

Service Mix in the Hospital Outpatient Department: Implications for Medicare Payment Reform

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Objective. To determine if implementation of a PPS for Medicare hospital outpatient department (HOPD) services will have distributional consequences across hospital types and regions, this analysis assesses variation in service mix and the provision of high-technology services in the HOPD.

Data. HCFA's 1990 claims file for a 5 percent random sample of Medicare beneficiaries using the HOPD was merged, by hospital provider number, with various HCFA hospital characteristic files.

Study Design. Hospital characteristics examined are urban/rural location, teaching status, disproportionate-share status, and bed size. Two analyses of HOPD services are presented: mix of services provided and the provision of high-technology services. The mix of services is measured by the percentage of services in each of 14 type-of-service categories (e.g., medical visits, advanced imaging services, diagnostic testing services). Technology provision is measured by the percentage of hospitals providing selected high-technology services.

Findings/Conclusions. The findings suggest that the role hospital types play in providing HOPD services warrants consideration in establishing a PPS. HOPDs in major teaching hospitals and hospitals serving a disproportionate share of the poor play an important role in providing routine visits. HOPDs in both major and minor teaching hospitals are important providers of high-technology services. Other findings have implications for the structure of an HOPD PPS as well. First, over half of the services provided in the HOPD are laboratory tests and HOPDs may have limited control over these services since they are often for patients referred from local physician offices. Second, service mix and technology provision vary markedly among regions, suggesting the need for a transition to prospective payment. Third, the organization of service supply in a region may affect service provision in the HOPD suggesting that an HOPD PPS needs to be coordinated with payment policies in competing sites of care (e.g., ambulatory surgical centers).

Key Words. Prospective payment, service mix, technology, hospital outpatient department

Innovations in technology, patient acceptance, and reimbursement controls on inpatient care have all contributed to the growth in Medicare hospital outpatient department (HOPD) expenditures. In 1990, Medicare expenditures for HOPD services were approximately \$8 billion. If recent trends in growth (about 15 percent annually) continue as expected, Medicare will expend nearly \$14 billion on HOPD services in 1994 (U.S. Congress, Committee on Ways and Means, 1993).

Until recently, HOPD services were paid on a retrospective, facility-specific, cost-based system. The retrospective nature of the system required a year-end adjustment that left HCFA uncertain of providers' true costs and their aggregate payment levels. Such a system gave providers little incentive to deliver care in a cost-efficient manner. Since reform of outpatient reimbursement occurred on a piecemeal basis, Medicare still uses 11 different payment systems for HOPD care (Sulvetta 1991). This patchwork arrangement of fee schedules, flat-rate prospective payment, and blended rates has brought little rationality to Medicare's payment for outpatient services.

Medicare's inpatient prospective payment system (PPS) has had success in controlling expenditures (ProPAC 1990). Hoping to emulate the success of Medicare's inpatient PPS Congress, with the Omnibus Budget Reconciliation Act of 1990, has directed the Health Care Financing Administration (HCFA) to develop a PPS for HOPD services. A PPS prospectively sets payment for a defined episode of care (e.g., a hospital admission), increasing the predictability of payments to providers, giving providers a tool for managing care, creating incentives for providers to control costs, and rationalizing payments across providers and geographic areas. Although HCFA has not yet released its recommendations, it appears that an HOPD PPS will focus first on surgical services and diagnostic testing and, later, on encompassing all HOPD services. The system is likely to define an HOPD encounter¹ as the episode of care (i.e., unit of payment) and use Ambulatory Patient Groups (APGs) to classify encounters.²

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Given the complexities of determining the true resource costs for services, setting the right price for each unit of service is difficult. In addition, depending on the classification scheme used to group the services, variation in service use may occur within each group. Nevertheless, assuming a broad mix of patients and services offered, services that are slightly underpaid and overpaid should cancel each other out, and hospitals will not be excessively penalized or rewarded under an HOPD PPS.³ However, if the provision of certain services is more concentrated in some HOPDs than others, a PPS could have distributional effects unrelated to efficiency. This, in turn, could produce incentives to specialize in a more profitable service mix that may not fully meet the needs of Medicare beneficiaries.

Because very new technologies are likely to be concentrated in only a small percentage of hospitals and since, unlike in other industries, new health care technology often does not contribute to lower input costs, these technologies may warrant separate consideration in the development of an HOPD PPS. Many analysts point to new technology as a significant force in health care expenditure growth (GAO 1992; Aaron 1991; Wilensky 1990; PPRC 1991; ProPAC 1993) and high technology is particularly important in the HOPD. Diagnostic testing is a major component of services provided in the HOPD, and many technological advances pertain to diagnostic testing (e.g., MRIs, doppler echography). Moreover, technological innovations have made many surgical procedures safe to perform in the outpatient setting (e.g., cataract removal and lens insertion). Thus, the introduction of a PPS could have unanticipated distributional effects, depending on the degree of a given HOPD's investment in these technologies, and it could create incentives that affect the rates at which new technology is made available.

This article examines the mix of Medicare services in the HOPD and the provision of high-technology services. The analysis looks at whether the degree of variation in the overall mix of services and in the provision of high-technology services among HOPDs of different types (e.g., teaching status and bed size) and regions is such that an HOPD PPS could be expected to have significant distributional consequences.

