Geographic Adjustment in Medicare Payment: Phase II: Implications for Access, Quality, and Efficiency

Margaret Edmunds, Frank A. Sloan, and A. Bruce Steinwald, Editors; Committee on Geographic Adjustment Factors in Medicare Payment; Board on Health Care Services; Institute of Medicine

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GEOGRAPHIC ADJUSTMENT
IN MEDICARE PAYMENT

Phase II: Implications for Access, Quality, and Efficiency

Committee on Geographic Adjustment Factors in Medicare Payment

Board on Health Care Services

Margaret Edmunds, Frank A. Sloan, and A. Bruce Steinwald, *Editors*

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Willing is not enough; we must do."*
—Goethe

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Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

Robert Berenson, The Urban Institute
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Lance A. Waller, Emory University, Rollins School of Public Health

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by

Harold Sox, American College of Physicians, and **Charles E. Phelps,** Rochester University. Appointed by the National Research Council and Institute of Medicine, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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Chapter 3

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Exhibit

Acronyms

ACA	Patient Protection and Affordable Care Act
ACS	American Community Survey
AHEC	Area Health Education Center
AHRQ	Agency for Healthcare Research and Quality
AMA	American Medical Association
ASC	ambulatory surgical center
BLS	Bureau of Labor Statistics
BPC	Bipartisan Policy Center
CAH	critical access hospital
CAHPS	Consumer Assessments of Healthcare Providers and Systems
CBSA	core-based statistical area
CHC	community health center
CMI	case-mix index
CMS	Centers for Medicare & Medicaid Services
COGME	Council on Graduate Medical Education
CPT	Current Procedural Terminology
CRS	Congressional Research Service
CSA	combined statistical area
CTS	Community Tracking Survey
CY	calendar year
DoD	Department of Defense
DRG	diagnosis-related group
DSH	disproportionate share hospital

EHR	electronic health record
FCC	Federal Communications Commission
FQHC	Federally Qualified Health Center
FY	fiscal year
GAF	geographic adjustment factor
GAO	Government Accountability Office
GIS	geographic information system
GME	graduate medical education
GPCI	geographic practice cost index
GSA	General Services Administration
HCAHPS	Hospital Consumer Assessment of Healthcare Providers and Systems Survey
HCFA	Health Care Financing Administration
HCPCS	Healthcare Common Procedure Coding System
HHA	home health agency
HHS	Department of Health and Human Services
HIT	health information technology
HITECH	Health Information Technology for Economic and Clinical Health Act of 2009
HPSA	Health Professional Shortage Area
HRR	hospital referral region
HRSA	Health Resources and Services Administration
HSA	hospital service area
HSIP	Healthcare Shortage Professional Area (HPSA) Surgical Incentive Payment
HUD	Department of Housing and Urban Development
HWI	hospital wage index
IME	indirect medical education
IMG	international medical graduate
IOM	Institute of Medicine
IPPS	Inpatient Prospective Payment System
IRS	Internal Revenue Service
KFF	Kaiser Family Foundation
LPN	licensed practical nurse
MDH	Medicare-dependent hospital
MedPAC	Medicare Payment Advisory Commission
MEPS	Medical Expenditure Panel Survey
MGCRB	Medicare Geographic Classification Review Board
MGMA	Medical Group Management Association
microSA	micropolitan statistical areas
MIPPA	Medicare Improvements for Patients and Providers Act
MMA	Medicare Modernization Act of 2003

MP	malpractice
MS-DRG	Medicare severity diagnosis-related group
MSA	metropolitan statistical area
NAICS	North American Industry Classification Systems
NCS	National Compensation Survey
NHDR	*National Healthcare Disparities Report*
NHQR	*National Healthcare Quality Report*
NHSC	National Health Service Corps
NP	nurse practitioner
NPI	National Provider Identifier
OBRA	Omnibus Budget Reconciliation Act of 1989
OES	Occupational Employment Statistics
OIG	Office of Inspector General
OMA	occupational mix adjustment
PA	physician assistant
PCSA	primary care service area
PE	practice expense
PFS	Physician Fee Schedule
PHS	Public Health Service
PLI	professional liability insurance
PPIS	Physician Practice Information Survey
PPS	prospective payment system
PQRS	Physician Quality Reporting System
ProPAC	Prospective Payment Advisory Commission
RBRVS	Resource-Based Relative Value Scale
RN	registered nurse
RSE	relative standard error
RRC	rural referral center
RUCC	Rural–Urban Continuum Code
RVU	relative value unit
SCH	sole community hospital
SE	standard error
SNF	skilled nursing facility
UDS	Uniform Data Systems

Summary:
Implications of Geographic Adjustment for Access, Quality, and Efficiency of Care

The Medicare program provides health coverage for more than 47 million Americans, including 39 million people aged 65 and older and 8 million people with disabilities. Although Medicare is a national program, it adjusts fee-for-service payments to Medicare providers for geographic differences in the costs of providing care. Payments in high-cost areas are increased relative to the national average, and payments in low-cost areas are reduced. Medicare spending reached $525 billion a year in 2010, so there is considerable interest in ensuring that payments are accurate in different parts of the country.

In July 2010, the Department of Health and Human Services (HHS) commissioned the Institute of Medicine (IOM) to produce two reports on improving the accuracy of the data sources and methods used for making geographic adjustments to fee-for-service Medicare payments. The statement of task for the 2-year study was developed by the IOM and the Centers for Medicare & Medicaid Services (CMS) on behalf of the Secretary of HHS, using language that came directly from Section 1157 of the Affordable Health Care for America Act (HR 3962) (see Box S-1).

