Care Patterns in Medicare and Their Implications for Pay for Performance

Hoangmai H. Pham, M.D., M.P.H., Deborah Schrag, M.D., M.P.H.,
Ann S. O'Malley, M.D., M.P.H., Beny Wu, M.S., and Peter B. Bach, M.D., M.A.P.P.

ABSTRACT

From the Center for Studying Health Sys-
tem Change, Washington, DC (H.H.P.,
A.S.O.); the Health Outcomes Research
Group, Memorial Sloan-Kettering Cancer
Center, New York (D.S., P.B.B.); and Social
and Scientific Systems, Silver Spring, MD
(B.W.). Address reprint requests to Dr.
Pham at the Center for Studying Health
System Change, 600 Maryland Ave. SW,
Suite 550, Washington, DC 20024, or at
mpham@hschange.org.

BACKGROUND

Two assumptions underpin the implementation of pay for performance in Medicare: that with the use of claims data, patients can be assigned to a physician or to a practice that will have primary responsibility for their care, and that a meaningful fraction of the care physicians deliver is for patients for whom they have primary responsibility.

METHODS

We analyzed Medicare claims from 2000 through 2002 for 1.79 million fee-for-service beneficiaries treated by 8604 respondents to the Community Tracking Study Physician Survey in 2000 and 2001. In separate analyses, we assigned each patient to the physician or primary care physician with whom the patient had had the most visits. We determined the number of physicians and practices seen annually, the percentage of care received from the assigned physician or practice, the stability of assignments over time, and the percentage of physicians' Medicare patients who were their assigned patients.

RESULTS

Beneficiaries saw a median of two primary care physicians and five specialists working in four different practices. A median of 35% of beneficiaries' visits each year were with their assigned physicians; for 33% of beneficiaries, the assigned physician changed from one year to another. On the basis of all visits to any physician, a primary care physician's assigned patients accounted for a median of 39% of the physician's Medicare patients and 62% of Medicare visits. For medical specialists, the respective percentages were 6% and 10%. On the basis of visits to primary care physicians only, 79% of beneficiaries could be assigned to a physician, and a median of 31% of beneficiaries' visits were with that assigned primary care physician.

CONCLUSIONS

In fee-for-service Medicare, the dispersion of patients' care among multiple physicians will limit the effectiveness of pay-for-performance initiatives that rely on a single retrospective method of assigning responsibility for patient care.

POLICYMAKERS ARE CONSIDERING IMPLE-menting pay for performance on a large scale in the fee-for-service Medicare program.[1] Pay-for-performance demonstrations targeting physician practices are under way,[2,3] and Congress recently passed legislation authorizing payment for physicians who report on quality of care.[4]

The rationale for pay-for-performance is that the quality of care will improve if physicians can earn bonuses for providing high-quality care. Two assumptions underpin the implementation of pay for performance in Medicare: that primary responsibility for care of a beneficiary can be assigned to an individual physician or practice, and that Medicare can link performance to meaningful financial incentives for those providers. Challenges may arise if care of beneficiaries is dispersed across many providers, if the provider assigned responsibility for that care changes frequently, or if only a small percentage of the beneficiaries treated by a provider serve as the basis of performance measurement.

Large-scale implementation of pay for performance is expected to rely on claims data, rather than resource-intensive chart reviews, for characterization of care and assignment of patients to providers.[5,6] Therefore, we analyzed claims in order to describe typical care delivery patterns in fee-for-service Medicare, to evaluate the extent to which a beneficiary's care could reliably be assigned to a single physician or practice, and to determine the extent to which physicians can be held accountable for the care they deliver to Medicare beneficiaries when they are assigned responsibility for some of the patients they treat and not for others.

METHODS

DATA SOURCES

We analyzed claims data for beneficiaries in fee-for-service Medicare who were treated by respondents to the 2000–2001 Community Tracking Study Physician Survey, a nationally representative sample of physicians. Details about the survey and its link to Medicare claims have been described previously.[7,8] We excluded pediatricians and specialists who had limited responsibility for ongoing patient care (e.g., radiologists, anesthesiologists, and pathologists). We used professional-services claims for all beneficiaries treated at least once by a Community Tracking Study physician in 2000

and complete claims for 2000 through 2002 for beneficiaries who were the assigned patients of Community Tracking Study physicians in 2000.