DATA AND METHODS

This analysis uses HCFA's 1990 Hospital Outpatient Claims file, which comprises all facility bills for a random 5 percent sample of all Medicare beneficiaries using the HOPD.⁴ Claims were screened (to eliminate

duplicate claims) and then merged, on the basis of hospital provider number, with various HCFA hospital characteristics files (e.g., the Hospital Cost Reporting Information System, Provider Specific file). The resulting analysis file includes 2,257,761 claims for 728,028 beneficiaries in 5,201 hospitals.

Each HOPD claim is a collection of "trailers," one for each different service provided during an encounter; that is, each unique date of service in the HOPD generates a claim. Trailers generally include a HCFA common procedure coding system (HCPCS) code, which allows us to categorize services using a recently developed service typology (Berenson and Holahan 1992).⁵ Berenson and Holahan used groups of physician consultants to categorize each of more than 9,000 CPT-4 codes into 21 broad type-of-service categories.⁶ Since all 21 categories were not relevant to the HOPD setting, we collapsed the Berenson and Holahan scheme to 14 categories. Visit services are evaluation and management services provided by a physician,⁷ and are reported as routine, emergency/critical care, specialist/consultations (e.g., visit with an ophthalmologist), and other. Imaging services are reported as standard (e.g., x-ray) and advanced (e.g., CT scan, MRI). Surgery is reported as cataract/lens/other eye; ambulatory/minor (e.g., hernia repair, skin biopsy); endoscopy; and unclassified (discussed further on). Tests are reported as laboratory and other (e.g., electrocardiography), and the "other" category includes dialysis/oncology and other (i.e., all remaining) services.

Two final data construction issues warrant comment. First, trailers that do not include HCPCS codes always include revenue center codes (e.g., revenue center 324, chest x-ray; revenue center 351, CT head scan), and for these services we constructed a cross-walk between the revenue center codes and type-of-service categories. Second, because revenue center codes are not descriptive enough for specific classification of surgery services,⁸ a separate category of unclassified surgery was created.

Identifying High-Technology Services. For the second part of the analysis, HCPCS codes were used to identify high-technology services.⁹ The Physician Payment Review Commission (PPRC 1991) has identified high-technology services for the purpose of estimating the contribution of these services to overall Medicare physician expenditure growth. PPRC generated the list of technologies using CPT-4 codes based on consultations with specialty societies, insurers, and other organizations. In constructing the list, PPRC found that a few broad classes of services—CT scans, MRIs, ultrasound, endoscopy, lasers, and joint prostheses—account for the overwhelming majority of high-technology services provided to Medicare beneficiaries. We selected services from the PPRC list that demonstrated high HOPD volume. The services fall into seven categories:

- *Endoscopic/laser surgery.* For example, knee arthroscopy, laser colonoscopy to control bleeding;
- *Laser eye surgery.* For example, trabeculoplasty to treat glaucoma, vitrectomy and photocoagulation to treat a detached retina;
- *Lithotripsy.* For example, shock wave treatment of urinary tract stones;
- *Diagnostic Imaging.* For example, CT scan and MRI of the brain;
- *Diagnostic Ultrasound.* For example, doppler echocardiography examination of the heart or the carotid artery;
- *Diagnostic Testing.* For example, electroencephalogram and electromyography; and
- *Therapeutic Radiology.* For example, clinical brachytherapy.

Several caveats are associated with this analysis of technology. PPRC points out that the list is subjective and that some new technologies cannot be identified because they are reported under traditional HCPCS codes.¹⁰ But the objective of the analysis is not to generate a comprehensive list of all services potentially classifiable as high-technology services; rather it is to identify several “indicative” technologies and to examine the patterns of provision in the HOPD. Additionally, since this analysis depends on identifying services using HCPCS codes, some bias may occur if certain hospital types are more likely to report services using HCPCS codes than other hospital types. However, coding enforcement is likely to vary by carrier and therefore by state, which is most likely to affect the regional analysis.

Testing for Significant Variations. We present here the composition of services by hospital type and region. There are four hospital types: bed size (<100 beds, 100–350 beds, and 351+ beds), teaching status (nonteaching, minor, and major),¹¹ disproportionate-share status,¹² and location (urban and rural). There are substantial overlaps between some hospital types: for instance, major teaching hospitals are also likely to be disproportionate-share hospitals and urban hospitals. Consequently, analyzing hospital types with substantial overlap in membership may produce similar results. Regions are defined using the nine census divisions, which are the same administrative units that Medicare PPS uses in defining region.

To test for statistical differences in the composition of services by hospital type and region, we have used analysis of variance (ANOVA) with an unbalanced design. By hospital type the comparison groups are small hospitals (i.e., <100 beds), nonteaching hospitals, non-disproportionate-share hospitals, and rural hospitals. For the regional analysis, New England is the comparison group.

Table 1: Hospital Outpatient Department Services by Type of Service and Hospital Type—Mix of HOPD Services by Hospital Type

