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Quality of Care in the United States Territories, 1999–2012

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Mr. Nuti and Dr. Murugiah were also affiliated with the Center for Outcomes Research and Evaluation during the time the work was conducted.

All authors had access to the data and a role in writing the manuscript.

Conflicts of Interest/Financial Disclosure

Dr. Krumholz chairs a cardiac scientific advisory board for UnitedHealth, is a participant/participant representative of the IBM Watson Health Life Sciences Board, and is the founder of Hugo, a personal health information platform. Dr. Ross receives support from the Blue Cross and Blue Shield Association for projects to better understand medical technology, and from the Laura and John Arnold Foundation to support the Collaboration on Research Integrity and Transparency (CRIT) at Yale. Drs. Ross and Krumholz are the recipients of research agreements from Medtronic and from Johnson & Johnson (Janssen), through Yale University, to develop methods of clinical trial data sharing and from Medtronic and the Food and Drug Administration, through Yale University, to develop methods for post-market surveillance of medical devices. Drs. Krumholz, Ross, and Normand work under contract to the Centers for Medicare & Medicaid Services to develop and maintain performance measures. Dr. Masoudi has a contract with the American College of Cardiology as the Senior Medical Officer of the National Cardiovascular Data Registries. The other authors do not have disclosures to report.

LIST OF SUPPLEMENTAL DIGITAL CONTENT

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Abstract

Background: Millions of Americans live in United States territories, but health outcomes and payments among Medicare beneficiaries in these territories are not well characterized.

Methods: Among Fee-for-Service Medicare beneficiaries aged ≥ 65 years hospitalized between 1999 and 2012 for acute myocardial infarction (AMI), heart failure (HF), and pneumonia, we compared hospitalization rates, patient outcomes, and inpatient payments in the territories and states.

Results: Over 14 years, there were 4,350,813 unique beneficiaries in the territories and 402,902,615 in the states. Hospitalization rates for AMI, HF, and pneumonia declined overall and did not differ significantly. However, 30-day mortality rates were higher in the territories for all 3 conditions: in the most recent time period (2008–2012), the adjusted odds of 30-day mortality were 1.34 (95% CI, 1.21 to 1.48), 1.24 (95% CI, 1.12 to 1.37), and 1.85 (95% CI, 1.71 to 2.00) for AMI, HF, and pneumonia, respectively; adjusted odds of 1-year mortality were also higher. In the most recent study period, inflation-adjusted Medicare in-patient payments, in 2012 dollars, were lower in the territories than the states, at \$9234 less (61% lower than states), \$4479 less (50% lower), and \$4403 less (39% lower) for AMI, HF, and pneumonia hospitalizations, respectively ($p < 0.001$ for all).

Conclusions and Relevance: Among Medicare Fee-for-Service beneficiaries, **in 2008–2012** mortality rates were higher, **or not significantly different**, and hospital reimbursements were lower for patients hospitalized with AMI, HF, and pneumonia in the territories. Improvement of health care **and policies** in the territories **is critical** to ensure health equity for all Americans.

Keywords

health disparities; health policy; Medicare; outcomes

INTRODUCTION

Laws and health policies in the United States (U.S.) territories, which include American Samoa, the Commonwealths of the Northern Mariana Islands and Puerto Rico, Guam, and the U.S. Virgin Islands, differ compared with the 50 states and District of Columbia (D.C.). (1–8) **For example, although contributing** equally as states into Social Security and Medicare, the territories have more restrictive criteria for, and capitations on, federal Medicaid funding, and **territory** hospitals have lower Medicare reimbursement rates.(1–3) These factors have not changed substantially with the Affordable Care Act (ACA).(9)

Despite these and other differences, such as location **and** race/ethnicity,(3, 10–13) **little is known** about how health outcomes of **Americans** in the territories compare with those in the states **in recent times**. National reports of health and care quality by federal agencies contain little to no information about the territories.(14–16) Consistent with the government’s commitment to eliminate disparities,(4, 17–19) knowledge about **differential** care and outcomes could support policy and clinical interventions **to promote health equity**.

Accordingly, we compared hospitalization rates, outcomes, and Medicare payments between Medicare Fee-for-Service beneficiaries in the territories and the 50 states and D.C. (hereafter called “states”) from 1999 through 2012. We focused on acute myocardial infarction (AMI), heart failure (HF), and pneumonia, 3 common conditions associated with substantial morbidity, mortality, and costs, **quality improvement efforts, and validated risk-adjusted outcomes measures**.(4, 20–23) We focused on Fee-for-Service beneficiaries because information on hospitalizations is available; because Medicare Advantage membership has become disproportionately common in Puerto Rico, we also compared all-cause mortality between Fee-for-Service and Medicare Advantage **beneficiaries** to assess **for** selection effects.