ASSIGNMENT METHODS

We identified treating physicians by using the unique physician identification number of performing physicians, excluding claims that had any of 83 empirically identified outlier identification numbers (those associated with 900 or more beneficiaries). We identified treating practices using tax identification numbers, which are assigned to legal entities that bill Medicare for services and can be linked to unique physician identification numbers for physicians within that practice.[2,9] We assigned all eligible beneficiaries to physicians by using unique physician identification numbers and to their practices by using tax identification numbers, and we conducted analyses according to each type of assignment.

We identified the assigned provider for each beneficiary, using a well-accepted method currently used in pay-for-performance initiatives.[2,10] The "plurality provider algorithm" assigns a beneficiary to the physician (or practice) who billed for the greatest number of that beneficiary's evaluation and management visits (those in which no procedures are performed) in a given year.[11,12] We resolved ties between physicians or practices by first favoring primary care physicians and then favoring the physician billing for the greatest total charges for that beneficiary. The methods used to identify evaluation and management visits and physician specialty are detailed in Section A of the Supplementary Appendix (available with the full text of this article at www.nejm.org). We applied the plurality algorithm to successive years of claims from 2000 through 2002 and defined changed assignments as instances in which a beneficiary was assigned to a different physician or practice in different years.

We repeated analyses using three alternative assignment methods. The "plurality primary care physician algorithm" is a modified version of the plurality algorithm that excludes specialist visits and that assigns the beneficiary to the primary care physician billing for the most evaluation and management visits. The "majority provider algorithm" assigns the beneficiary to the provider who billed for the plurality of evaluation and management visits, with the added criterion that the plurality must be at least 50% of those vis-

its.[13] The "multiple provider algorithm" assigns the beneficiary to all providers who billed for at least 25% of the beneficiary's evaluation and management visits, thereby allowing the beneficiary's care to be assigned to more than one provider.[14] We also repeated the analyses with inpatient claims excluded.

BENEFICIARY POPULATIONS

We conducted cross-sectional analyses to describe care patterns in 2000 for all beneficiaries treated at least once that year by a Community Tracking Study physician. We used longitudinal analyses to track beneficiaries assigned to a Community Tracking Study physician in 2000 by following their annual assignments through 2001 and 2002.

We also described care patterns for beneficiaries with diabetes, those with coronary artery disease, and those with lung cancer, each of which is a serious, prevalent condition for which care is in some cases delivered primarily by specialists (see Section A of the Supplementary Appendix for the identifying codes). In addition, we studied the care of beneficiaries with different levels of chronic-illness burden, determined by using the method of Hwang et al.[15] based on *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) codes for chronic conditions, aggregated by using the Clinical Classification System.[16]

In all analyses, we included beneficiaries 65 years or older but excluded those without claims for the year of measurement, those who died during the study period, and those who were eligible for Medicare because they had end-stage renal disease or a disability. In longitudinal analyses, we also excluded beneficiaries who enrolled in Medicare managed-care plans or entered hospice or nursing homes, those with claims filed from more than one state in 2000, and those assigned to surgeons or emergency medicine physicians.

STATISTICAL ANALYSIS

We weighted data to allow for estimation of national rates by adjusting for the complex sampling strategy of the Community Tracking Study and for nonresponse; adjustments were made to account for the clustering of the sample in 60 communities, the inclusion of a supplemental random national sample, the oversampling of primary care physicians, and known differences between respondents and nonrespondents.[17] If more than one Community Tracking Study physician treated a beneficiary, we applied a weight that was the mean of the weights for individual physicians. Weighted percentages are therefore representative of all adult clinical care physicians in the United States practicing at least 20 hours per week and the Medicare beneficiaries they treat. Analyses were conducted with the use of SAS[18] and SUDAAN[19] software.

Our study was approved by the institutional review contractor for Mathematica, the corporation that includes the Center for Studying Health System Change. Only beneficiary data derived from administrative claims were used, in a manner approved by the Privacy Board of the Centers for Medicare and Medicaid Services. Completion of the survey (which was voluntary) was considered to represent the consent of the physicians.