Type of Service	All HOPDs		Bed Size			Teaching Status			Location			Disproportionate-Share Status (DSH)	
	≤100†	101-350	351+	Non†	Minor	Major	Rural†	Urban	Non-DSH†	DSH			
Visits	12.73%	11.34%	14.85%***	10.91%	12.82%***	21.06%***	11.05%	13.33%***	11.33%	16.14%***			
Routine visits	3.47	1.64	6.88 ***	0.93	3.73 ***	14.78 ***	1.28	4.26 ***	1.92	7.26 ***			
Emergency/Critical care	4.83	5.38	4.94 ***	5.39	4.48 ***	3.09 ***	5.40	4.62 ***	4.81	4.88			
Specialist/Consultations	1.05	0.59	1.16 ***	0.94	1.27 ***	1.00 *	0.74	1.16 ***	1.08	0.99 ***			
Other visit	3.38	3.73	3.52 **	3.65	3.33 ***	2.19 ***	3.62	3.29 ***	3.53	3.01 ***			
Imaging	15.38%	14.88%	13.87%***	16.39%	15.47%***	10.36%***	15.39%	15.38%	15.87%	14.18%***			
Standard imaging	12.44	12.79	13.01	13.44	12.20 ***	8.41 ***	12.93	12.27 ***	12.84	11.47 ***			
Advanced imaging	2.93	2.09	3.22 ***	2.95	3.27 ***	1.95 ***	2.46	3.10 ***	3.02	2.71 ***			
Surgery	6.23%	5.06%	6.75%***	6.48%	6.76%***	3.69%***	5.38%	6.54%***	6.58%	5.38%***			
Ambulatory/Minor	1.09	0.88	1.16 ***	1.10	1.18 ***	0.79 ***	0.91	1.15 ***	1.15	0.94 ***			
Endoscopy	1.08	0.81	1.17 ***	1.11	1.22 ***	0.62 ***	0.88	1.16 ***	1.14	0.95 ***			
Cataract/Lens/Other eye	0.77	0.55	0.87 ***	0.78	0.88 ***	0.41 ***	0.59	0.83 ***	0.80	0.67 ***			
Unclassified surgery	3.30	2.82	3.55 ***	3.49	3.48	1.87 ***	2.99	3.41 ***	3.49	2.82 ***			
Tests	55.17%	58.55%	54.12%***	55.25%	54.55%*	56.46%***	57.28%	54.42%***	55.56%	53.25%***			
Lab tests	50.19	54.72	48.85 ***	50.53	49.03 ***	51.68 **	53.22	49.11 ***	51.02	48.18 ***			
Other tests	4.98	3.83	5.26 ***	4.72	5.51 ***	4.78	4.06	5.31 ***	4.94	5.07 *			
Other	10.49%	10.17%	10.51%*	10.97%	10.40%***	8.42%***	10.90%	10.34%***	10.25%	11.06%***			
Dialysis/Oncology/Other	1.41	0.25	1.37 ***	0.93	1.98 ***	2.20 ***	0.69	1.67 ***	1.30	1.69 ***			
	9.08	9.92	9.14 ***	10.04	8.42 ***	6.23 ***	10.21	8.67 ***	8.96	9.36 **			
Percent of All Services	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%			
Sum of All Services	6,787,888	1,522,874	3,681,732	1,583,282	3,892,206	2,143,208	812,474	1,793,216	4,994,672	4,819,741			

***Significantly different from reference group mean at the 99% confidence level.

**Significantly different from reference group mean at the 95% confidence level.

*Significantly different from reference group mean at the 90% confidence level.

†Reference group for significance tests.

MIX OF SERVICES BY HOSPITAL TYPE

Teaching Status. Table 1, and Table 2 (further on), present HOPD service mix by hospital type and region, respectively. There is significant variation in the composition of services across hospital type and region, but the differences are often small. The most striking outcome in Table 1 is that nationally, 55.2 percent of Medicare services provided in the HOPD are diagnostic tests.¹³ Although the variation in this component is significant, there is little absolute difference by teaching status. Between 55 and 56 percent of services provided in both teaching and nonteaching HOPDs are diagnostic tests. In contrast, if one examines the number of tests provided *per patient*,¹⁴ major teaching HOPDs provide significantly more tests than their counterparts—5.4 as compared to about 4 per patient, respectively. Across all services, major teaching HOPDs provide 9.5 services per patient while their counterparts provide 7.4. (Per patient data not shown.)

Nationally, visit and imaging services account for 12.7 percent and 15.4 percent of HOPD services, respectively, whereas surgery services account for about 6.2 percent of services. Distributions of these services vary substantially within the HOPD by teaching status—particularly with respect to major teaching HOPDs. Visit services account for between 11 percent and 13 percent of all services in nonteaching and minor teaching HOPDs, for example, in sharp contrast with major teaching HOPDs, where visits account for 21.1 percent of services. This difference in visit services is accounted for by routine (i.e., clinic) visits, which account for 14.8 percent of major teaching HOPD services as compared with 3.7 percent and 0.9 percent in minor teaching and nonteaching HOPDs, respectively. On a per patient basis (data not shown), major teaching HOPDs provide significantly more routine visits per patient (1.4), as compared with minor teaching (0.3) and nonteaching (0.1) HOPDs. Emergency, specialist/consultation, and other visits account for lower proportions of services in major teaching HOPDs relative to nonteaching and minor teaching HOPDs.

The trade-off in major teaching HOPDs appears to be to provide a greater proportion of visit services and lower proportions of imaging and surgery services. About 16 percent of services in nonteaching and minor teaching HOPDs are imaging services, as compared with 10.4 percent in major teaching HOPDs. This difference is reflected in both standard and advanced imaging. Similarly, about 7 percent of the services in nonteaching and minor teaching HOPDs are surgical, as compared with about 3.7 percent in major teaching HOPDs. Again, this is reflected across all surgery service categories (i.e., ambulatory, endoscopy, eye, and unclassified).

The imaging and surgery results for major teaching HOPDs are somewhat surprising. The literature examining inpatient facility costs would suggest that major teaching HOPDs often handle cases of greater complexity and, given their teaching function, are more likely to have the latest technologies. Consequently, one might expect greater proportions of surgery and imaging services, particularly advanced imaging; furthermore, given the teaching function, one might expect greater proportions of diagnostic testing and imaging services. However, relative to nonteaching and minor teaching HOPDs, the distribution of services in major teaching HOPDs is skewed toward routine evaluation and management services, that is, visit services.

