Original Investigation

# Growth in Medicare Expenditures for Patients With Acute Myocardial Infarction
## A Comparison of 1998 Through 1999 and 2008

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**IMPORTANCE** Medicare expenditures continue to grow rapidly, but the reasons are uncertain.

**OBJECTIVE** To compare expenditures from 1998 through 1999 and 2008 for Medicare beneficiaries hospitalized for acute myocardial infarction (AMI).

**DESIGN, SETTING, AND PARTICIPANTS** Cross-sectional analysis of a random 20% sample of fee-for-service Medicare beneficiaries admitted with AMI from 1998 through 1999 (n = 105 074) and a 100% sample for 2008 (n = 212 329).

**MAIN OUTCOMES AND MEASURES** Per-beneficiary expenditures, standardized for price and adjusted for risk and inflation. Expenditures were measured across 4 periods: overall (index admission to 1 year), index (within the index admission), early (postindex admission to 30 days), and late (31-365 days).

**RESULTS** Compared with the subjects from 1998 through 1999, those in 2008 were older and had more comorbidities but slightly less ischemic heart disease and cerebrovascular disease. Although there was a 19.2% decline in the rate of hospitalizations for AMI, overall expenditures per patient increased by 16.5% (absolute difference, $6094). Of the total risk-adjusted increase in expenditures, 25.6% occurred within 30 days (22.0% attributed to the index admission), and 74.4% happened 31 to 365 days after the index admission. Spending per beneficiary within 30 days increased by $1560 (7.5%), and spending between 31 and 365 days increased by $4535 (28.0%). Expenditures for skilled nursing facilities, hospice, home health agency, durable medical equipment, and outpatient care nearly doubled 31 to 365 days after admission. Mortality within 1 year declined from 36.0% in 1998 through 1999 to 31.7% in 2008; of the decline, 3.3% was in the 30 days following admission, and 1.0% was in days 31 to 365.

**CONCLUSIONS AND RELEVANCE** Between 1998 and 2008, Medicare expenditures per patient with an AMI substantially increased, with about three-fourths of the increase in expenditures occurring 31 to 365 days after the date of hospital admission. Although current bundled payment models may contain expenditures within 30 days of an AMI, they do not contain spending beyond 30 days.

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Between 2000 and 2010, the growth in Medicare expenditures per enrollee, without adjusting for inflation, was about 5.9% annually, considerably greater than the 2.8% annual growth in gross domestic product.[1,2] Given the large budget deficits in the United States and the high cost of caring for Medicare beneficiaries, unanswered questions remain: why have Medicare costs been rising so rapidly? Do reimbursement rates, or the mix of services per disease, account for increased expenditures? Alternatively, has the threshold for treatment decreased so that patients are treated more aggressively?

We addressed these questions with detailed Medicare claims data and focused on a well-defined index event: hospital admission for acute myocardial infarction (AMI). Patients with AMI are almost universally hospitalized (making this a reliable index event). The considerable technological progress in the treatment of AMI has improved survival rates.[3] For the index admission, our hypothesis was that changes in both the technology of treatment and reimbursement rates led to increased costs. For the acute (within 30 days of the AMI) and longer-term (31-365 days) postadmission periods, our hypothesis was that treatment intensity increased for patients after their initial hospitalization.

## Methods

This study was approved by Dartmouth College's Committee on the Protection of Human Subjects (CPHS No. 15475).

### Data

We used a random 20% sample of Medicare beneficiaries from 1998 through 1999 and a 100% sample for 2008. Eligible patients were fee-for-service Medicare enrollees with the diagnosis of AMI based on the presence of appropriate diagnosis codes from the *International Classification of Diseases, Ninth Revision* (410.xx [except 410.x2]), from 1998 through 1999 or 2008. Eligibility in the sample was limited to those (1) enrolled in Medicare (Part A and B, as identified through the Medicare denominator file) for the entire year beyond their index admission (or until the month of their death), (2) at least 65 years or older at the time of their index admission, and (3) enrolled in a non-health maintenance organization plan for more than 1 month during each of the 12-month periods (eFigure in the Supplement). Data from the Medicare Provider Analysis and Review files were linked to other Centers for Medicare & Medicaid Services files (Carrier file, Home Health Agency, Durable Medical Equipment, Outpatient, and Hospice) containing claims that represented services associated with the patient's index admission and subsequent services (and expenditures) for a 1-year period following admission. Outpatient claims differ from physician claims; they include bills from rehabilitation facilities, hospital outpatient departments, and other institutional outpatient providers.