The first report, *Geographic Adjustment in Medicare Payment: Phase I: Improving Accuracy*, was released in May 2011, with a second edition following in September 2011. That report focused on the accuracy of estimates of labor and other input costs in fee-for-service payments under Medicare Part A (hospitals) and Part B (physicians and other clinical practitioners). The report recognized that some costs are beyond providers' control and recommended continuation of the use of indexes to calculate geographic adjustments with several significant changes and justifications. These changes include the use of one set of payment areas and one source of wage and benefits data for hospitals and practitioners; expanding the range of occupations used in making the geographic adjustments for employee compensation; and developing a new empirical model for adjusting practitioner payment. The report concluded that its recommendations, if implemented, would substantially improve the accuracy of Medicare's geographic payment adjustments and render unnecessary the many exceptions and reclassifications that exist in the current payment system.

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BOX S-1
Statement of Task

An ad hoc committee will conduct a comprehensive empirical study on the accuracy of the geographic adjustment factors established under Sections 1848(e) and 1886(d)(3)(E) of Title XVIII of the Social Security Act and used to ensure that Medicare payment fees and rates reflect differences in input costs across geographic areas.

Specifically, the committee will

- Evaluate the accuracy of the adjustment factors.
- Evaluate the methodology used to determine the adjustment factors.
- Evaluate the measures used for the adjustment factors for timeliness and frequency of revisions, for sources of data and the degree to which such data are representative of costs, and for operational costs of providers who participate in Medicare.

Within the context of the U.S. health care marketplace, the committee will also evaluate and consider

- The effect of the adjustment factors on the level and distribution of the health care workforce and resources, including
  - Recruitment and retention, taking into account mobility between metropolitan and nonmetropolitan areas;
  - Ability of hospitals and other facilities to maintain an adequate and skilled workforce; and
  - Patient access to providers and needed medical technologies;
- The effect of adjustment factors on population health and quality of care; and
- The effect of the adjustment factors on the ability of providers to furnish efficient, high-value care.

A first report will address the issues surrounding the adjustment factors themselves, and then a second report that evaluates the possible effects of the adjustment factors will follow. The reports, containing findings and recommendations, will be submitted to the Secretary of HHS and the Congress.

The current report addresses the second phase of the IOM study of geographic adjustments in Medicare payment. The committee members deliberated at length about how to approach the statement of task for Phase II, which included both very specific and very expansive language about their responsibilities. The Phase I report had recommended that geographic adjustment should be used only to improve technical accuracy of Medicare payments and that policy objectives, such as equitable access to health care services in high- and low-cost areas, or influencing the distribution of the workforce in shortage areas, should be addressed through other means.

Thus, in Phase II, the committee was tasked with determining how its recommendations about the accuracy of geographic adjustment would affect access and quality of health care and the supply and distribution of the health care workforce. With regard to access to care, the committee learned from the payment simulations that payments to physicians and other

practitioners in shortage areas, which are disproportionately populated by racial and ethnic minorities, would be adversely affected by the Phase I recommendations.

Particularly because the committee's recommended approach to geographic adjustment appeared to place some providers in shortage areas at an added disadvantage, the committee included analysis of the potential impact of its recommendations on high-risk and vulnerable populations and on other public programs designed to address shortages, as part of its charge. Although not explicitly mentioned in the statement of task, the committee sought to develop recommendations to help strengthen access and improve efficiency, particularly for high-risk and vulnerable populations, in order to address the adverse impact of the proposed adjustment. With regard to quality of care and the workforce supply and distribution, the committee did not find evidence that its recommendations about accuracy of geographic adjustment would have a significant impact.

Taken together, the Phase I and Phase II reports seek to increase the likelihood that the geographic adjustments to fee-for-service Medicare payment reflect reasonably accurate measures of input price differences and are consistent with the long-term national policy goals of creating a payment system that rewards high-value and high-quality health care.

IMPACT ANALYSIS: PHASE I RECOMMENDATIONS

In Chapter 2, the committee reports the findings of a series of statistical simulations conducted to obtain the estimated impact of the changes recommended in the committee's Phase I report on payments to hospitals and clinical practitioners. In designing the simulations, the committee sought to identify vulnerable, medically underserved geographic areas that might experience a disproportionate impact if the Phase I recommendations were implemented.

The committee used Health Professional Shortage Areas (HPSAs)[1] as the generally accepted representation of underserved areas for comparing access, quality, and workforce supply across geographic areas. HPSAs are a recognized standard in workforce research in that they are the official national designation of shortage areas, and they are also being used for a new incentive payment program for primary care services and general surgery in underserved areas from 2011 to 2015, as described in Chapter 4.

There are some recognized drawbacks to using HPSAs, including their degree of currency and accuracy as designated shortage areas compared with other nondesignated areas; the degree to which they accurately reflect access barriers given that patients travel outside HPSAs to seek health care; their high practitioner vacancy rates and varying appeal to practitioners as practice locations; and the fundamental differences in access problems between rural and urban HPSAs. Nevertheless, the committee viewed HPSAs as the generally accepted standard and an acceptable basis for its deliberations and simulations.

For purposes of the simulations, the committee used the definition of geographically based HPSAs for primary care services, as adopted by CMS for purposes of implementing the primary care bonus payment program initiated under the Affordable Care Act.[2] Health professionals eligible for primary care bonus payments include physicians in general internal medicine, family practice, pediatrics, and geriatrics, as well as nurse practitioners (NPs) and physician assistants

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[1] Health Professional Shortage Areas are an administrative designation by the Health Resources and Services Administration that identify areas with a low or insufficient primary care workforce (http://bhpr.hrsa.gov/shortage).