RESULTS

Of 1,921,937 Medicare beneficiaries who had at least one visit with a Community Tracking Study physician in 2000, a total of 1,787,454 (94%) had at least one evaluation and management visit and were assigned to individual physicians of any specialty (who either did or did not participate in the Community Tracking Study); these beneficiaries were the subjects of cross-sectional analyses. Of these beneficiaries, 381,796 (15%) were assigned to a primary care physician or medical specialist from the Community Tracking Study and were included in longitudinal analyses (Fig. 1). Applying the plurality algorithm to only primary care physician visits resulted in the assignment of only 1,555,923 beneficiaries (79%), because the remaining 231,531 beneficiaries (15%) had visits only with specialists. Six percent of beneficiaries had no evaluation and management visits and could not be assigned to any physician under any method.

NUMBER OF PROVIDERS PER BENEFICIARY

Approximately 66% of beneficiaries had a traditional primary care physician as their assigned physician, with a substantial minority having a medical specialist (22%) or a surgeon (12%). In a single year, the typical beneficiary treated by a Community Tracking Study physician saw a median of two primary care physicians and five
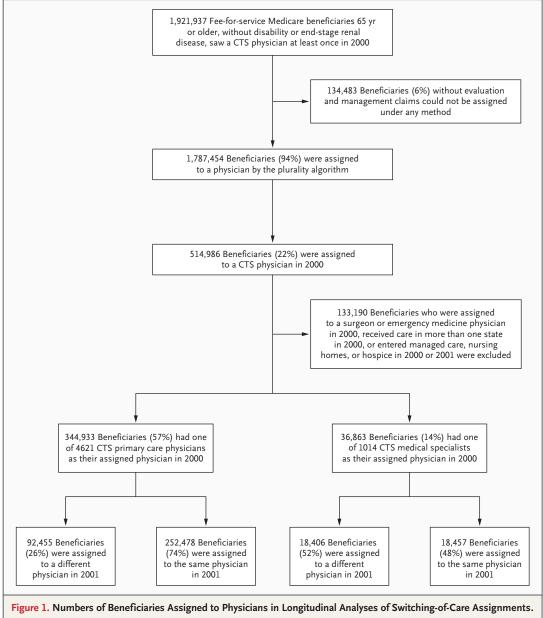
Figure 1. Numbers of Beneficiaries Assigned to Physicians in Longitudinal Analyses of Switching-of-Care Assignments.
Numbers of beneficiaries are unweighted, and percentages of beneficiaries are weighted with Community Tracking Study (CTS) physician weights.

specialists, collectively working in four different practices (Table 1). Dispersion of care among multiple physicians was greater for beneficiaries assigned to specialists than for those assigned to primary care physicians (data not shown) and was reduced when only evaluation and management visits were considered. Beneficiaries with diabetes, coronary artery disease, or lung cancer saw more physicians than the typical beneficiary, with specialty care accounting for most of this difference.

Care dispersion increased with an increasing number of chronic conditions.

Inpatient claims accounted for only 10% of all physician visits and 2% of evaluation and management visits. Exclusion of inpatient claims resulted in a modest reduction of the number of providers seen by beneficiaries with a high chronic-illness burden but with no material change in our overall findings (see Section B of the Supplementary Appendix).

Table 1. Numbers of Providers Who Treated Medicare Beneficiaries in 2000.*

Beneficiary Group	No. of Beneficiaries (%)	No. of Unique Providers							
		Total Physicians		PCPs		Specialists		Practices	
		median	*IQR*	*median*	*IQR*	*median*	*IQR*	*median*	*IQR*
All beneficiaries	1,787,454 (100)								
Considering all physician visits		7	4–11	2	1–4	5	2–8	4	3–7
Considering evaluation and management visits		3	2–5	1	1–2	2	1–3	3	2–4
Beneficiaries with chronic conditions, considering all physician visits†									
Diabetes	430,461 (25)	8	5–14	3	1–4	6	3–10	5	3–8
Coronary artery disease	633,750 (38)	10	6–15	3	1–5	7	4–11	6	4–8
Lung cancer	40,086 (3)	11	7–16	3	2–5	8	5–12	6	4–9
No. of conditions									
0–2	257,471 (13)	3	2–5	1	1–2	2	1–3	2	1–3
3 or 4	451,774 (24)	5	3–7	2	1–3	3	2–5	3	2–5
5 or 6	448,855 (25)	7	5–10	2	1–3	4	3–7	4	3–6
≥7	629,354 (38)	11	8–16	3	2–5	8	5–12	7	5–9