We excluded patients admitted to a non-acute care hospital with a primary diagnosis of AMI, those transferred to an acute care hospital with a primary diagnosis other than AMI, and those discharged alive with a total length of stay less than 1 day and who were not transferred. These exclusions left a total of 317 403 patients in our final sample (eFigure in the Supplement).

We defined a transfer as occurring if the date of discharge was the same as the date of admission between 2 mutually exclusive hospitals. The total length of stay for the index admission was defined from the date of admission to discharge, including any transfers.

### Calculation of Expenditures

We report price-standardized Medicare payments for the index admission and postindex use up to 1 year following a patient's hospitalization for AMI.[4] Standardized Medicare payments adjust for differences across regions in reimbursement rates for Medicare services owing to costs of living, graduate medical education, and payments provided for serving a disproportionate number of low-income patients.

### Hospital Payments

Hospital payments included the acute index hospitalization (diagnostic-related group [DRG] payment plus outlier payments when present) and other hospitalizations occurring within 1 year of the initial admission date. Expenditures included actual payments to providers but not amounts billed to patients or their supplemental insurance policies.

We disaggregated expenditures after the index admission into the specific categories of hospital use and accounted for changes in definitions of DRGs over time, including the (new) Medicare Severity–Diagnosis-Related Group (MS-DRG) categories (eTables 1 and 2 in the Supplement). Because of the difficulty of risk-adjusting each specific DRG/MS-DRG category in every period, we present unadjusted expenditures.

### Physician Payments and Use

We provide use of and payments for physician services based on current procedural terminology and the Berenson-Eggers type of service codes.[5] The Berenson-Eggers codes create clinically relevant service categories for analyzing Medicare expenditures.

### Other Expenditures After the Index Hospitalization

We included expenditures for skilled nursing facilities, outpatient facilities, home health agency, hospice, and durable medical equipment.

### Statistical Analysis

We calculated the population-based rates of AMI hospitalizations and total expenditures (index and postindex admission) for all fee-for-service Medicare beneficiaries. The 1998 through 1999 expenditures are expressed in terms of 2008 US dollars after adjustment for general inflation using the chain-weighted gross domestic product price deflator. We adjusted for age, sex, race, ST-segment AMI, and Charlson comorbidities (including 13 comorbid conditions previously predictive of long-term mortality).[6] We used 2-sample *t* tests (for unequal sample sizes and unequal variances across periods). Although our study was not designed to test the causal effect of greater spending levels on health outcomes, we used a simi-

lar risk adjustment approach to compare 30-day rates from 1998 through 1999 with corresponding 31- to 365-day case fatality rates in 2008.

## Results

We identified 317 403 Medicare beneficiaries who were hospitalized for an AMI (105 074 from the 20% sample of enrollees in 1998-1999 and 212 329 from the 100% sample in 2008). These comprised 0.64% of all fee-for-service Medicare enrollees from 1998 through 1999 and 0.47% in 2008 ($P < .001$). Thus, there was a 19.2% decline in the incidence of AMI during the decade.

As shown in **Table 1**, patients in 2008 were older and sicker on average than patients in 1998 through 1999 and had more comorbid conditions, exclusive of less ischemic heart disease and cerebrovascular disease (all $P < .001$). There was a shift from coronary artery bypass graft (CABG) surgery during the index admission to percutaneous coronary intervention. Median length of stay was 1 day shorter in 2008 (5 vs 6 days in 1998-1999, $P < .001$). Reductions in length of stay were associated with concomitant increases in other expenditures, including a 75.4% increase in the use of skilled nursing facilities in the first 30 days (**Table 2**).