[2] See *Overview, HPSA/PSA Bonuses,* at https://www.cms.gov/hpsapsaphysicianbonuses.

(when billed under a supervising physician). The committee's approach was consistent with the evidence that access to primary care and having a usual source for routine medical care are generally associated with better health status.

Key Findings from Hospital Payment Simulations

1. As a result of moving to a more technically accurate wage index, the change in payments would be between –5 and +5 percent for discharges in 88 percent of hospitals.
2. The most substantial differences in payments under the index as recommended by the committee as compared to payments under current CMS policy are the result of eliminating policy adjustments, such as the various exceptions, market reclassifications, and floors, rather than the result of technical corrections to improve accuracy.
   a. The largest negative effect on payments in metropolitan areas is due to the elimination of state rural floors for metropolitan areas in states where the index for the rural area is higher than an index for a metropolitan area. For the majority of these areas, the committee's revised index for metropolitan areas is lower than the index under the current system with the rural floor.
   b. Commuter-based smoothing adjustments have a modest effect on the hospital wage index for the great majority of counties (99 percent of the hospital wage indexes after smoothing are between 0.99 and 1.04), but smoothing serves to partially offset the effects of eliminating reclassifications.
3. A hospital wage index based on Bureau of Labor Statistics (BLS) data yields generally higher relative wages in rural areas, as compared to an index based on data from hospital cost reports.
4. In general, relative wages computed from benefits-adjusted BLS data are not substantively different from relative wages computed from hospital data. There are notable exceptions, however, in markets where few hospitals contribute to that market's hospital wage index.
5. Payments to rural referral centers are slightly lower under the index proposed by the committee. Payments to other rural hospitals with special payment status are generally higher (by roughly 1 percent), except for those located in frontier states.
6. The committee found no specific types of hospitals (for example, by teaching status, disproportionate share status, size, or region) that appeared to be disproportionately advantaged or disadvantaged by moving to a more technically accurate index.

Key Findings from Physician Payment Simulations

1. As a result of moving to more technically accurate geographic practice cost indexes (GPCIs), the changes in payments would be between –5 and +5 percent in counties where 96 percent of relative value units are billed. Most of the redistribution would be from rural to urban areas and from small urban to large urban areas.
2. The most important intervention to improve accuracy of physician payment adjusters is the move from current payment localities to core-based statistical area (CBSA) markets.
3. GPCIs computed under CBSA markets yield lower relative wages in rural areas, as compared to GPCIs computed under the larger payment localities.
4. Commuter-based smoothing adjustments have a modest effect on the GPCIs for the great majority of counties (99 percent of the wage component of the practice expense GPCIs

after smoothing are between 0.98 and 1.07), but smoothing serves to partially offset the impact of changing to CBSA markets in rural counties that are adjacent to metropolitan areas.

5. Because many rural areas are also HPSAs, physician payments under the committee's proposed indexes are reduced in most of the rural primary care shortage areas that are currently eligible for Medicare primary care bonus payments. Among medium, high, or full primary care shortage counties in rural areas, estimated payment changes range from a reduction of 26 percent to an increase of 1.7 percent.

6. The impact of the proposed changes would vary primarily between metropolitan and nonmetropolitan county designations rather than across Health Professional Shortage Area designations. The positive effects on metropolitan counties and negative effects on nonmetropolitan counties would be reduced with a 0 percent adjustment for physician work and increased with a 100 percent work adjustment. The impact of a 25 percent adjustment, the current level, would fall within the two extremes.

7. Under the committee's more technically accurate indexes, areas with the highest reductions in payments would be the frontier states, with Alaska experiencing the largest reduction.

In summary, the committee found that the effects of implementing its Phase I recommendations would make less than a 5 percent change in either direction (increase or decrease) for the large majority of hospital and practitioner services. In aggregate, the payment simulations showed that 88 percent of Medicare discharges from hospitals and 96 percent of physician billings differed less than 5 percent from current payments. However, the committee recognizes that percentages that may seem small when they are aggregated net real differences in payments for clinical services and hospital margins.

The committee determined that underserved areas, particularly those that would experience reductions in payment under the proposed payment adjustment changes, would require attention in subsequent analyses and policy changes. Chapter 2 includes a section on provider impact that illustrates the ways in which the payments would change for selected geographic locations.

EVIDENCE OF GEOGRAPHIC VARIATION IN ACCESS, QUALITY, AND WORKFORCE DISTRIBUTION

The statement of task called for the committee to "evaluate and consider" the effects of the geographic adjustment factors on access, quality, and workforce distribution. Because of the vast number of studies that have addressed these topics over the years, the committee did a targeted search for recent studies that specifically compared access and/or quality of care for beneficiaries in different geographic areas, including regions of the country, metropolitan and nonmetropolitan areas, and local health systems, and then considered how Medicare and other payment policies might improve access for beneficiaries based on the evidence they found.

Geographic Variations in Access to Care

Generally speaking, most Medicare beneficiaries have good access to care, when defined as services that are readily available and that yield the most favorable outcomes possible. The majority of physicians accept Medicare payment for services, although it can be challenging for

beneficiaries to find a new physician in some localities. Racial and ethnic minorities consistently face more barriers in accessing both primary and specialty care, and they are more likely to receive poorer-quality care as measured by a core set of quality measures developed by HHS.