Part of the explanation for these results may lie in more fully understanding the role played by major teaching HOPDs in Medicare. Major teaching hospitals are likely to be large, often public hospitals located in urban areas serving a disproportionate number of the poor. Seventy-seven percent of major teaching hospitals receive disproportionate-share payments, and teaching hospitals as a group account for 65 percent of such payments (Shiengold 1990). In their communities, major teaching HOPDs may be the source of basic care for poor Medicare beneficiaries. If this is true, we should see many of these same patterns when disproportionate-share HOPDs are examined.

Disproportionate-Share Status. One might expect that disproportionate-share HOPDs treat patients of greater complexity with poor health status and less continuity of care. Lower health status and less continuity of care might be expected to result in greater proportions of surgery (neglected illnesses requiring more aggressive interventions) and diagnostic testing (which would be reflected in laboratory and other tests as well as imaging services).

However, similar to major teaching HOPDs, the service mix in disproportionate-share HOPDs is skewed toward visits and away from surgery and imaging—but the difference is not as dramatic. A greater proportion of the services in disproportionate-share HOPDs are visit services (16.1 percent) as compared with non-disproportionate-share HOPDs (11.3 percent). This difference is almost entirely reflected in routine visit services, which account for 7.3 percent of services in disproportionate-share HOPDs but only 1.9 percent in non-disproportionate-share HOPDs. Although the differences are small, imaging (14.2 percent) and surgery (5.4 percent) services account for smaller proportions of disproportionate-share HOPD services as compared to non-disproportionate-share HOPDs (15.9 percent and 6.6 percent, respectively). These differences are consistently reflected in each of the individual imaging and surgery service subcategories. Disproportionate-

share HOPDs also have lower proportions of testing services (53.3 percent) than non-disproportionate-share HOPDs (56.0 percent).

Urban and Rural Location. The pronounced differences in the service mix provided by teaching and disproportionate-share HOPDs and their counterparts are not apparent when urban and rural HOPDs are compared. Visit services account for 13.3 percent of all services in urban HOPDs as compared with 11.1 percent in rural HOPDs. Again, the biggest difference between urban and rural HOPDs is for routine visits, which account for about 4.3 percent of services in urban HOPDs and about 1.3 percent in rural HOPDs. Imaging services account for similar proportions of services in urban and rural HOPDs (about 15.4 percent). Surgery services account for a greater proportion of urban HOPD services (6.5 percent) than of rural HOPD services (5.4 percent). This appears to be the case across all surgery subcategories.

Bed Size. Given the preceding discussion of major teaching and disproportionate-share HOPDs, it is not surprising to find that a greater proportion of the services provided by large HOPDs are visits, particularly routine medical visits. About 6.9 percent of large HOPD services are for routine visits as compared to 2.8 percent and 1.6 percent of services in medium and small HOPDs, respectively. Also similar to the teaching/disproportionate-share HOPD results, imaging services account for a smaller proportion of services in large HOPDs. This is because a smaller proportion of services in large HOPDs (about 10.8 percent) are composed of standard imaging services, as compared to small and medium (about 13 percent) HOPDs. Surgery services, however, account for greater proportions of services in both medium (6.8 percent) and large (6.2 percent) HOPDs as compared to small HOPDs (5.1 percent).

Diagnostic testing services present an interesting case. About 58.6 percent of the services provided in small HOPDs are diagnostic tests, compared with about 54 percent of services in medium and large HOPDs. However, the pattern varies depending on the type of testing service. Laboratory tests account for about 54.7 percent of small HOPD services as compared with about 49 percent in medium and large HOPDs. But other diagnostic tests (e.g., cardiovascular stress tests) account for greater proportions of the services in medium and large HOPDs (about 5 percent) when compared to small HOPDs (3.8 percent).

Region. Table 2 reports service mix by region. One might expect variations in service mix to be dampened when examined by region given the level of aggregation. On the contrary, some interesting variations emerge

that may reflect differences in medical practice patterns across the country. Visit services as a percentage of all services range from 11.4 percent in the East North Central region to 15.2 percent in the Mountain region. But this obscures even greater variations observed for specific visit services. Routine visit services account for a greater percentage of services in New England (5.2 percent) and Mountain (4.7 percent) HOPDs, and substantially lesser proportions of services in East South Central (2.1 percent) and West South Central (2.3 percent) HOPDs. Emergency/critical care visits account for 4.8 percent of Medicare HOPD services nationally, but account for substantially greater proportions in East South Central (7.0 percent), South Atlantic (5.8 percent), West South Central (5.7 percent), and Pacific (5.7 percent) region HOPDs.

Imaging services are about 13.5 percent of all services in New England and Middle Atlantic HOPDs, but over 17 percent of services in South Atlantic and East South Central HOPDs. This variation is largely driven by standard imaging services, which range from nearly 14 percent of services in South Atlantic (13.8 percent) and East South Central (13.9 percent) HOPDs to 10.9 percent in New England HOPDs. Surgery services comprise a lesser proportion of the services in New England (4.8 percent) and Middle Atlantic (4.9 percent) HOPDs, and a greater proportion of the services in South Atlantic (7.0 percent), West North Central (7.7 percent), and West South Central (8.0 percent) HOPDs. Finally, testing services as a proportion of all services vary from 47.8 percent in the East South Central region to 62.1 percent in the Middle Atlantic region. The variation is most pronounced for laboratory tests, which range from a high of 57.5 percent in Middle Atlantic HOPDs to a low of 42.8 percent in East South Central HOPDs.