* The numbers of beneficiaries are unweighted, and the percentages of beneficiaries and median numbers of providers are weighted. The medians are based on the number of providers billing for any type of physician-related visit, or for physician-related evaluation and management visits, among all complete Medicare professional-services claims for 1.79 million beneficiaries who were treated at least once by a Community Tracking Study physician in 2000. We excluded beneficiaries under 65 years of age, those with end-stage renal disease or disability, and those who did not have claims in 2000. PCP denotes primary care physician, and IQR interquartile range.
† Beneficiaries could have more than one chronic condition. The number of chronic conditions was determined by using the method of Hwang et al.[15] based on ICD-9-CM codes for chronic conditions assigned to mutually exclusive clinical categories based on the Clinical Classification System of the Agency for Healthcare Research and Quality.[16]

PERCENTAGE OF BENEFICIARIES' CARE BILLED BY ASSIGNED PROVIDERS

The assigned physician billed for a median of 53% of evaluation and management visits and 35% of total physician visits for each beneficiary (Table 2). These percentages were moderately higher (65% and 50%, respectively) when assignments were made to practices. Exclusion of inpatient claims resulted in a minimal increase in the percentage of each beneficiary's total visits with the assigned physician (from 35% to 39%), with no material change in the percentage of evaluation and management visits with the assigned physician. Applying the plurality algorithm only to primary care physicians resulted in the assignment of 50% of each assigned beneficiary's evaluation and management visits and 31% of the beneficiary's total physician visits (Table 2).

CONSISTENCY OF PROVIDER ASSIGNMENTS

Between 2000 and 2001, and again between 2001 and 2002, an average of 33% of beneficiaries had a change in their assigned physician, with that assignment changing to a different practice for the vast majority (97%). Applying the plurality algorithm only to primary care physician visits resulted in changed assignments for 20% of beneficiaries. These results were essentially the same when inpatient claims were excluded. The frequency with which assignments changed over time was substantial, regardless of the number of beneficiaries' evaluation and management visits (see Section C of the Supplementary Appendix) or their chronic-illness burden. Nearly half the beneficiaries (46%) changed assignments at least once between 2000 and 2002 (Fig. 2).

The majority of changes in physician assignments (59%) between 2000 and 2001 were to a physician who did not bill for any visits with the beneficiary in 2000; similarly, 53% of changes between practices were to a practice that had not treated the beneficiary during 2000. Among beneficiaries with an assigned physician in 2000, 17% had no visits of any kind with that physician

Table 2. Percentage of Care Billed for Medicare Beneficiaries by Their Assigned Physicians, According to Plurality Assignment to Any Physician or Only Primary Care Physicians (PCPs).*

Beneficiary Group	Percentage of All Physician Visits That Were with Assigned Physicians				Percentage of Evaluation and Management Visits That Were with Assigned Physicians			
	Any Physician		PCPs Only		Any Physician		PCPs Only	
	median	IQR	median	IQR	median	IQR	median	IQR
All beneficiaries†	35	22–50	31	17–50	53	40–75	50	30–70
Beneficiaries with chronic conditions‡								
Diabetes	33	20–50	31	17–50	55	40–75	50	33–71
Coronary artery disease	30	18–44	25	14–71	50	38–69	44	27–67
Lung cancer	31	19–47	20	10–33	50	39–70	35	20–56
No. of conditions								
0–2	50	33–71	47	25–69	67	50–100	60	40–100
3 or 4	41	27–60	38	22–57	60	43–80	50	33–75
5 or 6	36	24–50	33	19–50	52	40–73	50	30–67
≥7	28	17–42	25	13–39	50	36–67	25	14–42

* Beneficiaries were assigned to physicians with the use of the plurality algorithm, first allowing for assignment to any physician and then for assignment only to PCPs. Median percentages of visits were calculated on the basis of Medicare professional-services claims billed by 8604 physician respondents to the Community Tracking Study survey for 1.79 million beneficiaries that they treated at least once in 2000; percentages were weighted with Community Tracking Study survey weights. IQR denotes interquartile range.

† The PCP-only plurality method resulted in the assignment of 1,555,923 beneficiaries. We excluded beneficiaries with claims filed from more than one state in 2000, those under 65 years of age, those with end-stage renal disease or disability, and those who did not have claims in 2000.