Geographic Variations in Quality of Care

Hospital quality reporting has been under way for some time, with a recent focus on reducing preventable readmissions as a measure of the quality of care (see Chapter 4). Quality data for physicians and other health professionals will become available by early 2013, to meet requirements of the Medicare Improvements for Patients and Providers Act. Thus far, according to a series of National Healthcare Quality Reports from the Agency for Healthcare Research and Quality, improvements in the quality of care have been disappointingly slow.

Quality of care varies considerably within local metropolitan and nonmetropolitan areas, and there is no strong evidence to suggest clear differences in quality of care between metropolitan and nonmetropolitan areas in aggregate. However, the committee recognized that there is considerable concern that variations in payment rates could contribute to variations in health care quality and access across geographic areas. In particular, stakeholders expressed concerns in their testimony to the committee that lower payment rates in rural and underserved areas could have adverse effects on existing problems with quality and access (see Appendix E).

Because little published research was available to determine the empirical basis for these concerns, the committee conducted an analysis of data collected as part of the 2010 Consumer Assessments of Healthcare Providers and Systems (CAHPS) survey of fee-for-service Medicare beneficiaries. The analysis showed that metropolitan areas tended to do better on timeliness of access, and nonmetropolitan areas scored higher on communication with doctors and overall satisfaction with physicians. While the study had several limitations, it found little evidence to suggest that revisions in the geographic adjustment factors proposed by the committee would systematically favor areas that currently experience either superior or inferior patient-reported performance on measures of access and quality.

In sum, the committee concluded that there are wide discrepancies in access to and quality of care across geographic areas, particularly for racial and ethnic minorities. However, the variations do not appear to be strongly related to differences in or potential changes to fee-for-service payment.

Workforce Distribution and Supply

The committee was also asked to consider the "level and distribution of the health care workforce and resources, including mobility between metropolitan and nonmetropolitan areas." The health care workforce is unevenly distributed across the country, as are Medicare beneficiaries themselves.[3] More than half of Medicare beneficiaries have one or more chronic conditions, such as diabetes, hypertension, and kidney disease, and their care often requires a combination of primary care and specialty services from multiple clinicians.

Of the 1 million practitioners eligible to bill the Medicare program for services delivered to

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[3] While Medicare beneficiaries make up 15 percent of the population nationwide, up to 60 percent of Medicare beneficiaries in six states (Mississippi, Montana, North Dakota, South Dakota, Vermont, and Wyoming) live in rural areas (KFF, 2010).

beneficiaries, half are physicians and the other half are nurse practitioners, physical therapists, podiatrists, clinical psychologists, and other professionals. There is a growing body of evidence that shows improved outcomes for beneficiaries when their practitioners coordinate care and function in collaborative teams.

Due primarily to limitations in data, the committee's assessment of workforce supply and distribution of health care services was focused on primary care physicians, general surgeons, nurses, nurse practitioners, and physician assistants. The committee documented geographic variation in the practice locations for certain primary care practitioners; for example, nurse practitioners are more likely than physicians to provide primary care services and to choose to practice in shortage areas. However, secondary data used to understand workforce need improvement, and further analysis is needed to understand existing regional differences and the geographic differences in the relationship between primary care or specialist supply and population health.

The committee concluded that Medicare beneficiaries in some geographic pockets face persistent access and quality problems, and many of these pockets are in medically underserved rural and inner-city areas. However, geographic adjustment of Medicare payment is not an appropriate approach for addressing problems in the supply and distribution of the health care workforce. The geographic variations in the distribution of physicians, nurses, and physician assistants and local shortages that create access problems for beneficiaries should be addressed through other means.

PROGRAMS AND POLICIES TO IMPROVE ACCESS AND QUALITY OF CARE FOR BENEFICIARIES

Access to high-quality health care services is not uniform across the United States. The health care workforce varies in size relative to population, and its composition varies both across and within metropolitan and nonmetropolitan areas. The evidence reviewed by the committee suggests that geographic access has been improving, most likely as a result of market forces as well as various workforce policies, but that the supply and distribution of practitioners in some areas continue to be a concern.

Evaluation of Workforce Programs and Policies

Workforce policies have been in place for many years, some for decades, with the intent of supporting, training, and increasing the production of health professionals who are found to be in short supply. The availability of evidence to determine the effectiveness of these programs varies greatly by program, from none to numerous studies.

While residents of underserved communities probably have benefited from the public programs on balance, the programs have been underfunded and have not been implemented on a sufficient scale to have had meaningful effects in all or even some areas. There are many such programs with a relatively small investment per program, especially relative to the size of the U.S. health care sector overall and public programs like Medicare and Medicaid in particular.

Similarly, the investment in evaluation of the effectiveness of these programs has been minimal. In general, while a variety of programs attempt to enhance health professional recruitment, retention, or both, little is known about which types of policies are most successful in improving access in underserved areas.

NEW OPPORTUNITIES TO IMPROVE ACCESS, QUALITY, AND EFFICIENCY

The committee sought to determine which policies and programs have been most effective in improving access to hospital and clinical services, improving quality of care, and increasing the supply of practitioners as well as influencing their distribution across geographic areas. The committee also considered ways in which current payment policies might be changed to improve access to care by expanding the reach of the existing workforce. These include the use of telehealth technologies and reevaluating scope-of-practice limitations.

Recent Developments in the Use of Telehealth Services

One very promising and rapidly developing strategy to improve access and efficiency of care is to provide practicing clinicians with new resources and technology tools that enable them to reach more patients. Telehealth services, which involve using information and communication technologies to provide services when patients and providers are in different locations, are being used by nearly 50 recognized medical subspecialties. These services include videoconferencing, transmission of images, patient portals, consumer health education, remote monitoring of vital signs, nursing call centers, and others.