Again, we examined service use per patient to understand further the regional variations just noted. New England (8.6) and East North Central (8.5) HOPDs provide the greatest number of services per patient, whereas those in the Pacific (6.8) and South Atlantic (6.9) regions provide the fewest. Two types of services, routine visits and laboratory tests, seem to be associated most consistently with a region's overall utilization patterns. For example, New England, Middle Atlantic, and East North Central HOPDs have higher than average utilization rates, and each of these regions has laboratory test utilization rates (4.7, 4.8, and 4.5, respectively) substantially exceeding the United States mean (3.8). HOPDs in the South Atlantic, East South Central, and West South Central regions have lower overall utilization and below-average utilization of testing services (3.1, 3.0, and 3.2, respectively). The Mountain and Pacific regions are interesting cases:

both provide fewer services per patient overall (7.0, Mountain; 6.8, Pacific; 7.6, United States). This lower provision of services seems to be reflected across virtually all service categories—imaging, tests, and other services and, to a lesser extent, surgery and visit services.

PROVISION OF HIGH-TECHNOLOGY SERVICES

Table 3 displays 17 high-technology services sorted by degree of availability (i.e., the percentage of HOPDs providing this service to Medicare patients). The technologies demonstrate very different degrees of availability. For example, 50 percent or more of the HOPDs in the nation provide CT scans or (nondoppler) ultrasound services, whereas only 1 percent provide upper GI laser endoscopy and 3 percent provide lithotripsy. Moreover, there is significant variation in the availability of these technologies by hospital type.

It appears that technologies available in only a small percentage of HOPDs nationally are more common in large, urban, and major teaching HOPDs.¹⁵ For example, nationally 3 percent of HOPDs provided lithotripsy services, but 11 percent, 5 percent, and 9 percent of large, urban, and major teaching HOPDs, respectively, provide these services. Given that part of the role of major teaching HOPDs is to train interns and residents in the latest technologies, these results might tentatively suggest that major teaching HOPDs (which are often large HOPDs located in urban areas) are the originating hospitals for these technologies. In contrast, technologies that are more widely available nationally are more likely to be provided in minor than in major teaching HOPDs. In fact, all of the selected technologies offered by over 20 percent of HOPDs nationally are more likely to be provided in minor teaching hospitals than in major teaching hospitals.

Table 4 analyzes regional variations in technology provision. Similar to the hospital type results, there is considerable variation across regions and many of the differences are significant. These variations suggest two points. First, technology is consistently more widely available in certain regions, specifically, the New England, Middle Atlantic, South Atlantic, and East North Central regions. In the Pacific region certain endoscopic/laser surgeries, certain laser eye surgeries, and lithotripsy appear to be more widely available. Second, in a few instances, a given region unexpectedly stands out from its counterparts. For example, the percentage of HOPDs

Table 2: Hospital Outpatient Department Services by Type of Service and Hospital Type—Region

Type of Service	All HOPDs	New England	Middle Atlantic	South Atlantic	East North Central	East South Central	West North Central	West South Central	Mountain	Pacific
Visits	12.73%	15.02%	12.10%	13.09%	11.40%	12.74%	12.26%	12.58%	15.21%	13.99%
Routine visits	3.47	5.20	4.23	2.76	3.59	2.12	2.78	2.28	4.68	3.51
Emergency/Critical care	4.83	4.84	4.01	5.81	3.68	7.00	4.28	5.68	5.01	5.66
Specialist/Consultations	1.05	1.20	1.14	1.02	1.11	0.67	1.10	0.94	1.16	0.94
Other visit	3.38	3.79	2.71	3.51	3.03	2.95	4.09	3.69	4.36	3.87
Imaging	15.38%	13.46%	13.63%	17.07%	15.10%	17.43%	15.29%	16.85%	15.20%	15.62%
Standard imaging	12.44	10.87	11.29	13.84	12.20	13.94	12.19	13.48	11.97	12.72
Advanced imaging	2.93	2.59	2.34	3.23	2.91	3.49	3.10	3.38	3.23	2.90
Surgery	6.23%	4.76%	4.93%	7.03%	6.00%	6.70%	7.65%	7.99%	5.50%	6.39%
Ambulatory/Minor	1.09	1.05	0.91	1.07	1.21	1.16	1.31	1.06	1.04	1.02
Endoscopy	1.08	0.89	0.88	1.27	1.03	1.21	1.26	1.29	1.06	1.05
Cataract/Lens/Other eye	0.77	0.60	0.63	0.82	0.69	0.87	0.88	1.07	0.57	0.89
Unclassified surgery	3.30	2.22	2.52	3.87	3.07	3.47	4.20	4.57	2.84	3.43
Tests	55.17%	58.84%	62.13%	49.85%	58.15%	47.82%	53.70%	49.45%	53.55%	52.62%
Lab tests	50.19	54.37	57.47	44.42	53.18	42.82	49.23	44.05	48.80	47.22
Other tests	4.98	4.47	4.65	5.43	4.97	5.00	4.48	5.39	4.75	5.41
Other	10.49%	7.91%	7.21%	12.96%	9.35%	15.30%	11.10%	13.12%	10.54%	11.38%
Dialysis/Oncology	1.41	1.80	1.55	1.52	1.54	1.15	1.13	1.16	0.96	1.21
Other	9.08	6.11	5.66	11.45	7.82	14.15	9.97	11.97	9.58	10.16
Percent of All Services	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Sum of All Services	6,787,888	506,698	1,244,638	1,081,159	1,493,495	413,721	547,774	565,851	291,154	643,398

***Significantly different from the New England mean at the 99% confidence level.

**Significantly different from the New England mean at the 95% confidence level.

*Significantly different from the New England mean at the 90% confidence level.

providing lithotripsy in the South Atlantic region (6.2 percent) markedly exceeds that of any other region. And the percentage of HOPDs in the East North Central region providing doppler carotid artery examinations (35 percent) substantially exceeds that of other regions.