Overall, 1-year case fatality rates per patient with AMI declined from 36.0% from 1998 through 1999 to 31.7% in 2008; of the 4.3% decline, 3.3% was in the 30 days following admission (from 18.6% to 15.3%) and 1.0% was in days 31 to 365. The case fatality rate for days 31 to 365 (among patients surviving for 30 days after an AMI) declined from 22.3% to 20.2%. The available data did not allow us to measure changes in quality of life.

Adjusted 1-year expenditures increased 16.5% (absolute difference, $6094) for 1998 through 1999 compared with 2008 (Table 2). Spending per beneficiary within 30 days increased by $1560 (7.5%), and spending between 31 and 365 days increased by $4535 (28.0%). Medicare expenditures in the first 30 days accounted for 25.6% of the increase in spending (22.0% attributed to the index admission); expenditures between 31 and 365 days after admission accounted for the remaining 74.4%. The components of the 74.4% increase between 31 and 365 days were home health agency, hospice, or durable medical equipment (22.9%); skilled nursing facilities (17.3%); inpatient (12.8%) and outpatient (11.1%) services; and physician payment (10.4%).

Together, inpatient and skilled nursing facility spending accounted for the greatest absolute change in cost (total of $3033) during 1 year (Table 2) and the greatest proportion of the overall cost increase (48.8%). Growth in home health agency and hospice expenditures was not associated with declines in inpatient facility expenditures.

From 1998 through 1999, 33.9% of the cohort was rehospitalized within 3 months of the index admission (20.0% within 1 month) compared with 33.4% within 3 months in 2008 (19.8% within 1 month). Although overall rates of readmission did not change appreciably, the mean cost per readmission increased by 9.8% ($8991 in 1998-1999 to $9874 in 2008).

**Table 1. Characteristics of Patients and Care Provided to Medicare Beneficiaries Admitted for Acute Myocardial Infarction, 1998 Through 1999 and 2008[a]**

| Characteristic | 1998-1999 (20% Sample From Each Year) | 2008 (100% Sample) |
|---|---|---|
| No. of patients | 105 074 | 212 329 |
| Age, y | | |
| Mean (SD) | 77.7 (7.7) | 78.9 (8.3) |
| 65-74 | 39 908 (38.0) | 71 465 (33.7) |
| 75-84 | 43 448 (41.4) | 82 169 (38.7) |
| ≥85 | 21 718 (20.7) | 58 695 (27.6) |
| Race | | |
| White | 93 506 (89.0) | 187 048 (88.1) |
| Black | 6803 (6.5) | 16 186 (7.6) |
| Other | 4765 (4.5) | 9095 (4.3) |
| Female sex | 52 532 (50.0) | 107 662 (50.7) |
| Comorbid conditions | | |
| Ischemic heart disease | 48 786 (46.4) | 94 701 (44.6) |
| Peripheral arterial disease | 12 563 (12.0) | 27 113 (12.8) |
| Coronary heart disease | 105 074 (100.0) | 212 329 (100.0) |
| Cerebrovascular disease | 12 576 (12.0) | 23 687 (11.2) |
| Type 2 diabetes mellitus | 31 654 (30.1) | 68 402 (32.2) |
| Procedures performed and resource use | | |
| PCI | 22 766 (21.7) | 68 089 (32.1) |
| CABG surgery | 15 128 (14.4) | 21 704 (10.2) |
| Length of stay, median (SE), d | 6.0 (7.0) | 5.0 (8.0) |
| Outcome | | |
| In-hospital mortality | 16 612 (15.8) | 23 659 (11.1) |
| 30 d[b] | 18.6 (0.1) | 15.3 (0.08) |
| 31-365 d[b] | 22.3 (0.1) | 20.2 (0.09) |

Abbreviations: CABG, coronary artery bypass graft; PCI, percutaneous coronary intervention.