An increasing body of evidence shows that telemedicine or telehealth care management of beneficiaries with chronic diseases, such as diabetes and congestive heart failure, can help reduce preventable rehospitalizations and reduce access barriers related to geographic distance, weather, disability, lack of transportation, or shortages of practitioners in rural areas and other medically underserved urban areas.

Scope of Practice

Traditionally, discussions of workforce and supply in primary care have focused on how to recruit and retain physicians into primary care rather than specialty care and to provide incentives for physicians to practice in underserved areas. As discussions of new care models have evolved, more attention is being paid to the functions and roles of members of care teams and to the nature and extent of their collaborations and working relationships.

The scope of practice of various health professions is not only an area of disagreement over professional autonomy between physicians and other health professionals, it also has a major impact on regulatory and payment policies. As of March 2012, 16 states and the District of Columbia have passed laws that remove nurse practitioner practice barriers, enabling them to practice to the full extent of their education and within their scope of preparation, bearing responsibility for the care they deliver, under their own license. Although some of these 16 states have large rural areas (e.g., Alaska, Hawaii, Iowa, North Dakota, Oregon, and Washington), other more restrictive states such as Georgia and Alabama also have significant rural areas, as well as provider shortages that could be alleviated by full use of the available workforce.

RECOMMENDATIONS

The committee members sought to determine which policies and programs have been most effective in improving access to hospital and clinical services, improving quality of care, and in increasing the supply of practitioners as well as influencing their distribution across the country.

The evidence review was hampered by the lack of evaluation, mixed results, and methodological challenges in defining quality and workforce measures that also included geographic comparisons. Therefore, the committee also identified some promising new areas of policy and program development where changes in payment policies have the potential to expand beneficiaries' access to efficient and appropriate health care. The committee offers six recommendations that, if followed, would improve the balance of service across geographic areas.

RECOMMENDATION 1: The Medicare program should develop and apply policies that promote access to primary care services in geographic areas where Medicare beneficiaries experience persistent access problems.

A focus on primary care is an important part of any effort to build a system of care that will provide efficient, high-value care for all Medicare beneficiaries. This is true for those beneficiaries who require care from multiple specialists because of multiple chronic conditions and also for those who live in medically underserved areas where there are shortages of health professionals, particularly medical specialists.

In determining the impact of its Phase I recommendations on vulnerable populations, the committee used HPSAs with shortages of primary care physicians and other practitioners as the standard representation of geographic areas in which beneficiaries may experience access problems due to the undersupply of clinical practitioners. The committee's impact analyses did show that payment to physicians and other clinical practitioners in HPSAs, which are disproportionately populated by racial and ethnic minorities, would be adversely impacted by the Phase I recommendations.

The committee also analyzed data from the CAHPS survey and did not find evidence that the proposed revisions in the geographic adjustment factors were related to consumer-reported access and quality of care.

Based on these analyses and the review of evidence about access and quality of care, the committee concluded that geographic adjustment is not an appropriate tool for achieving policy goals such as improving quality or expanding the pool of providers available to see Medicare beneficiaries. However, Medicare payment policy already provides bonus payments to primary care practitioners and general surgeons who practice in HPSAs. The committee supports these targeted bonus payments and encourages CMS to support other policy adjustments to encourage the provision of care in underserved areas.

RECOMMENDATION 2: The Medicare program should pay for services that improve access to primary and specialty care for beneficiaries in medically underserved urban and rural areas, particularly telehealth technologies.

Telehealth involves the use of information and communications technology to exchange information and provide services when patients and practitioners are in different locations. For example, remote patient monitoring, in which electronic devices are used to remotely collect and send real-time personal health information to a clinician, is emerging as a standard of care that improves access and clinical efficiencies and reduces the travel burden on beneficiaries.

Currently, Medicare pays for telehealth services when provided by qualified providers to beneficiaries in rural areas, but individuals and facilities in medically underserved metropolitan areas are not eligible for Medicare payment for telehealth services. While the committee recog-

nizes the importance of ensuring that all telehealth providers are appropriately credentialed, the committee calls for changes in CMS payment policy to support telehealth services that improve access for all beneficiaries, and particularly for those in underserved urban and rural areas.

RECOMMENDATION 3: To promote access to appropriate and efficient primary care services, the Medicare program should support policies that would allow all qualified practitioners to practice to the full extent of their educational preparation.

The committee reviewed multiple sources of workforce data and found clear documentation of the need for primary care practitioners in general, and specifically in rural areas. There is evidence that primary care NPs choose to practice in rural areas more than their physician counterparts. There are many inconsistencies in state laws regulating scope of practice, and NPs are more likely to locate in rural areas in states with more progressive, less restrictive regulations.

Given the shortage of primary care providers in the United States and specifically in rural areas, the committee agrees that it would be reasonable to remove barriers in Medicare and state licensing language so all qualified practitioners are able to practice to the full extent of their educational preparation in providing needed services for Medicare beneficiaries.

RECOMMENDATION 4: The Medicare program should reexamine its policies that provide location-based adjustments for specific groups of hospitals, and modify or discontinue them based on their effectiveness in ensuring adequate access to appropriate care.

Several groups of hospitals currently receive special treatment in determining Medicare payment, on the basis that extra payment is necessary to preserve beneficiaries' access to appropriate care in the areas they serve: critical access hospitals, sole community hospitals, Medicare-dependent hospitals, low-volume hospitals, and rural referral centers. The criteria for qualifying for special treatment are generally not consistently stated or applied, nor have access benefits for beneficiaries been consistently demonstrated. It may be advisable over time to combine existing programs—or establish new ones to replace existing ones—to protect access to appropriate high-quality care for Medicare beneficiaries in different areas of the United States.