METHODS

Study Population

We utilized **Centers for Medicare & Medicaid Services** (CMS) Medicare denominator files to identify all beneficiaries aged ≥ 65 years enrolled in the Medicare program for ≥ 1 month from January 1, 1999 through December 31, 2012. For each year, the number of beneficiaries in the Fee-for-Service or Medicare Advantage plans was counted. Individuals were considered in Fee-for-Service if they participated in that plan ≥ 1 month during any part of a given year. Using beneficiaries’ residence ZIP code, we identified those who resided in the territories and states (for map location, see e-Appendix Figure 1). To account for new enrollment, disenrollment, or death during a given year, we calculated person-years for each Fee-for-Service beneficiary.

Using CMS Medicare inpatient data, we identified all Fee-for-Service beneficiaries hospitalized with a principal discharge diagnosis of AMI, HF, or pneumonia in an acute-care hospital in the territories or states from January 1, 1999 through December 31, 2012 as defined by the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.(21–23) To facilitate data presentation and analysis, we combined data in 3 measurement periods: 1999–2003, 2004–2007, and 2008–2012.(4)

The Yale University Human Investigation Committee reviewed the study and waived the requirement for informed consent.

Characteristics of Medicare Beneficiaries

We obtained beneficiaries’ age, sex, and race (white, black, other) from the denominator files. Using the denominator files, we identified beneficiaries who were **dual**-eligible for Medicaid and those not enrolled in supplementary medical insurance (Medicare Part B).

For hospitalized Fee-for-Service beneficiaries, we ascertained comorbidities from secondary diagnosis codes **and** from principal and secondary diagnosis codes from all hospitalizations for 12 months before the index hospitalization; data from 1998 were used for hospitalizations in 1999. Comorbidities were classified using modified Hierarchical Condition Categories.(22)

Outcomes

We calculated all-cause mortality rates by dividing the total number of deaths in each year by the corresponding number of beneficiaries. For Fee-for-Service beneficiaries, we assessed hospitalizations and hospitalization-related outcomes, including in-hospital, 30-day, and 1-year all-cause mortality and 30-day all-cause readmission rates, for each of the 3 conditions. We calculated annual condition-specific hospitalization rates by dividing the total number of condition-specific hospitalizations in each year by the corresponding person-years of beneficiaries. Hospitalizations were attributed to the patient's residence location at the time of admission, regardless of hospital location. Crossing 3 conditions, approximately 2.6% of patients from the territories were admitted into hospitals located in states and less than 0.02% of patients from the states were admitted into hospitals located in territories. The time zero was from the date of admission for mortality rates and from the date of discharge for readmissions. Outcome rate calculations were restricted to unique beneficiaries in each year. Denominator data from 2013 were used to obtain 1-year mortality information for Fee-for-Service beneficiaries discharged in 2012. Other outcomes **from the inpatient dataset** included Consumer Price Index-adjusted (to 2012) Medicare total inpatient payments, hospital length of stay, and discharge disposition.

Statistical Analysis

For each **measurement** period, we examined patient demographic and clinical characteristics. To assess differences in hospitalization rates within each period, we fitted a mixed effects model with a Poisson link function, adjusting for age, sex, and race. The model included a random effect for each state and territory. We included a patient-level binary indicator, territories (yes/no), in the model and exponentiated its coefficient to obtain an incidence rate ratio representing the age-sex-race-adjusted difference in the hospitalization rate. Similarly, to assess differences in mortality rates, we fitted a mixed model with a logit link function and hospital-specific random intercepts, adjusting for patient demographics and comorbidities, and including the binary indicator for territories. To assess differences in rates of readmission, we fitted a Cox proportional hazards model, adjusting for patient demographics and comorbidities, including the binary indicator for territories, and censoring for deaths and loss-of-follow-up. We fitted separate models for each condition and measure period.

Because the majority of Medicare beneficiaries in the territories were from Puerto Rico,¹⁸ to determine whether findings in the territories reflected the effect of Puerto Rico, we conducted a secondary analysis by including 2 territories indicators, Puerto Rico (yes/no) and the remaining territories: American Samoa, Northern Mariana Islands, Guam, and the U.S. Virgin Islands. All statistical testing was 2-sided at a significance level of 0.05. We conducted the analyses with SAS version 9.3 (SAS Institute Inc., Cary, North Carolina).