DISCUSSION

It is important to reiterate two limitations of our study here. First, our analysis of high-technology services is confined to those services reported using HCPCS codes. The use of HCPCS codes is likely to vary by carrier and therefore by state, potentially increasing the appearance of regional differences in the availability of high-technology services. Second, the variations in service mix and technology provision are likely to stem from differences in practice patterns, patient mix, and the organization of service supply (e.g., ambulatory surgery centers). While our analysis does not isolate the causes of this variation, it does allow us to highlight those services for which changes in payment policy are more likely to result in distributional impacts. We comment further on the impact of service supply organization below.

The first major finding from this analysis relates to the role of major teaching and disproportionate-share HOPDs in their communities. In contrast to previous research on inpatient services provided in these hospital types, it appears that the service mix in major teaching and disproportionate-share HOPDs is made up of greater proportions of routine visit services and smaller proportions of high-complexity imaging and surgical services. This suggests that the role of the HOPD in these hospital types is oriented toward providing basic care in the communities where they are located. Consistent with this finding, previous research also shows that these hospital types have lower than average HOPD case mix (Miller and Sulvetta 1993).

The policy implication of this result is that major teaching and disproportionate-share HOPDs are more heavily vested in providing evaluation and management services and, therefore, that the impact of an HOPD PPS on these services in general, and on routine visits in particular, will be important to these HOPDs. Moreover, because these two hospital types provide the majority of these services (major teaching HOPDs provide 51 percent of routine visits and disproportionate-share HOPDs provide 61 percent), the actual reimbursement levels for these services will have important implications for access. Given that these hospitals are often located in poor

Table 3: Percentage of Hospital Outpatient Departments Providing Selected High-Technology Services by Hospital Type

Technology	All HOPDs	Bed Size			Teaching Status			Location	
		<100†	101-350	351+	Non†	Minor	Major	Rural†	Urban
Upper GI laser endoscopy	1.41%	0.22%	2.36%***	4.52%***	0.91%	2.92%***	4.41%***	0.20%	2.48%***
Lithotripsy	3.21	0.37	5.30 ***	11.43 ***	2.22	6.28 ***	8.82 ***	1.19	5.01 ***
Radioisotope therapy	5.52	3.20	6.67 ***	15.00 ***	4.30	9.63 ***	11.27 ***	3.16	7.64 ***
Laser eye or lens surgery	10.41	2.39	17.42 ***	28.33 ***	7.38	22.94 ***	13.71 ***	4.22	15.93 ***
Laser treatment of retina	10.57	2.13	17.22 ***	32.86 ***	7.31	22.08 ***	23.03 ***	4.18	16.26 ***
Electromyography, limbs	11.42	1.95	19.87 ***	31.67 ***	7.33	24.78 ***	31.87 ***	3.73	18.27 ***
SPECT nuclear scan of heart	14.08	2.13	23.85 ***	44.05 ***	9.63	30.52 ***	27.95 ***	4.80	22.36 ***
Arthroscopy, knee	15.68	5.19	25.96 ***	33.81 ***	12.69	28.46 ***	17.16 *	17.66	23.42 ***
MRI brain	16.09	3.09	26.45 ***	50.00 ***	12.05	27.38 ***	45.08 ***	8.28	23.05 ***
Doppler carotid artery exam	21.75	10.81	31.40 ***	45.71 ***	18.00	37.12 ***	26.49 ***	14.06	28.61 ***
Laser secondary cataracts	21.98	9.38	36.65 ***	42.86 ***	18.38	38.64 ***	18.13	11.56	31.28 ***
Electroencephalogram	26.27	7.72	42.84 ***	65.95 ***	20.28	48.16 ***	46.07 ***	14.06	37.16 ***
Doppler heart exam	27.41	11.47	42.69 ***	56.43 ***	22.28	46.85 ***	41.18 ***	16.48	37.16 ***
Laser colonoscopy	33.94	14.56	52.31 ***	70.24 ***	27.81	59.10 ***	41.69 ***	17.74	48.38 ***
Ultrasound head/chest	50.20	33.65	66.09 ***	80.24 ***	45.22	70.01 ***	59.37 ***	38.11	60.98 ***
CT scan head/brain	62.26	42.55	82.43 ***	91.90 ***	57.32	80.40 ***	77.89 ***	49.92	73.26 ***
Ultrasound abdomen	67.30	54.73	80.47 ***	84.76 ***	64.61	80.09 ***	62.68	61.11	72.81 ***

Note: Table sorted based on the availability of the technology nationally.

***Significantly different from the reference group mean at the 99% confidence level.

**Significantly different from the reference group mean at the 95% confidence level.

*Significantly different from the reference group mean at the 90% confidence level.