[a] Values represent the number (percentage) unless otherwise specified. All comparisons are at $P < .001$. *International Classification of Diseases, Ninth Revision* codes are as follows: ischemic heart disease (428), peripheral arterial disease (440-448), coronary heart disease (410-414, 429.2), cerebrovascular disease (430-438), type 2 diabetes mellitus (250), PCI (00.66, 36.01, 36.02, 36.05, 36.06, 36.07, and 36.09; *Current Procedural Terminology* codes: 92980-92982, 92984, and 92995-92996), and CABG (36.1-36.19 and 39.61 if using cardiopulmonary bypass).

[b] Represents risk-adjusted percent (standard error). The 31- to 365-day rate is conditional on surviving the first 30 days.

The greatest absolute increases (from 1998-1999 to 2008) in hospital facility expenditures during 1 year per patient with AMI were for percutaneous coronary intervention ($571) and cardiac defibrillator implantation ($541), the latter a technology not reimbursed by Medicare for coronary artery disease from 1998 through 1999 (**Figure 1**). Unadjusted expenditures for cardiac defibrillator implantation, rehabilitation, or septicemia accounted for 47.1% of the increase in hospitalization costs after the index admission.

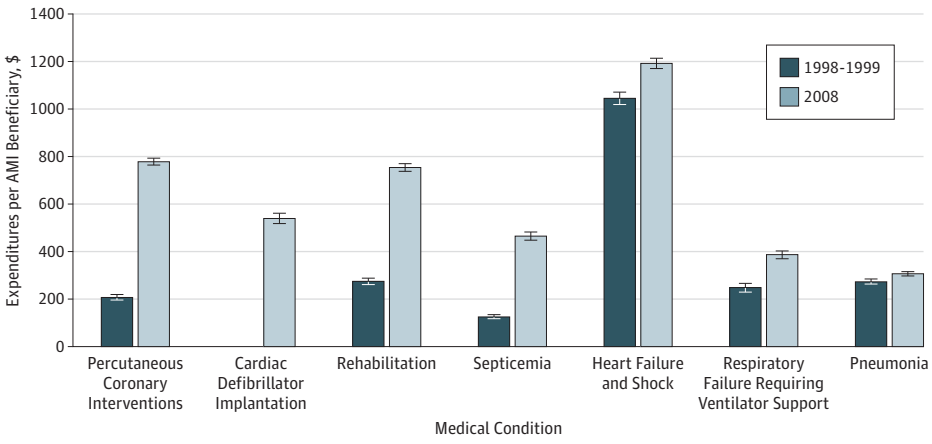
Physician expenditures per beneficiary decreased by 1.0% during the index admission and were unchanged within the first 30 days (Table 2). Between 31 and 365 days, physician expenditures increased by $632 (21.8%), primarily because of a 43.5% increase in outpatient physician spending (Table 2). The

Table 2. Total, Index, and Postindex Admission Spending for Patients Admitted for Acute Myocardial Infarction[a]