RESULTS

Population Characteristics

The total number of records for Medicare beneficiaries aged ≥ 65 years was 170,008,524 in 1999–2003, 141,869,394 in 2004–2007, and 194,371,420 in 2008–2012. The proportion of beneficiaries enrolled in Fee-for-Service for ≥ 1 month decreased over time in the territories (99.2% in 1999–2003 to 38.6% in 2008–2012) and the states (83.9% to 75.2%) (Table 1; e-Appendix Figure 2). Among **all** Medicare beneficiaries (Fee-for-Service and Medicare Advantage) there were higher proportions of White beneficiaries in the states, and mean ages were no different (Table 1 and e-Appendix Table 1).

Over the study period, all-cause Medicare population mortality (**including Medicare FFS and Medicare Advantage**) for both programs was lower in the territories (e-Appendix Figure 3). Mortality for Fee-for-Service started higher but ended lower than for Medicare Advantage in the territories, but was consistently lower for the Medicare Advantage population in the states (Figure 1).

For the Medicare Fee-for-Service population over the study period, there were 702,968 unique Fee-for-Service beneficiaries in the territories, representing 4,058,930 person-years, and 56,565,190 unique Fee-for-Service beneficiaries in the states, representing 384,029,209 person-years. All-cause mortality was lower in the territories across the study period (Table 1).

Characteristics, Hospitalizations, and Outcomes for Fee-for-Service Beneficiaries

Demographic characteristics of patients hospitalized are shown in e-Appendix Figure 4. e-Appendix Table 2 shows patient comorbidities; there were modest differences except for higher rates of diabetes in all 3 conditions in the territories.

Observed hospitalization rates for patients with AMI, HF, and pneumonia were lower in the territories (Table 2, e-Appendix Figure 5). In 1999–2003 and 2008–2012, compared with the states, the adjusted incidence risk ratios of hospitalizations for patients from the territories were not significantly different (Figure 2). These findings did not solely reflect the influence of rates in Puerto Rico (e-Appendix Figure 6).

In-hospital, 30-day, and 1-year mortality rates were significantly higher for patients hospitalized in the territories for AMI, HF, and pneumonia in 1999–2003 (Table 2), which persisted in 2008–2012 (e-Appendix Figures 7, 8). In 2008–2012, the adjusted odds ratios for 30-day mortality for patients in the territories relative to the states were significantly higher: 1.34 (95% CI, 1.21 to 1.48), 1.24 (95% CI, 1.12 to 1.37), and 1.85 (95% CI, 1.71 to 2.00) for AMI, HF, and pneumonia, respectively (Figure 3). In 1999–2003, the territories had significantly higher adjusted 30-day readmission rates for all 3 conditions, but rates were no longer significantly higher in 2008–2012 (Figure 3). These findings were not due to Puerto Rico alone (e-Appendix Figure 9).

Medicare In-patient Payments, Length of Stay, and Discharge Disposition

In 1999–2003, total inflation-adjusted inpatient payments for all 3 conditions, in 2012 dollars, were significantly lower for patients in the territories despite higher length of stay, and these differences persisted over time (Table 2). In 2008–2012, inflation-adjusted inpatient payments were \$5,870 vs. \$15,104 (61% lower, absolute difference \$9,234, $p<0.001$) for AMI, \$4,460 vs. \$8,939 (50% lower, absolute difference \$4,479, $p<0.001$) for HF, and \$6,871 vs. \$11,274 (39% lower, absolute difference \$4,403, $p<0.001$) for pneumonia, for the territories and states, respectively. More patients in the territories were discharged directly home instead of a post-acute care facility (e- Figure 10).

DISCUSSION

Among Medicare **Fee-for-Service** beneficiaries hospitalized in the territories, in-hospital, 30-day, and 1-year mortality rates were higher, **with large absolute differences**, for AMI, HF, and pneumonia compared with patients hospitalized in the states and have increased over time, with most mortality rates for the territories in 2008–2012 at the same level of those in the states during 1999–2003. Moreover, payments for services were significantly lower in the territories.

There is **limited** literature on health in the territories.(3, 14–16) A **cross-section** study of publically reported hospital process and outcomes measures for AMI, HF, and pneumonia in 2005–2008 showed **worse quality** and outcomes in the territories than in the states.(24) Another showed poor quality of care in Puerto Rico.(25) This study adds comprehensive, **contemporary** information on hospitalizations, patient characteristics, in-hospital and long-term mortality, payments, length of stay, and discharge disposition.