RECOMMENDATION 5: Congress should fund an independent ongoing entity, such as the National Health Care Workforce Commission, to support data collection, research, evaluations, and strategy development, and make actionable recommendations about workforce distribution, supply, and scope of practice.

The committee was tasked with assessing "the effect of the adjustment factors on the level and distribution of the health care workforce and resources, including recruitment and retention, taking into account mobility between urban and rural areas." That task was made difficult by the lack of objective, longitudinal research on the workforce. There is a serious lack of clear and consistent data collected in a uniform manner over time or that consider more than one profession or discipline.

Recognizing these problems and constraints, the committee recommends the funding of an organization independent of the programs that can focus policy questions, combine viewpoints, prioritize policy choices, collect more useful data, coordinate evaluation and assessment

projects, and evaluate cross-cutting policy options. One such body, the Workforce Commission established in the Affordable Care Act, has already been appointed but has not yet been funded.

RECOMMENDATION 6: Federal support should facilitate independent external evaluations of ongoing workforce programs intended to provide access to adequate health services for underserved populations and Medicare beneficiaries. These programs include the National Health Service Corps, Title VII and VIII programs under the Public Health Service Act, and related programs intended to achieve those goals.

The committee conducted a comprehensive literature review of public programs designed to improve the geographic distribution of health care professionals. Virtually all of the studies dealt with physicians, and most studies focused on physician retention instead of their original recruitment to underserved areas or on their practice location decisions.

The committee asks for much more rigorous independent evaluation of these programs to identify which program strategies are most effective. These evaluations should not be limited to physicians, and they should focus on decision making of health professionals and on impacts on populations who live in underserved areas.

CONCLUSION

Through its recommendations presented in its Phase I and Phase II reports, the committee has fulfilled its charge to recommend improvements in the accuracy of how Medicare's fee-for-service geographic payment adjustments are calculated. Changes in fee-for-service payments that encourage greater coordination of care may be helpful in promoting outcome-based delivery system changes.

The committee's Phase I recommendations to harmonize hospital and practitioner labor market areas and data sources are examples of ways that fee-for-service payment changes may encourage delivery system improvements. Consistent with this harmonization is the recognition in Phase II of the importance of the health care workforce in achieving access and quality goals.

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1

Introduction and Overview

BACKGROUND

Medicare is the largest payer of health care services in the United States, representing approximately 30 percent of total spending on hospital care and 20 percent of total spending on physician services (CMS, 2010). The program provides health coverage for more than 47 million Americans, including 39 million people aged 65 and older and 8 million people with disabilities (KFF, 2011).

Although Medicare is a national program, it adjusts fee-for-service payments to Medicare providers for geographic differences in the costs of providing care. Payments in high-cost areas are increased relative to the national average, and payments in low-cost areas are reduced. Medicare spending reached $525 billion a year in 2010 (CMS, 2010) so there is considerable interest in ensuring that payments are accurate in different parts of the country.

This is the second of two Institute of Medicine (IOM) reports to the Secretary of the Department of Health and Human Services (HHS) and the U.S. Congress addressing geographic adjustments in Medicare payment. The first report, *Geographic Adjustment in Medicare Payment: Phase I: Improving Accuracy*, focused on the accuracy of estimates of labor and other input costs in fee-for-service payments under Medicare Part A (hospitals) and Part B (physicians and other clinical practitioners) (IOM, 2011a).The first report recognized that some costs are beyond providers' control and recommended continuation of the use of indexes to calculate geographic adjustments with several significant changes and simplifications. These include the use of one set of payment areas and one source of wage and benefits data for hospitals and practitioners; expanding the range of occupations used in making the geographic adjustments for employee compensation; and developing a new empirical model for adjusting practitioner payment. The report concluded that its recommendations, if implemented, would substantially improve the accuracy of Medicare's geographic payment adjustments and render unnecessary the many exceptions and reclassifications that exist in the current payment system.

This report addresses Phase II of the IOM study of geographic adjustments in Medicare pay-

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ment. It begins with an analysis of the impact of implementing the Phase I recommendations on hospital and practitioner payments and considers the implications for beneficiaries' access to care in different geographic areas. It next reviews evidence of geographic differences in access, quality, and the distribution of the health care workforce, and then reviews evidence about the effectiveness of various programs and policies that have sought to influence the supply and distribution of the clinical workforce. After discussing some of the larger payment policy issues considered by the committee, the report offers six recommendations for policy changes that would improve access to care for beneficiaries and address workforce data and policy gaps.

Taken together, the Phase I and II reports seek to increase the likelihood that the geographic adjustments to Medicare payment reflect reasonably accurate measures of input price differences, and are consistent with the national policy goals of creating a payment system that rewards accessible and high-quality health care for all beneficiaries.

CONCEPTUAL APPROACH TO GEOGRAPHIC ADJUSTMENT

In July 2010, HHS commissioned the IOM to produce a report on how to improve the accuracy of the data sources and methods used for making geographic adjustments to fee-for-service Medicare payments. The statement of task for the 2-year study was developed by the IOM and the Centers for Medicare & Medicaid Services (CMS) on behalf of the Secretary of HHS, using language that came directly from Section 1157 of the Affordable Health Care for America Act (HR 3962) (see Box 1-1).[1]

During the first phase of this study, the IOM Committee on Geographic Adjustment Factors in Medicare Payment (the committee) developed a set of general principles to guide its deliberations (see Box 1-2). The committee made a clear distinction between its technical responsibilities under the statement of task to improve the accuracy of the data sources and methods used to make geographic adjustments, and its responsibilities under the second part of the statement of task to evaluate the impact of the adjustment factors on workforce supply and distribution, beneficiary access to quality care, and population health. Principle 7 from the Phase I report (see Box 1-2) summarizes the committee's agreement that geographic adjustment should be used only to improve technical accuracy of Medicare payments and that policy objectives, such as equitable access to primary care and specialty services in high- and low-cost areas, should be addressed through separate and distinct measures.