| Characteristic | 1998-1999, US$ (n = 105 074) | 2008, US$ (n = 212 329) | Change | | % of Total Increase |
|---|---|---|---|---|---|
| | | | Absolute, US$ | Relative, % | |
| Total spending | 37 026 (122.8) | 43 120 (84.2) | 6094 | 16.5 | 100 |
| Inpatient services | 26 187 (90.9) | 27 586 (62.9) | 1399 | 5.3 | 23.0 |
| Skilled nursing facility | 2066 (24.3) | 3700 (16.8) | 1634 | 79.1 | 26.8 |
| Physician payment | 5725 (19.4) | 6360 (13.4) | 633 | 11.1 | 10.4 |
| Outpatient services | 1432 (15.2) | 2356 (10.5) | 924 | 64.5 | 15.2 |
| Home health agency, hospice, or durable medical equipment | 1616 (18.4) | 3118 (12.7) | 1502 | 93.0 | 24.7 |
| Index admission | 18 710 (63.6) | 20 053 (44.0) | 1342 | 7.2 | 22.0 |
| Inpatient services | 16 142 (57.2) | 17 304 (39.6) | 1162 | 7.2 | 19.1 |
| Physician payment | 2428 (7.8) | 2396 (5.4) | −32 | −1.3 | −0.5 |
| Other | 140 (2.7) | 353 (1.9) | 213 | 152.1 | 3.5 |
| Up to 30 d after the index admission | 20 856 (55.9) | 22 416 (38.7) | 1560 | 7.5 | 25.6 |
| Inpatient services | 16 875 (48.9) | 17 496 (33.8) | 621 | 3.7 | 10.2 |
| Skilled nursing facility | 767 (10.5) | 1345 (7.2) | 578 | 75.4 | 9.5 |
| Physician payment | 2831 (7.4) | 2833 (5.1) | 1 | 0.1 | 0 |
| Outpatient services | 199 (3.3) | 449 (2.3) | 250 | 125.6 | 4.1 |
| Home health agency, hospice, or durable medical equipment | 184 (2.7) | 293 (1.8) | 109 | 59.2 | 1.8 |
| 31 to 365 d after the index admission | 16 171 (96.4) | 20 705 (66.7) | 4535 | 28.0 | 74.4 |
| Inpatient services | 9312 (67.4) | 10 091 (46.6) | 779 | 8.4 | 12.8 |
| Skilled nursing facility | 1299 (19.8) | 2355 (13.7) | 1056 | 81.3 | 17.3 |
| Physician payment | 2895 (16.3) | 3527 (11.3) | 632 | 21.8 | 10.4 |
| Outpatient services | 1233 (14.3) | 1907 (9.9) | 674 | 54.7 | 11.1 |
| Home health agency, hospice, or durable medical equipment | 1432 (17.8) | 2825 (12.3) | 1393 | 97.3 | 22.9 |

[a] Adjusted for age, sex, race, ST-segment acute myocardial infarction, and Charlson comorbidities. Values represent the numerator (SE) unless otherwise specified.

Figure 1. Expenditures for Rehospitalization, Based on Diagnostic-Related Group (for 1998-1999) and Medicare Severity–Diagnosis-Related Group (for 2008)




Expenditures reflect the total hospital facility cost (in 2008 US dollars) for the specific reason per patient with acute myocardial infarction (AMI) accrued during 1 year following index discharge.

greatest per-beneficiary increase in expenditures after the index admission, $498, was for durable medical equipment or "other services or exceptions," such as ambulance transport and chiropractic care (**Table 3**). Expenditures in this category increased from $602 in 1998 through 1999 to $1100 in 2008.

Physician expenditures for cardiac procedures after the index hospitalization declined from $1120 per patient from 1998 through 1999 to $803 in 2008, or by 28.3% (Table 3). The rate of rehospitalizations for percutaneous coronary interventions increased from 1.7 per 100 patients with AMI from 1998

Table 3. Rates and Expenditures for Physician and Other Services[a] in 1998 Through 1999 and 2008 After the Index Admission for Acute Myocardial Infarction (AMI)[b]