The worse outcomes observed may reflect poorer quality of care in territory hospitals, **as documented** lower adherence to processes of care could translate to worse outcomes. (24, 25) (20, 26–28) Further, during a period characterized by **hospital quality improvement** in the states,(29) there have been few **such** efforts in the territories,(7, 30) which may explain the growing disparity in outcomes over time. **Our results are unlikely to reflect “adverse selection” of sicker patients in Fee-for-Service in the territories given declining all-cause mortality compared with increasing mortality in Medicare Advantage. Furthermore, the general population in the territories is not higher risk because all-cause Fee-for-Service mortality in the territories was lower than for both Fee-for-Service and Medicare Advantage in the states. Finally, large absolute differences in the context of relative differences indicate disparities not due to sample size effects alone**

Hospitalization rates for AMI, HF, and pneumonia were lower in the territories than in the states, but these differences were not significant after risk-adjustment. Our findings are consistent **with** studies showing lower hospitalization rates among non-white patients.(2, 31, 32) Territories **hospitals** may have a lower propensity to admit, **but we found** no marked differences in **comorbidities**. Further, a lower propensity to admit may reflect limited access to hospital beds or **longer emergency room wait times** rather than physician discretion.(33)

Our findings reflect the **broader** health care **context** in the territories.(34) Unequal access to programs, such as the Medicare Disproportional Share Hospital Program,(7) may have had a particularly important negative impact on the funding of hospitals in the territories, where poverty **rates** are generally substantially higher than in the states.(13) Moreover, the ACA is unlikely to benefit because of differential provisions,(35) including the absence of an individual mandate requirement and insurance subsidies in the territories. **Therefore**, potential benefits of increased health care coverage and access for a poor, highly-uninsured **are minimal**.(13)

Our study has several limitations. We **cannot** assert whether our findings are generalizable to younger populations or the Medicare Advantage population. **Moreover**, we utilized administrative claims data, which lack the clinical detail **of** medical records, but used established risk models for adjustment validated for claims.

CONCLUSIONS

In 2008–2012, we found higher, **or not significantly different**, mortality rates and lower payments for Medicare Fee-for-Service beneficiaries hospitalized with AMI, HF, and pneumonia in the territories. For many outcomes, differences increased over time.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Observed All-cause Mortality Rates Among Medicare Fee-for-Service and Medicare Advantage Beneficiaries Age 65 Years in the Territories and States, 1999–2012.

Medicare beneficiaries aged 65 years enrolled in the Fee-for-Service plan for 1 month and Medicare beneficiaries aged 65 years enrolled in a Medicare Advantage program for the full duration for a given year are shown. The blue line represents mortality among Fee-for-Service beneficiaries in the territories, the yellow line represents mortality among Medicare Advantage beneficiaries in the territories, the green line represents mortality among Fee-for-Service beneficiaries in the states, and the orange line represents mortality among Medicare Advantage beneficiaries in the states.

Figure 2.

Risk of Hospitalization for Medicare Fee-for-Service Beneficiaries from the Territories Compared with Beneficiaries from the States for Acute Myocardial Infarction, Heart Failure, or Pneumonia, 1999–2012.

Adjusted incidence risk ratios for hospitalization for Medicare Fee-for-Service beneficiaries from the territories compared with those from the states (referent) for each of the 3 conditions (acute myocardial infarction, heart failure, and pneumonia) in each study period (1999–2003, 2004–2007, 2008–2012).

Figure 3.

Odds of 30-day Mortality, 30-day Readmission, and 1-year Mortality for Medicare Fee-for-Service Beneficiaries Hospitalized with Acute Myocardial Infarction, Heart Failure, or Pneumonia in the Territories Compared with the States, 1999–2012.

Adjusted odds ratios for 30-day mortality, 30-day readmission, and 1-year mortality for Medicare Fee-for-Service beneficiaries hospitalized in the territories compared with those hospitalized in the states (referent) for each of the 3 conditions (acute myocardial infarction, heart failure, and pneumonia) in each study period (1999–2003, 2004–2007, 2008–2012).

Table 1.
Characteristics of Medicare Beneficiaries Age 65 Years in the Territories and States, 1999–2012.