‡ Beneficiaries could have more than one chronic condition. The number of chronic conditions was determined by using the method of Hwang et al.[15] based on ICD-9-CM codes for chronic conditions assigned to mutually exclusive clinical categories based on the Clinical Classification System of the Agency for Healthcare Research and Quality.[16]
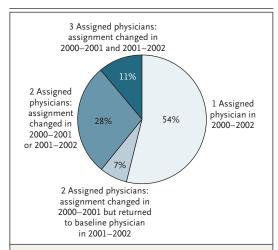
in 2001, and 19% had no evaluation and management visits.

PERCENTAGES OF PHYSICIANS' MEDICARE VISITS WITH THEIR ASSIGNED PATIENTS

For Community Tracking Study physicians, 39% of a primary care physician's Medicare patients, and 6% of a medical specialist's Medicare patients, were assigned to them (Table 3). Assigned patients accounted for a median of 20% of all visits billed by the 8604 Community Tracking Study physicians in 2000 (62% of primary care physician's visits and 10% of medical specialist's visits). The percentages were modest for all other subgroups of physicians. Medical specialists billed for higher total charges for their assigned patients than did primary care physicians, reflecting higher reimbursement rates for specialist services.

When plurality assignment was limited to primary care physicians, a median of 47% of the Medicare patients of each Community Tracking Study primary care physician were assigned to that physician, accounting for 87% of the evalua-tion and management visits and 70% of the total visits for which the physician billed Medicare.

PERCENTAGES OF PHYSICIANS' ASSIGNED BENEFICIARIES WHOSE ASSIGNMENTS CHANGED

A total of 7216 Community Tracking Study physicians had at least one assigned beneficiary in the year 2000. For primary care physicians, a median of 29% of their assigned patients (interquartile range, 18 to 50) changed assignment in the next year. For medical specialists, the median percentage was 67% (interquartile range, 46 to 86). When assignment was based on visits to primary care physicians only, a median of 20% of each primary care physician's assigned patients in 2000 were assigned to a different primary care physician in 2001.

ALTERNATIVE APPROACHES TO PHYSICIAN ASSIGNMENT

As compared with the plurality algorithm, both the majority provider and the multiple provider algorithms assigned a higher proportion of ben-

Figure 2. Stability of Physician Assignments of Medicare Beneficiaries from 2000 through 2002.

Percentages are based on claims from 2000 through 2002 for 381,796 Medicare beneficiaries who had a Community Tracking Study primary care physician or medical specialist as their assigned physician in 2000 and are weighted with Community Tracking Study survey weights. We excluded beneficiaries with claims filed from more than one state in 2000, those under 65 years of age, those with end-stage renal disease or disability, those who did not have claims for the years of interest, those who died in 2001 or 2002, and those who entered Medicare managed care, nursing homes, or hospice for any period. Beneficiaries were assigned to physicians by applying the plurality algorithm to their evaluation and management visits.

eficiaries' visits to their primary provider but assigned fewer beneficiaries to any physician at all. The majority algorithm assigned both primary care physicians and specialists responsibility for a lower percentage of their Medicare patients and visits than the plurality algorithm did, whereas the multiple provider algorithm assigned physicians responsibility for moderately higher proportions. Rates of changed assignments were higher with the majority approach and lower with the multiple provider approach than with the plurality approach (see Sections C through G in the Supplementary Appendix).

DISCUSSION

Our study shows that health care for beneficiaries of fee-for-service Medicare is widely dispersed. Typically, beneficiaries see many physicians, and no more than half their visits are with physicians or practices to which they would be assigned un-

der current pay-for-performance models. Similarly, our study shows that most beneficiaries whom a physician treats are not considered to be assigned to that physician under common assignment methods, and many patients assigned to a particular physician or practice would change assignments in subsequent years. Our findings were similar when we limited the assignment of patients to primary care physicians, an approach that had the additional shortcoming of leaving more beneficiaries unassigned. These results, derived from an analysis of a large population of physicians treating Medicare patients, are consistent with the results of previous studies of care dispersion that were smaller in scope or focused on nonelderly populations,[13,21-23] and they highlight several challenges that current care patterns pose for pay-for-performance initiatives in Medicare.