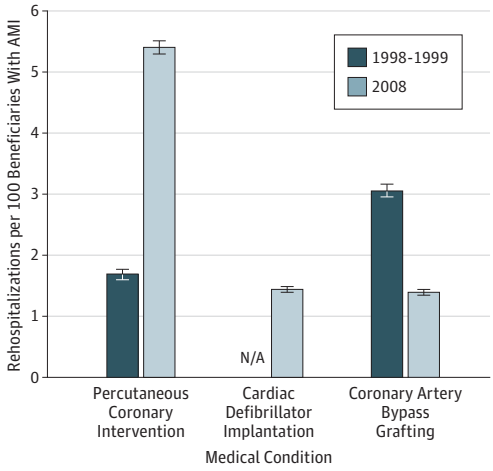
| | Expenditures per AMI Patient | | | | Rates per 100 AMI Patients | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Change | | | | Change | |
| Expenditure Type | 1998-1999, US$ (n = 105 074) | 2008, US$ (n = 212 329) | Absolute, US$ | Relative, % | 1998-1999, US$ (n = 105 074) | 2008, US$ (n = 212 329) | Absolute, US$ | Relative % |
| Evaluation and management | 2491 (9.3) | 2807 (6.4) | 316 | 12.7 | 3330 (12) | 3910 (8) | 580 | 17.4 |
| Cardiac procedures | 1120 (4.0) | 803 (2.7) | −317 | −28.3 | 220 (1) | 230 (1) | 10 | 4.5 |
| Noncardiac procedures | 686 (4.2) | 698 (2.9) | 12 | 1.7 | 480 (5) | 640 (3) | 160 | 33.3 |
| Imaging | 525 (2.0) | 600 (1.4) | 75 | 14.3 | 1510 (5) | 1940 (3) | 430 | 28.5 |
| Testing | 302 (1.4) | 351 (1.0) | 49 | 16.2 | 2060 (8) | 2290 (6) | 230 | 11.2 |
| Durable medical equipment, other services, or exceptions | 602 (9.0) | 1100 (6.2) | 498 | 82.7 | 580 (6) | 710 (4) | 130 | 22.4 |

[a] Derived from Berenson-Eggers type of service codes.[5]

[b] Expenditures are reported per patient with acute myocardial infarction (AMI). Rates are reported per 100 patients with AMI and adjusted for age, sex, race, ST-segment AMI, and Charlson comorbidities. Values represent the numerator (SE) unless otherwise specified.

through 1999 to 5.4 in 2008 (**Figure 2**). However, the rehospitalization rate for CABG surgery declined from 3.1 per 100 patients with AMI from 1998 through 1999 to 1.4 in 2008, or by 54.8%. Medicare's cost per patient during 1 year for those undergoing inpatient percutaneous coronary interventions, with adjustment for inflation but not risk, was $12 327 from 1998 through 1999 and $14 385 in 2008, a 16.7% increase. Medicare's cost per patient during 1 year for rehospitalizations in which a CABG was performed, with adjustment for inflation but not risk, was $31 727 from 1998 through 1999 and $30 686 in 2008. For both percutaneous coronary interventions and the rehospitalizations for CABG, the figures for cost per patient include the instances when a patient had more than 1 percutaneous coronary intervention or more than 1 rehospitalization for CABG within the year; the figures are not per percutaneous coronary intervention or per rehospitalization for CABG.

Figure 2. Rehospitalization Rates Following Index Hospitalization per 100 Beneficiaries With Acute Myocardial Infarction (AMI) for 3 Common Conditions




Medicare did not reimburse cardiac defibrillator implants for coronary artery disease from 1998 through 1999; their use rates in this period are denoted with NA (not applicable).

## Discussion

Although fewer Medicare beneficiaries were admitted for AMI from 1998 through 1999 compared with 2008, total inflation-adjusted spending for patients increased by 16.5%, with about one-fourth of the increase in the first 30 days and about three-fourths between days 31 and 365.

Our findings inform discussion about the reasons health care expenditures are increasing in the United States. Are there increases in the quantity of services, the price per service, or both? A study using private insurance data from 2001 through 2006 suggested that most of the increase in expenditures resulted from greater provision of outpatient services and pharmaceuticals.[7] Another study attributed the increase in private insurance costs between 2009 and 2011 primarily to increases in prices charged by providers.[8] Less is known about the causes of growth per enrollee within the Medicare program; the program sets reimbursement rates that have grown slowly (if at all).