†Reference group.

communities, the issue of access warrants attention. At the same time, lucratively reimbursing these services could encourage the further concentration of these services in these hospitals and potentially induce volume increases (particularly if the HOPD PPS is visit-based). Imaging and surgery services are slightly more concentrated in nonteaching, minor teaching, and non-disproportionate-share hospitals, suggesting that changes in reimbursement for these services may be important to these three hospital types.

The analysis of high-technology provision suggests a second role for major teaching HOPDs more similar to the inpatient role of these hospitals. These HOPDs, along with large and urban HOPDs, appear to be an important source of new technology. Technologies that are available in only a small percentage of HOPDs are more likely to be provided by major teaching HOPDs than by their counterparts. (Minor teaching HOPDs also appear to play an important role in the provision of more widely available technologies, with a higher percentage of minor teaching HOPDs providing these technologies than major teaching HOPDs.) These results suggest that the roles played by certain hospital types in providing new technologies may require special attention under a PPS. In setting payment rates, policymakers will have to strike a balance between a payment level that encourages technological innovations while discouraging over-investment.

Another finding of this study relates to the proportion of HOPD services that are diagnostic tests. Diagnostic testing represents over half of what HOPDs do for Medicare patients. The implication of the diagnostic testing finding for an HOPD PPS is both positive and negative. On the one hand, prospectively paying for diagnostic testing services will capture much of the HOPD services provided, and to do so should not result in gross distributional effects across hospital types.

On the other hand is the issue of control. The HOPD in a community can serve as an independent diagnostic testing center, and thus much of its volume is subject to the referral patterns of local physicians. If an HOPD PPS is put in place that pays for *each* diagnostic test, the referral issue is not critical—the PPS acts simply as a fee schedule. However, if the PPS defines the unit of payment to be larger than the single service in order to control volume (e.g., bundling simple diagnostic testing in with medical or surgical services during an encounter), the issue of referral testing will have to be addressed. There is considerable regional variation in testing services per patient, suggesting that any bundling policy is likely to have regional effects. One method of addressing this issue would be to incorporate HOPD services into Medicare physician volume performance standards (VPS). This

Table 4: Percentage of Hospital Outpatient Departments Providing Selected High-Technology Services by Region

Technology	All HOPDs	New England		Middle Atlantic		South Atlantic		East North Central		East South Central		West North Central		West South Central		Mountain		Pacific	
Upper GI laser endoscopy	1.41%	2.62%	1.32%	2.33%	1.91%	0.22%**	1.07%*	1.07%*	0.97%*	1.45%	1.01%*								
Lithotripsy	3.21	3.49	2.65	6.20 **	2.67	2.89	1.74	2.63	2.91	2.91	3.36								
Radioisotope therapy	5.52	2.62	4.16	7.36 ***	3.68	2.90	7.51 ***	6.22 **	10.18 ***	10.18 ***	3.86								
Laser eye or lens surgery	10.41	19.21	15.69	12.79 ***	13.21 ***	6.23 ***	7.64 ***	6.08 ***	5.23 ***	5.23 ***	10.40 ***								
Laser treatment of retina	10.57	15.29	14.18	11.37 *	12.46	7.80 ***	7.77 ***	6.92 ***	6.98 ***	6.98 ***	14.10								
Electromyography, limbs	11.42	21.83	17.95	8.66 ***	23.50	10.46 ***	8.31 ***	6.09 ***	6.98 ***	6.98 ***	2.86 ***								
SPECT nuclear scan of heart	14.08	11.78	21.17 ***	18.48 ***	24.14 ***	8.91	7.50 *	9.82	12.80	12.80	7.72								
Arthroscopy, knee	15.68	20.10	17.77	18.09	17.66	10.47 ***	9.79 ***	10.93 ***	15.11	15.11	23.83								
MRI brain	16.09	19.64	12.85 **	21.32	21.09	16.25	12.33 ***	17.29	13.95 *	13.95 *	8.55 ***								
Doppler carotid artery exam	21.75	20.50	21.73	24.03	35.07 ***	22.27	17.03	23.52	10.77 ***	10.77 ***	11.41 ***								
Lasering secondary cataracts	21.98	30.11	25.51	26.36	29.09	16.47 ***	14.34 ***	16.59 ***	13.66 ***	13.66 ***	25.66								
Electroencephalogram	26.27	40.15	38.74	28.82 ***	41.04	24.26 ***	17.96 ***	22.40 ***	18.90 ***	18.90 ***	7.90 ***								
Doppler heart exam	27.41	43.69	35.35 **	29.85 ***	38.75	26.52 ***	20.90 ***	21.43 ***	21.49 ***	21.49 ***	15.43 ***								
Laser colonoscopy	33.94	55.47	49.52	40.43 ***	41.82 ***	22.74 ***	24.00 ***	23.79 ***	22.12 ***	22.12 ***	33.05 ***								
Ultrasound head/chest	50.20	71.61	73.55	59.30 ***	60.37 ***	52.33 ***	38.46 ***	42.89 ***	38.68 ***	38.68 ***	24.68 ***								
CT scan head/brain	62.26	83.46	74.09 ***	78.03	75.48 **	64.17 ***	49.08 ***	57.68 ***	50.87 ***	50.87 ***	32.88 ***								
Ultrasound abdomen	67.30	83.83	78.83	77.78 *	77.65 *	74.18 ***	57.63 ***	67.22 ***	59.55 ***	59.55 ***	34.90 ***								

Notes: Table sorted based on the availability of the technology nationally.