	1999–2003		2004–2007		2008–2012	
	Territories	States	Territories	States	Territories	States
Medicare Population, age 65 years						
Average annual total beneficiaries (#)	412,106	33,589,599	454,516	35,012,833	510,356	38,363,928
Mean age, year (SD)	76.1 (9.3)	75.2 (7.4)	76 (9.0)	75.3 (7.6)	75.7 (8.7)	75.1 (7.7)
Female (%)	55.9	58.8	56.1	57.9	56.1	56.8
Race (%)						
White	59.9	86.9	64.8	86.1	69.0	85.0
Black	5.6	8.0	6.0	8.2	6.4	8.4
Other	34.5	5.1	29.2	5.7	24.6	6.5
Dual Medicare/Medicaid eligibility (%)	1.4	12.1	1.3	13.1	1.0	13.1
All-cause annual mortality rate (%)	4.3	5.3	4.2	4.9	3.9	4.6
Medicare Fee-for-Service Population						
Average annual total beneficiaries (#)	408,832	28,182,217	330,514	29,436,571	196,919	28,849,045
Proportion of total Medicare population	99.2	83.9	72.7	84.1	38.6	75.2
Average annual total person-years	394,427	26,862,091	292,605	27,995,652	183,275	27,547,229
Mean age, year (SD)	76.1 (9.3)	75.3 (7.5)	76.6 (9.7)	75.3 (7.6)	77.9 (10.8)	75.1 (7.9)
Female (%)	55.9	58.8	56.1	57.7	55.1	56.6
Race (%)						
White	59.9	87.2	64.4	86.4	67.1	85.5
Black	5.6	8.0	5.9	8.1	6.1	8.1
Other	34.5	4.8	29.7	5.5	26.8	6.4
No supplemental medical insurance (Medicare Part B) (%) *	23.9	4.3	31.2	5.1	51.8	7.6
At least 1 month of enrollment in Medicare Advantage (%)	2.0	2.2	18.9	3.1	8.6	2.6
Dual Medicare/Medicaid eligibility (%)	1.4	13.4	1.4	13.7	1.5	13.6
All-cause annual mortality rate (%)	4.3	5.4	4.2	5.1	3.5	4.8
Medicare Advantage Population						
Average annual enrollment in Medicare Advantage for all 12 months (#)	3274	5,407,382	124,002	5,576,256	313,436	9,514,883
Proportion of total Medicare population (%)	0.8	16.1	27.3	15.9	61.4	24.8

	1999–2003		2004–2007		2008–2012	
	Territories	States	Territories	States	Territories	States
Mean age, year (SD)	73.8 (7.0)	74.7 (6.9)	74.2 (7.3)	75.4 (7.1)	74.3 (7.3)	74.9 (7.3)
Female (%)	53.9	58.2	56.1	58.4	56.8	57.5
Race (%)						
White	59.0	85.6	65.8	84.0	70.1	83.4
Black	6.2	7.9	6.4	8.9	6.6	9.6
Other	34.8	6.5	27.8	7.1	23.3	7.0
Dual Medicare/Medicaid eligibility (%)	3.1	5.5	1.1	9.7	0.6	11.4
All-cause annual mortality rate (%)	3.7	4.4	4.1	4.4	4.1	4.0

Note: All differences in rates between the territories and states are significant at $p < 0.01$.

* Medicare Part B covers doctors' services and outpatient care, as well as services and supplies deemed medically necessary. Fee-for-Service beneficiaries have to pay to obtain Part B, in contrast to most managed care plans in which these services are covered.

Table 2.

Hospitalizations and Outcomes for Medicare Fee-for-Service Beneficiaries Hospitalized with Acute Myocardial Infarction, Heart Failure, and Pneumonia in the Territories and States, 1999–2012.