The involvement of many providers in the care of each Medicare beneficiary — the typical beneficiary treated by a Community Tracking Study physician saw seven physicians in four practices in a given year — impedes the ability of any one assigned provider to influence the overall quality of care for a given patient. Such a limitation may limit the potential of incentives to improve the quality of care.

Another concern is that only a minority of a physician's Medicare patients may be assigned to that physician, which would reduce the size of the maximum incentives available to the physician if Medicare logically structures bonuses to be proportional to the physician's caseload of assigned Medicare patients (as in the Physician Group Practice Demonstration).[2] The proportion of a physician's total practice that is subject to performance measurement would be further limited if pay for performance were restricted to the physician's Medicare patients, since incentives would constitute a small proportion of the physician's total revenues, particularly for specialists.

Finally, even among patients assigned to a given physician or practice, Medicare would have deemed only half as remaining in stable assignments with the same physician, and 63% as remaining with the same practice, from 2000 to 2002. Instability of assignments may decrease the motivation of physicians to invest in long-term improvements in care for patients with chronic conditions (e.g., hiring patient educators), or the ability to target interventions to specific patients, if they perceive that the benefits to patients will

Table 3. Medicare-Reimbursed Care Delivered by Physicians to Their Assigned Patients.*

Physician and Practice Characteristics	No. (%)	Percentage of Physicians' Medicare Patients Who Were Assigned to Them		Percentage of Total Visits That Were with Assigned Patients		Percentage of Evaluation and Management Visits That Were with Assigned Patients‡		Total Charges Billed That Were for Care of Assigned Patients†	
		median	IQR	median	IQR	median	IQR	median	IQR
All Community Tracking Study physicians	8604 (100)	12	2–37	20	3–60	40	17–77	205	6–648
Specialty§									
PCPs	5527 (45)	39	14–57	62	23–77	77	56–87	467	42–1293
All medical specialists	1406 (25)	6	1–14	10	1–28	28	15–49	186	2–477
Oncologists	97 (2)	28	21–34	62	53–70	66	56–74	1616	619–6637
Cardiologists	213 (4)	7	3–13	17	9–32	34	21–52	945	198–1591
Neurologists	114 (2)	7	4–12	14	7–21	21	15–31	205	23–277
Dermatologists	88 (2)	7	4–10	10	7–17	15	12–21	233	80–227
Surgeons	1261 (23)	9	4–14	14	7–23	18	10–27	136	12–147
Emergency medicine physicians	390 (6)	0	—	0	—	6	0–16	0	—
Practice size and type									
1 or 2 physicians	3092 (36)	16	4–46	26	7–69	46	17–83	311	18–838
3–10 physicians	1696 (22)	11	4–27	20	7–50	31	16–68	323	27–793
11–50 physicians	633 (8)	9	2–34	17	4–60	33	17–74	333	16–1007
≥51 physicians	279 (3)	11	1–35	23	2–63	46	18–75	228	1–994
Medical school	555 (7)	9	2–22	15	2–42	28	15–60	61	2–154
All other	2349 (25)	8	0–37	13	0–59	51	17–79	40	0–341
PCPs only¶	5527 (45)	47	20–68	70	33–86	87	68–94	541	53–1458

* The numbers of physicians are unweighted, and all percentages are weighted. Assignments of patients to individual physicians were made using the plurality provider algorithm, first allowing for assignments to any physician and then allowing for assignment to only primary care physicians. Medians were based on Medicare claims billed by 8604 Community Tracking Study physician survey respondents for 1.79 million beneficiaries they treated in 2000 and were weighted with Community Tracking Study survey weights. We excluded beneficiaries under 65 years of age, those with end-stage renal disease or disability, and those who did not have claims in 2000. IQR denotes interquartile range, and PCP primary care physician.
† Charges are reported as relative value units, derived from the Physician Fee Schedule tables of the Centers for Medicare and Medicaid Services.[20]
‡ Estimates of the percentage of physicians' evaluation and management visits that were with assigned patients were based on the subgroup of 7630 Community Tracking Study physicians who billed for at least one evaluation and management visit in 2000 (4955 primary care physicians, 1309 medical specialists, 1245 surgeons, and 121 emergency medicine physicians).
§ Specialty data were missing for 20 physicians. Selected types of medical specialists are listed.
¶ Assignment was to any physician except to PCPs only, for which assignment was to PCPs only.