***Significantly different from the New England mean at the 99% confidence level.

**Significantly different from the New England mean at the 95% confidence level.

*Significantly different from the New England mean at the 90% confidence level.

would equalize the incentives between physicians and hospitals, as excessive referrals for testing would affect payment levels for both the physician and the HOPD.

The pronounced regional variations in service mix and technology provision warrant comment. Differences in the organization of service supply across the region may be an important factor in these variations. The presence of ambulatory surgical centers (ASCs), and independent and physician office-based laboratories in an area might affect the composition of surgery services and diagnostic testing services in certain regions. For example, 26 percent of ASCs in the nation are located in the Pacific region as opposed to 10 percent of hospitals. While we cannot offer conclusive evidence of a trade-off, this does point to the need to study payment interactions between competing sites of care.

The regional analysis has three policy implications. First, the mix of services within HOPDs does vary markedly by region. Thus, if payments under an HOPD PPS are set inappropriately high or low for selected types of service, the relative gains and losses will vary by region. For example, if visit services were under- or overpaid, New England HOPDs would be most directly affected. These effects could be dampened by using a transition period from the current system to national prospective payment rates. During this transition, payment rates could reflect regional and U.S. averages (or, like the inpatient PPS transition, reflect hospital-specific, regional, and national averages). Second, as noted earlier, an important factor in the regional variations observed here may be the organization of health service supply. Since certain regions may have more choices regarding the site of an outpatient service (e.g., an HOPD versus an ASC), reforming HOPD payment cannot be undertaken without a coordination of payments in competing sites of care; otherwise the system may have decidedly differential effects by region. Finally, the different utilization per patient across the regions may warrant attention inasmuch as it reflects differences in practice patterns rather than case mix. Bundling services might be one means of offering an incentive to HOPDs to control volume of services per patient. However, this and other volume controls may put HOPDs at risk for the referral practices of local physicians.

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NOTES

1. We use "encounter" to refer to all services provided to a beneficiary in the HOPD on a specific date. We reserve the term "visit" to refer to an evaluation and management service provided by a physician. During an encounter a beneficiary may, but does not necessarily have to, receive a visit service.
2. APGs, developed at 3M/Health Information Systems, incorporate the basic concepts of the DRG system. They also draw on the concepts of the ambulatory visit group (AVG) system developed by Yale researchers. APGs attempt to classify patients into homogeneous groups based on common organ systems or etiology, a specific medical specialty usually providing the care, and patients having similar medical characteristics (see Averill et al. 1990 for complete discussion). APGs are assigned based on the ICD-9-CM diagnosis codes, the CPT-4 code, and the age and sex of the patient.

There are 297 APGs divided into 145 significant procedure APGs, 80 medical APGs, and 72 ancillary APGs. Significant-procedure APGs refer to surgical procedures (e.g., hernia repair), certain treatments (e.g., physical therapy), and significant tests (e.g., cardiac stress tests). Ancillary APGs refer to nonsignificant procedures (e.g., immunizations) and certain (radiology, laboratory, pathology) tests ordered by a physician to assist in diagnosis or treatment. Significant and ancillary APGs are assigned on the basis of CPT-4 codes. Medical APGs are assigned based on diagnosis code and are grouped into categories such as malignancy, trauma, and cardiovascular.

3. Obviously this depends on the accuracy of the classification categories used as the basis of the case-mix measure and whether other payment adjustors are used, such as an adjustment for teaching hospitals.
4. This file is a date-of-service file, and captures all services delivered during 1990 for this sample of beneficiaries.
5. HCFA's common procedure coding system (HCPCS) encompasses the American Medical Association's CPT-4 codes and additional HCFA-created alpha codes, for services such as durable medical equipment.
6. The criteria used in developing the classification scheme were completeness (i.e., all CPT-4 codes were classified with little reliance on "other" categories), and category definitions that were mutually exclusive, clinically meaningful, stable over time, and relatively immune to changes in technology and practice patterns.
7. If the physician is salaried staff of the hospital, the hospital will submit a bill for his or her services. Even if the physician is not a salaried employee, the facility bill for such a service encompasses the costs associated with the observation or examining room and nursing care, for example.
8. Surgery services are reported in broad operating room or recovery room revenue centers.
9. As noted, revenue center trailers do not always report HCPCS codes, and for this analysis of high-technology services the specific service (as opposed to the type of service) needs to be identified. Consequently, this analysis must be confined to those trailers reporting HCPCS codes.

10. For example, laparoscopic cholecystectomy (gall bladder removal) is reported under the traditional code for open cholecystectomy.
11. Major and minor teaching status is determined on the basis of the intern- and resident-to-bed ratio, $>.25 =$ major.
12. Disproportionate-share status refers to hospitals under Medicare PPS that receive special payments for serving large numbers of poor Medicare beneficiaries and the Medicaid insured.
13. This is consistent with previous research of Dubay and Sulvetta (1990), in which they found that 40 percent of HOPD encounters were to receive laboratory and radiology services only (i.e., with no accompanying visit service). Dubay and Sulvetta concluded that "referred ancillary" services (i.e., physicians referring patients to the HOPD for diagnostic testing) constituted a major component of Medicare HOPD services.
14. Per patient figures are calculated by summing all services provided in a given HOPD type and dividing by the number of unique beneficiaries visiting that HOPD type. If a beneficiary visits different types of HOPDs during the year (e.g., a patient visiting a rural HOPD and then being referred to an urban HOPD), the beneficiary is counted for each HOPD type he or she visits.
15. The proportions of non-disproportionate-share and disproportionate-share HOPDs providing each technology generally do not differ markedly and are not presented.

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