	1999–2003		2004–2007		2008–2012	
	Territories	States	Territories	States	Territories	States
Acute Myocardial Infarction						
Hospitalization rates (per 100,000 PY) (95% CI)	1080 (1066–1095)	1319 (1317–1321)	1025 (1007–1043)	1058 (1056–1060)	689 (672–706)	857 (856–859)
Outcomes (95% CI)						
In-hospital mortality rate	17.2 (16.7–17.8)	12.9 (12.9–13.0)	16.7 (16.0–17.5)	10.3 (10.2–10.3)	14.5 (13.6–15.5)	8.3 (8.3–8.4)
30-day mortality rate	21.8 (21.2–22.4)	18.0 (18.0–18.1)	21.1 (20.3–21.9)	15.9 (15.8–15.9)	18.7 (17.7–19.7)	14.3 (14.2–14.4)
1-year mortality rate	34.1 (33.4–34.8)	30.6 (30.5–30.6)	35.0 (34.1–36.0)	28.6 (28.6–28.7)	33.6 (32.3–34.8)	27.0 (27.0–27.1)
30-day readmission rate	25.9 (25.1–26.6)	21.9 (21.9–22.0)	23.6 (22.6–24.5)	21.4 (21.3–21.5)	20.8 (19.6–22.1)	19.6 (19.5–19.7)
Mean length of stay, days (SD)	6.9 (6.0)	6.4 (6.7)	7.0 (6.8)	6.1 (6.3)	6.9 (7.0)	5.4 (5.6)
Total Medicare in-patient payments (2012 \$, (SD))	5139 (6627)	14,881 (17,355)	5973 (7284)	16,086 (16,202)	5870 (8215)	15,104 (17,355)
Heart Failure						
Hospitalization rates (per 100,000 PY)	2253 (2232–2274)	2513 (2511–2516)	1614 (1591–1637)	2279 (2276–2282)	1071 (1050–1093)	1834 (1832–1837)
Outcomes (95% CI)						
In-hospital mortality rate	6.9 (6.7–7.2)	5.8 (5.7–5.8)	7.5 (7.0–7.9)	4.5 (4.5–4.6)	7.6 (7.0–8.2)	4.0 (4.0–4.0)
30-day mortality rate	10.9 (10.6–11.3)	11.4 (11.4–11.5)	11.4 (10.9–12.0)	10.7 (10.7–10.8)	11.6 (10.8–12.3)	11.4 (11.3–11.4)
1-year mortality rate	29.7 (29.2–30.2)	31.4 (31.4–31.5)	31.3 (30.5–32.1)	30.9 (30.8–31.0)	33.0 (31.9–34.1)	33.1 (33.0–33.1)
30-day readmission rate	21.8 (21.4–22.3)	20.9 (20.9–21.0)	21.4 (20.7–22.1)	21.3 (21.3–21.4)	20.5 (19.5–21.5)	21.2 (21.1–21.2)
Mean length of stay, days (SD)	6.5 (5.8)	5.8 (5.6)	6.8 (6.7)	5.5 (5.3)	7.1 (7.6)	5.3 (5.0)
Total Medicare in-patient payments (2012 \$, (SD))	3340 (4442)	7594 (10,157)	4062 (6071)	8917 (11,089)	4460 (6269)	8939 (11,518)
Pneumonia						
Hospitalization rates (per 100,000 PY)	2185 (2165–2206)	2509 (2507–2512)	1881 (1857–1906)	2327 (2325–2330)	1150 (1129–1172)	2055 (2053–2057)
Outcomes (95% CI)						
In-hospital mortality rate	17.3 (16.9–17.7)	10.9 (10.9–10.9)	18.8 (18.2–19.3)	9.8 (9.7–9.8)	22.8 (22.0–23.7)	10.4 (10.4–10.4)
30-day mortality rate	21.4 (21.0–21.9)	17.3 (17.3–17.4)	22.5 (21.9–23.1)	16.7 (16.7–16.8)	26.0 (25.1–26.9)	18.9 (18.8–18.9)
1-year mortality rate	37.5 (37.0–38.0)	35.7 (35.6–35.7)	39.6 (39.0–40.3)	35.0 (34.9–35.0)	44.5 (43.5–45.5)	37.5 (37.4–37.5)
30-day readmission rate	17.4 (17.0–17.8)	16.9 (16.8–16.9)	17.6 (17.0–18.2)	17.7 (17.6–17.7)	16.5 (15.6–17.3)	17.9 (17.9–18.0)
Mean length of stay, days (SD)	9.7 (8.2)	7.0 (7.0)	9.8 (8.6)	6.7 (6.6)	10.7 (10.5)	6.7 (6.9)

	1999–2003		2004–2007		2008–2012	
	Territories	States	Territories	States	Territories	States
Total Medicare in-patient payments (2012 \$s, (SD))	4905 (8073)	9035 (13,717)	5252 (7556)	9376 (12,541)	6871 (9470)	11,274 (14,031)

CI: Confidence interval; SD: Standard deviation; PY: Patient-years

* In-patient payments are inflation adjusted to 2012

* The risk-standardized mortality and readmissions measures utilized were developed for CMS and endorsed by the National Quality Forum. Risk-adjustment algorithms for 30-day mortality models were extended to 1-year mortality models.