The committee agreed on the importance of focusing its deliberations on issues that reflected geographic variation and Medicare payment policy. Specifically, the committee sought empirical evidence of geographic differences in access to appropriate levels of care for Medicare beneficiaries, quality of care provided to beneficiaries, and provider supply and distribution.

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[1] A second IOM study was commissioned by HHS based on language from Section 1159 of the House bill. That study addresses variation in health care spending, utilization, and quality across the country for individuals with Medicare, Medicaid, private insurance, or no insurance. Specifically, the IOM committee is examining how variation may or may not be related to factors such as (1) the cost of care, the supply of care, quality of care, and health outcomes; (2) diversity within patient populations, patients' current state of health, access to care, insurance coverage, and patients' preferences for their care; (3) market characteristics such as hospital competition, supply of services, public health spending, and the malpractice environment; (4) physicians' decisions on what care to give and the availability of reliable medical evidence to guide those decisions; and (5) how a geographic area is defined. To address unnecessary variation in Medicare spending, the IOM will recommend changes to specific Medicare payment systems that would promote high-value care. To this end, the IOM will consider alternative health care delivery and payment mechanisms, including a value index based on measures of quality and cost that payers could use to promote high-value services. The study was initiated in December 2009 and the report will be released in March 2013.

BOX 1-1
Statement of Task

An ad hoc committee will conduct a comprehensive empirical study on the accuracy of the geographic adjustment factors established under Sections 1848(e) and 1886(d)(3)(E) of Title XVIII of the Social Security Act and used to ensure that Medicare payment fees and rates reflect differences in input costs across geographic areas.

Specifically, the committee will

- Evaluate the accuracy of the adjustment factors.
- Evaluate the methodology used to determine the adjustment factors.
- Evaluate the measures used for the adjustment factors for timeliness and frequency of revisions, for sources of data and the degree to which such data are representative of costs, and for operational costs of providers who participate in Medicare.

Within the context of the U.S. health care marketplace, the committee will also evaluate and consider

- The effect of the adjustment factors on the level and distribution of the health care workforce and resources, including
  - o Recruitment and retention taking into account mobility between metropolitan and nonmetropolitan areas;
  - o Ability of hospitals and other facilities to maintain an adequate and skilled workforce; and
  - o Patient access to providers and needed medical technologies;
- The effect of adjustment factors on population health and quality of care; and
- The effect of the adjustment factors on the ability of providers to furnish efficient, high-value care.

A first report will address the issues surrounding the adjustment factors themselves, and then a second report that evaluates the possible effects of the adjustment factors will follow. The reports, containing findings and recommendations, will be submitted to the Secretary of HHS and the Congress.

Payment policies and programs to improve access through changes in workforce supply and distribution were also assessed. The evidence review is presented in Chapter 3, "Evidence of Geographic Variation in Access, Quality, and Workforce Distribution," and Chapter 4, "Programs and Policies to Improve Access and Quality of Care for Beneficiaries." Chapter 5 presents some additional policy considerations discussed by the committee throughout its deliberations, and Chapter 6 presents the committee's recommendations.

Defining Terms

The committee agreed that the Phase II report should be framed around a conceptual model for reviewing evidence based on recognized and standard definitions of some very broad terms, such as *access*, *quality*, *workforce*, *primary care*, and *shortage areas*. As presented in Box 1-3,

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BOX 1-2
Principles from the Phase I Report

1. **Evidence for adjustment.** The continued use of geographic adjustment factors in Medicare payment is warranted to reflect geographic variations in input prices.
2. **Accuracy.** Geographic adjustment for input price differences is intended to reflect the input prices faced by providers, not the costs incurred by providers.
3. **Local labor markets.** Geographic adjustment should reflect area-wide input prices for labor faced by all health care employers operating in the same local market and should not be drawn exclusively from data on the wages paid by hospitals or health care practitioners.
4. **Consistent criteria.** Consistent criteria should be used for determining the payment areas, data sources, and methods that are used in making the geographic adjustment for hospitals and practitioners.
5. **Consistent rationale.** Changes in the current system of geographic adjustment should be based on a clear and consistent rationale.
6. **Transparency.** The geographic adjustment process should provide sufficient information to allow transparency and empirical review of the data and methods used to make the adjustments.
7. **Policy adjustments.** Medicare payment adjustments related to national policy goals should only be made through a separate and distinct adjustment mechanism, and not through geographic adjustment.

SOURCE: IOM, 2011b.

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wherever possible, the committee adopted previous definitions from other IOM committees because they have been so widely adopted by federal agencies and the health policy community. For example, the Agency for Healthcare Research and Quality (AHRQ) defines accessible care for Medicare beneficiaries as services that are readily available and yield the most favorable outcomes (2010).[2]

For purposes of analyzing the payment impact on primary care, the committee used the CMS definition of specialties eligible for primary care payment bonuses. These include physicians in general internal medicine, family practice, pediatrics, and geriatrics as well as clinical nurse specialists, nurse practitioners, and physician assistants (when billed under a supervising physician).[3] Based primarily on data availability, the committee's assessment of the supply and distribution of primary care and specialty services was focused on physicians, nurse practitioners, and physician assistants. Other members of the health care workforce, including dentists, pharmacists, physical therapists, technicians, and medical assistants, were not included in the evidence review even though they may bill Medicare and are considered as part of the Medicare workforce.