1137

take years to accrue and that many of their patients are unlikely to remain assigned to them. Care dispersion may thus limit the motivation of physicians and their ability to improve the quality of care in multiple ways.

Our findings are robust across a range of assignment methods commonly used in current pay-for-performance programs. They suggest that any single, retrospective approach is likely to have serious limitations. In contrast with the plurality assignment method, approaches that only assign patients to physicians who provide a large percentage of their care (e.g., the majority provider algorithm) tend to leave more patients unassigned and hold individual physicians responsible for a smaller percentage of the total care they deliver. Methods that designate certain types of patient–physician pairings as better reflecting central care relationships (e.g., assignment only to primary care physicians) also leave more patients unassigned and some physicians unaccountable for any of the care they provide. None of the methods we examined would assign the average Community Tracking Study physician responsibility for more than a quarter of the Medicare patients he or she treated or more than two fifths of the Medicare visits provided.

Our assumptions are conservative with respect to the true extent of care dispersion in Medicare. We excluded beneficiaries who might have tended to have more providers (e.g., those who spent part of the year in a different state). Moreover, we relied on unique physician identification numbers and tax identification numbers to identify providers; in some cases, different physicians and loosely affiliated practices bill under the same identifier. The use of new, more reliable provider identifiers in claims may further clarify care patterns.[24]

Although we were able to characterize the care patterns for beneficiaries relative to their assigned practices, we could not describe care patterns for a typical practice because our data were drawn from a representative sample of individual physicians, not individual practices. We did not examine long-term continuity of care, the patient–physician relationship as viewed by patients and physicians, or associations between care dispersion and quality of care.[22,25] Our results reflect care patterns for beneficiaries treated by the typical physician; they may not be representative of care for all Medicare beneficiaries, some of whom receive little or no care in a given year. Our findings for beneficiaries with diabetes, coronary artery disease, or lung cancer may not be generalizable to those with other conditions. In addition, our study did not address pay for performance focused on structural measures, such as the adoption of information technology, or the average performance of physicians across all the patients they see.

Other assignment strategies could be used to circumvent some of the limitations of those we examined. For example, using models of shared accountability,[26] Medicare could separately define responsibility for services rendered largely by specialists, for services rendered largely by primary care physicians, and for services rendered by both. If applied retrospectively, like the methods we examined, such an approach may not enhance the ability of Medicare to identify the responsible physician when many are involved.

Identifying effective approaches may be especially important for certain high-priority populations that may benefit most from improvements in the quality of care, such as beneficiaries with a high chronic-illness burden. Our analyses show that these patients have more providers and hence have less of their care assigned to a primary provider, according to conventional methods, than patients with a low chronic-illness burden. For such beneficiaries, specialists may perform some of the functions of a primary physician,[13,27] and quality metrics could reflect the efforts of multiple physicians. The most seriously ill beneficiaries could benefit most from an alternative approach that would overcome ambiguities inherent in retrospective assignment. Prospective designation of the responsible providers, even if voluntary, implies some limitation of the freedom of both patients and physicians to choose the physicians with whom they work, but it would have the benefit of aligning physician, patient, and payer expectations of care relationships.

Care dispersion in the fee-for-service Medicare system will limit the potential of current pay-for-performance designs to improve the quality of care and thus patients' health outcomes. Implementation of pay for performance may be more successful if it incorporates strategies that address care dispersion.

REFERENCES

1. Institute of Medicine. Rewarding provider performance: aligning incentives in Medicare. Washington, DC: National Academies Press, 2006.

2. Pope GC, Trisolini M, Kautter J, Adamanche W. Physician Group Practice (PGP) demonstration design report. Baltimore: Centers for Medicare & Medicaid Services, 2002.

3. Medicare "Pay for Performance (P4P)" initiatives. Baltimore: Centers for Medicare & Medicaid Services, 2005. (Accessed February 16, 2007, at http://www.cms.hhs.gov/media/press/release.asp?Counter=1343.)

4. Medicare Physician Payment Reform and Quality Improvement Act of 2006: H.R.5866. (Accessed February 16, 2007, at http://thomas.loc.gov/home/gpoxmlc109/h5866_ih.xml.)

5. International classification of diseases, ninth rev., clinical modification: ICD-9-CM. Hyattsville, MD: National Center for Health Statistics, 1999.