We studied the cost to Medicare during 365 days of a well-defined cohort of beneficiaries hospitalized for AMI. Increased expenditures were not largely the result of price increases (DRG reimbursement stayed constant or even declined in real terms) or changes in the use of technology during the index admission. Instead, expenditures 31 to 365 days after the index admission rose by 28.0% because of increased use of home health agencies, hospices, durable medical equipment, skilled nursing facilities, and inpatient services. Although the first 30 days after admission are the focus of many bundled payment initiatives, care after the initial admission is still very much "fee for service," with greater intensity of care per patient rewarded with increased Medicare reimbursements. Similar to Chandra et al,[9] our findings suggest the need to revisit containing costs beyond an arbitrary 30-day (or 90-day) time frame, akin to accountable care organizations.

Our study and others have found a substantial decrease in the number of hospitalizations for AMI from 1998 through 1999 and 2008, despite the aging of the population.[3,10,11] Decreases in the rates of AMI are likely attributable to improvements in the prevention and treatment of coronary artery diseases.[10,11]

Although hospitals have incentives to transfer patients to other facilities to reduce length of stay and costs under Medicare's prospective payment system, Chen and colleagues[12] reported a significant relationship between discharge to a skilled nursing facility and the risk of a rehospitalization within 30 days of an AMI. Medicare instituted prospective payments for skilled nursing facilities in 1998.[13] Our findings suggest that this policy change has not been effective at containing the growth in expenditures for skilled nursing facilities, either within 30 days of the index hospital admission or within 31 to 365 days.

Total physician spending increased by 21.8% between 31 and 365 days after the index admission. Epstein et al[11] reported a 38% decrease in CABG and a 4% decrease in total inpatient and outpatient percutaneous coronary interventions between 2001 and 2008. Their study examined population-based rates of coronary interventions; their cohort was not restricted to patients with specific initial diagnoses, such as AMI. Our study, using Medicare claims, found a 28.3% decrease in postindex admission expenditures for cardiac procedures, resulting from a reduction in the use of CABG, not a decrease in the use of percutaneous coronary interventions. Differences between the 2 studies may be attributed to the differences in the periods and in the sampling of patients.

In our study, many rehospitalizations within 365 days were unrelated to the index admission. Our results are consistent with those of Dunlay and colleagues,[14] who reported that 18.6% of patients with incident AMI were rehospitalized within 30 days, with 30% of these rehospitalizations for reasons unrelated to the original condition.

Our study has limitations. First, there may be unmeasured confounding, including changes in the underlying health status of patients that are not reflected in Medicare claims data. Second, we could not determine the effect of specific medical treatments on the mortality declines following AMI from 1998 through 1999 and 2008. It is likely that some of the increased expenditures led to reductions in morbidity and mortality, such as through the use of prophylactic cardiac defibrillators for ischemic cardiomyopathy.[15] Home health care has not been associated with improved survival,[16] and according to 1 study, psychosocial nursing interventions for patients following AMI have not improved outcomes.[17] Indeed, Setoguchi et al[18] reported that reductions in long-term mortality after AMI between 1995 and 2004 were entirely due to better adherence to cardiovascular medications after discharge, which is not reflected in our expenditure measures. Drug use data are not available prior to Medicare Part D, which took effect in 2006.

Third, our study did not include Medicare patients enrolled in Medicare Advantage managed care (which grew as a percentage of Medicare from 17% to 21% during our study period),[19] making this enrollment increase an unlikely explanation for our results. Fourth, recent studies have shown a slowing rate of growth of Medicare expenditures, suggesting that the increase we observed in expenditures for patients with AMI may not have continued at the same rate after 2008 and may not continue in the future.[20] Finally, we did not include patients' out-of-pocket expenditures or care billed to supplemental insurance policies.[21]

In summary, our findings suggest that although Medicare's current bundled payments may include expenditures for patients with AMI within 30 days of the event, they do not contain spending beyond 30 days, which accounted for most of the expenditure growth for such patients from 1998 through 1999 and 2008. This growth in the use of health care services 31 to 365 days after an AMI challenges efforts to control costs. A potential approach is to extend bundled or episode-based reimbursements to periods beyond 30 days.

