74	9.9	10.1	9.7	9.1	9.3	9.0	8.2	8.2	7.9	8.1	7.6	7.4	-25.5
75–84	11.5	11.5	11.5	11.1	10.9	11.1	9.6	9.1	9.1	9.4	9.1	8.7	-24.2
85	18.6	17.2	16.4	16.5	16.9	15.2	15.4	13.1	13.6	14.2	13.3	12.9	-30.8
Sex													
Men	12.9	13.0	12.7	11.9	12.3	12.0	10.8	10.3	10.1	10.6	10.1	9.8	-24.0
Women	11.9	11.6	11.4	11.2	11.1	10.7	9.9	9.1	9.2	9.5	9.0	8.7	-27.0
Race													
White	12.0	11.8	11.8	11.3	11.5	11.0	10.0	9.6	9.0	9.9	9.4	9.0	-25.0
Black	14.1	13.9	12.5	12.6	12.1	12.2	11.6	9.2	9.8	9.4	9.4	9.5	-32.6
Other	13.6	13.6	10.3	12.6	9.5	11.7	9.5	8.6	8.9	8.6	8.2	9.5	-30.6
6-month Mortality Rates													
Adjusted Overall ^a	23.0	23.7	23.4	22.8	23.2	23.2	21.5	21.0	20.6	21.2	20.4	19.6	-14.8
Age (years)													
65–74	19.8	20.7	19.8	19.2	19.5	19.6	18.2	17.8	17.1	17.8	17.0	16.2	-18.1
75–84	21.9	22.7	23.1	22.4	22.7	23.1	21.2	20.5	20.1	20.5	20.0	19.2	-12.4

%													
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Relative Difference (%) ^c
85	31.6	31.2	30.9	30.5	31.2	29.80	29.3	27.8	27.8	29.1	27.3	26.8	-15.1
Sex													
Men	25.4	25.8	25.4	24.0	24.4	24.6	23.0	21.9	21.7	22.4	21.7	20.8	-18.1
Women	21.6	22.4	22.3	21.9	22.4	22.3	20.9	20.4	20.0	20.6	19.7	19.1	-11.5
Race													
White	22.6	23.3	23.1	22.3	23.0	22.8	21.2	20.8	20.2	21.2	20.2	21.3	-5.6
Black	25.4	26.9	25.8	25.2	24.6	25.4	24.4	21.5	22.2	21.5	21.5	21.3	-16.2
Other	25.2	23.4	20.2	25.4	21.9	25.0	21.3	21.6	21.3	21.2	19.8	21.4	-15.3

^a Adjusted for age, sex, race, and clinical comorbidities.

^b Including discharge against medical advice.

^c Relative difference from 1999 to 2010.

Table 4

Length of Stay, Discharge Disposition, and Readmission Rates of Pulmonary Embolism in Medicare Fee-for-Service Beneficiaries, 1999 to 2010.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Relative Difference (%) ^c
Length-of-stay (SD) (days)	7.6 (5.7)	7.4 (5.6)	7.3 (5.5)	7.3 (5.4)	7.1 (5.2)	6.9 (5.1)	6.7 (4.8)	6.5 (4.6)	6.4 (4.7)	6.3 (4.7)	6.1 (4.6)	5.8 (4.4)	-23.7
Discharge Disposition, %													
Home	51.1	52.0	52.3	50.7	47.9	45.0	46.0	45.0	44.8	44.0	44.7	44.1	-13.7
Home health care	14.8	14.2	14.5	15.2	16.9	19.5	19.5	20.9	21.1	21.1	21.0	22.0	48.7
ICF/SNF	19.2	18.8	18.8	18.8	19.6	20.6	20.7	21.2	21.2	21.3	20.9	21.1	9.9
Hospice	0.1	0.3	0.4	0.8	1.3	2.0	2.2	2.4	2.7	2.9	3.1	3.1	3000.0
Transferred out	2.0	2.1	1.8	1.9	1.6	1.4	1.4	1.2	1.1	1.2	1.2	1.0	-50.0
In-hospital mortality	8.3	7.9	7.4	7.0	6.8	6.2	5.4	4.9	4.8	5.0	4.7	4.4	-47.0
Other ^b	4.5	4.7	4.8	5.6	5.9	5.3	4.8	4.4	4.3	4.5	4.4	4.3	-4.4
30-day Readmission Rate, %													
Adjusted Overall ^d	15.5	15.5	16.2	15.9	16.6	16.8	16.4	16.5	16.0	15.8	15.5	15.1	-2.6
Age (years)													
65-74	15.5	15.4	15.6	15.6	16.5	16.3	15.5	16.0	15.5	15.2	14.3	14.2	-8.7
75-84	15.3	15.4	15.9	15.8	16.3	16.4	16.4	16.2	15.8	15.7	15.7	15.2	-0.9
85	16.2	15.8	17.7	17.3	17.8	18.9	18.5	18.8	18.2	17.5	17.7	17.4	7.4
Sex													
Men	16.5	16.1	17.3	16.6	17.3	17.4	16.5	16.5	16.5	16.1	15.9	15.4	-6.9
Women	15.0	15.1	15.5	15.6	16.2	16.5	16.5	16.6	16.0	15.6	15.3	15.1	0.9
Race													

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Relative Difference (%) ^c
White	15.2	15.2	15.6	15.5	16.2	16.3	15.8	16.1	15.5	15.3	15.1	14.8	-2.6
Black	18.1	18.3	20.5	19.0	19.3	20.8	20.1	19.8	20.6	19.3	18.3	18.4	1.6
Other	17.6	16.1	18.6	19.4	20.5	18.5	20.2	19.6	19.9	18.2	19.5	17.0	-3.4

^a Adjusted for age, sex, race, and clinical comorbidities.

^b Including discharge against medical advice.

^c Relative difference from 1999 to 2010. Abbreviations: ICF/SNF: Intermediate care facility/skilled nursing facility.