6. Current procedural terminology (CPT). 4th ed. Baltimore: Centers for Medicare and Medicaid Services, 2006.

7. Pham HH, Schrag D, Hargraves JL, Bach PB. Delivery of preventive services to older adults by primary care physicians. JAMA 2005;294:473-81.

8. Bach PB, Pham HH, Schrag D, Tate RC, Hargraves JL. Primary care physicians who treat blacks and whites. N Engl J Med 2004;351:575-84.

9. Medicare physician identifiers: UPINs, PINs, and NPI numbers. Minneapolis: Research Data Assistance Center, 2003. (Accessed February 16, 2007, at http://www.resdac.umn.edu/Tools/TBs/TB-002.asp.)

10. Advancing physician performance measurement: using administrative data to assess physician quality and efficiency. San Francisco: Pacific Business Group on Health, 2005. (Accessed February 16, 2007, at http://www.pbgh.org/programs/documents/PBGHP3Report_09-01-05final.pdf.)

11. Weiner JP, Parente ST, Garnick DW, Fowles J, Lawthers AG, Palmer H. Variation in office-based quality: a claims-based profile of care provided to Medicare patients with diabetes. JAMA 1995;273:1503-8.

12. Berenson-Eggers Type of Service (BETOS) codes. Baltimore: Centers for Medicare & Medicaid Services. (Accessed February 16, 2007, at http://www.cms.hhs.gov/HCPCSReleaseCodeSets/20_BETOS.asp.)

13. Rosenblatt RA, Hart LG, Baldwin LM, Chan L, Schneeweiss R. The generalist role of specialist physicians: is there a hidden system of primary care? JAMA 1998;279:1364-70.

14. The Leapfrog Group, Bridges to Excellence. Measuring provider efficiency: a collaborative multi-stakeholder effort. (Accessed February 16, 2007, at http://www.bridgestoexcellence.org/bte/pdf/Measuring_Provider_Efficiency_Version1_12-31-20041.pdf.)

15. Hwang W, Weller W, Ireys H, Anderson G. Out-of-pocket medical spending for care of chronic conditions. Health Aff (Millwood) 2001;20(6):267-78.

16. Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. Med Care 1998;36:8-27.

17. Center for Studying Health System Change. Physician survey methodology report, 2000-01. Technical publication no. 38. Washington, DC: Center for Studying Health System Change, 2003. (Accessed February 16, 2007, at http://hschange.org/CONTENT/570/.)

18. SAS software, release 9.1.3. Cary, NC: SAS Institute, 2004.

19. Shah BV, Barnwell BG, Bieler GS. SUDAAN users' manual, release 7.0. Research Triangle Park, NC: Research Triangle Institute, 1996.

20. Physician fee schedule relative value files. Baltimore: Centers for Medicare and Medicaid Services. (Accessed February 16, 2007, at http://www.cms.hhs.gov/PhysicianFeeSched/PFSRVF/list.asp#TofOfPage.)

21. Saultz JW. Defining and measuring interpersonal continuity of care. Ann Fam Med 2003;1:134-43.

22. Saultz JW, Lochner J. Interpersonal continuity of care and care outcomes: a critical review. Ann Fam Med 2005;3:159-66.

23. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. BMJ 2003;327:1219-21.

24. National Provider Identifier (NPI) standard. Baltimore: Centers for Medicare and Medicaid Services. (Accessed February 16, 2007, at http://www.cms.hhs.gov/NationalProvIdentStand/.)

25. Saultz JW, Albedaiwi W. Interpersonal continuity of care and patient satisfaction: a critical review. Ann Fam Med 2004;2:445-51.

26. Institute of Medicine. Performance measurement: accelerating improvement. Washington, DC: National Academies Press, 2006.

27. Starfield B. Primary care: balancing health needs, services, and technology. New York: Oxford University Press, 1998.

Copyright © 2007 Massachusetts Medical Society.

POWERPOINT SLIDES OF *JOURNAL* FIGURES AND TABLES

At the *Journal*'s Web site, subscribers can automatically create PowerPoint slides. In a figure or table in the full-text version of any article at **www.nejm.org**, click on Get PowerPoint Slide. A PowerPoint slide containing the image, with its title and reference citation, can then be downloaded and saved.