## ARTICLE INFORMATION

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**Author Contributions:** Drs Likosky and Skinner had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
*Study concept and design*: Likosky, Zhou, Malenka, Skinner.
*Acquisition of data*: Zhou, Skinner.
*Analysis and interpretation of data*: All authors.
*Drafting of the manuscript*: Likosky, Borden, Skinner.
*Critical revision of the manuscript for important intellectual content*: All authors.
*Statistical analysis*: Zhou, Skinner.
*Obtained funding*: Skinner.
*Administrative, technical, and material support*: Likosky, Zhou, Malenka.
*Study supervision*: Malenka.

**Conflict of Interest Disclosures:** Dr Skinner reported being a consultant to the National Bureau of Economic Research, receiving a grant from the Robert Wood Johnson Foundation, receiving payment for lectures from Cancer Clinics of Excellence and the Organisation for Economic Co-operation and Development, receiving travel expenses from the government of the Netherlands and the Congress of Neurological Surgeons, and serving on an advisory committee for Dorsata, Inc. Dr Borden reported serving as a senior advisor in the US Department of Health and Human Services, although his work on this study was not related to the US Department of Health and Human Services. Dr Likosky reported receiving a grant from the Agency for Healthcare Research and Quality. Dr Borden reported receiving support at Cornell University as a Nanette Laitman Clinical Scholar.

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Invited Commentary

# Going After the Money
## Curbing the Rapid Growth in Medicare Expenditures for Medical Services More Than 30 Days After Hospital Admission

Ashish K. Jha, MD, MPH

**Willie Sutton, the infamous** bank robber, was once asked why he robbed banks. He retorted, "That's where the money is." Sutton's response holds an obvious but critical lesson for policy makers, who are struggling with the rising costs of health care in the United States. Most people in the United States agree that high health care costs are a major threat, but these costs are not the biggest problem. The larger challenge is that the growth in health care spending continues to outstrip inflation and even economic activity. The United States is able to spend nearly 18% of national income on health care[1] by cutting back on other spending, such as that for infrastructure and education. Over time, if health care spending continues to grow at a rate faster than the economy, we will be forced to make even bigger cuts to spending on roads, bridges, medical research, teachers, and other social goods.

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A growing consensus is that "bending the cost curve"—slowing down the growth in health care costs—is the principal domestic policy challenge facing the nation. The Patient Protection and Affordable Care Act initiated a variety of experiments primarily focused on reducing spending on acute care, including rewarding hospitals for efficiency (part of its mix of metrics in value-based purchasing),[2] penalizing "excessive" readmissions, having greater transparency through public reporting of provider charges, extending bundled payments around episodes of hospital care, and, ultimately, encouraging the growth of accountable care organizations. However, it is less clear if hospital care is a major source of cost growth—and if it is not, then we may not be looking for savings in the right place.

In this issue of *JAMA Internal Medicine*, Likosky and colleagues[3] report on patterns of care and spending for Medicare beneficiaries hospitalized for an acute myocardial infarction (AMI). They compare a cohort of beneficiaries—all 65 years or older, with fee-for-service coverage and admitted in 1998 through 1999—with a comparable cohort admitted a decade later and assess spending per beneficiary in the first year after the AMI in the early post-acute period (up to 30 days post-index admission) and the late post-acute period (31-365 days after admission). Some findings are predictable: many more cardiac catheterizations were performed in 2008 than a decade earlier, and some patients who might have undergone coronary artery bypass graft surgery in the earlier years had percutaneous coronary interventions in 2008. Despite substitutions such as the greater use of percutaneous coronary interventions, which should save money, Medicare's expenditure per AMI patient increased by 16% during the decade, after adjustment for inflation. In 2008 through 2009, Medicare spent $6094 more per beneficiary in the first year after an AMI than it did a decade earlier. Was the additional spending worth it? The answer depends on where we look.

If we focus on the initial AMI and examine what happened during the hospitalization and the time immediately following, it appears that Medicare and its beneficiaries got a good deal. Although costs in the early post-acute period, up to 30 days after