The committee made a distinction between "medically underserved" populations and medically underserved areas because of its focus on evidence related to Medicare beneficiaries. To describe geographic areas in which there are inadequate numbers of health professionals

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[2] The AHRQ definition is based on the definition of the 1993 IOM Committee on Access.
[3] CMS requires that 60 percent of Medicare billings for eligible practitioners must be for primary care services such as office-based and other outpatient visits, but that requirement was not applied in these analyses.

BOX 1-3
Definitions Used in This Report

Access: "The timely use of personal health services to achieve the best possible health outcomes" (IOM, 1993).

Health Professional Shortage Area (HPSA): An administrative designation by the Health Resources and Services Administration that identifies areas with a low or insufficient primary care, dental, or mental health workforce (HRSA, 2012).

Primary Care: "The provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community" (IOM, 1996).

Quality: "The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (IOM, 1990); and the six aims of quality improvement are to provide care that is "safe, effective, patient centered, timely, efficient, and equitable" (IOM, 2001).

Workforce: Broadly speaking, the health care workforce includes all health professionals and other workers who contribute to the delivery of care and indicate they work in the health care industry (Baker Institute, 2012). The Medicare workforce includes physicians, nurses, and other health professionals who can bill Medicare for services, and the workers who support them (e.g., receptionists, clerks, nursing assistants). This report focuses primarily on physicians, nurses, physician assistants, and others who are eligible for bonus payments to practice in HPSAs.

SOURCES: Baker Institute, 2012; HRSA, 2012; IOM, 1990, 1993, 1996, 2001.

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to meet local needs, the committee used the definition of Health Professional Shortage Areas (HPSAs) adapted by CMS for purposes of implementing the primary care bonus payment program (CMS, 2012a).

The primary care bonus payments became effective January 2011, and CMS requires that primary care services account for at least 60 percent of the practitioner's Part B allowed charges (CMS, 2012b). In contrast, the geographically based HPSA bonus payments are made automatically to practitioners who furnish services to Medicare beneficiaries within eligible ZIP codes (CMS, 2012b). Generally speaking, however, HPSAs are geographic areas, or populations within geographic areas, that lack sufficient practitioners to meet the health care needs of the area or population. The designations are used to identify areas of greater need so resources can be better directed to those areas (CMS, 2012b).

The committee chose to focus on the need for primary care as the foundation of the health system's continuum of care for beneficiaries (IOM, 1996), including those who require care coordination from multiple specialists because of multiple chronic conditions and those who live in medically underserved areas where there are shortages of health professionals.

Addressing the Committee's Charge

After defining basic terms, the committee discussed the nature and extent of the relationship between Medicare payment policy and the nation's ability to ensure a sufficient workforce to provide access to care that meets the health care needs of Medicare beneficiaries. As will be discussed in Chapter 3, the health care workforce is unevenly distributed across the country, as are the Medicare beneficiaries themselves.[4]

The committee viewed its charge for Phase II of the study as having two components. The first component was to identify the payment impact of the recommendations made in the first report and to better understand how access may vary across geographic areas, particularly metropolitan and nonmetropolitan areas. The second component was to identify variations in health care supply and other access problems (across geographic areas or specific populations) and consider the evidence for whether and how payment policy can affect these problems. Defining the relationship between payment policy and workforce distribution is difficult, given the lack of empirical evidence linking payment to the supply of practitioners and to access and utilization of care by beneficiaries.

Payment systems may affect access to care in numerous ways, some intended and some not. The Phase I report focused on geographic adjustments but acknowledged that there are other aspects of payments that might also have geographic consequences even though they are not, strictly speaking, geographic in nature. In addition, many nonpayment policies and programs have been created to address access through other means than payment incentives.

In Phase I, the committee realized early in its deliberations that health care labor markets are a critical element of geographic factors affecting the costs of delivery of health care services. In Phase II, the committee also quickly appreciated the role of the health care workforce in patient access to high-quality health care services. While the health care delivery system comprises a wide range of institutional and noninstitutional providers, all rely on the presence of a well-trained workforce to deliver the services that are both needed and timely. Thus, this report emphasizes the composition and geographic distribution of physicians, nurse practitioners, physician assistants, and other health care workers as the key factor in determining whether acceptable access is realized in different parts of the country.

Throughout its deliberations, the committee discussed several related questions in different contexts. These questions provide the foundation for the report and the conceptual framework in the next section.

- First, to what extent is the health care workforce distributed appropriately across different types of metropolitan and nonmetropolitan areas to maintain beneficiaries' access to appropriate levels of care?
- Second, how do Medicare's payment policies either help or hinder appropriate workforce distribution and access to needed health care service?
- Third, what policies are in place to encourage a more appropriate distribution of workforce resources, and how effective are they?
- Finally, what additional policies could either augment or replace existing policies to improve access to appropriate levels of health care services?

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[4] Medicare beneficiaries make up 15 percent of the population nationwide. In six states (Mississippi, Montana, North Dakota, South Dakota, Vermont, and Wyoming) up to 60 percent of Medicare beneficiaries live in rural areas (KFF, 2010).

Conceptual Framework

More than half of Medicare beneficiaries have one or more chronic conditions, such as diabetes, hypertension, or kidney disease, and they often receive care from multiple clinicians (Schneider et al., 2009). Of the 1 million practitioners eligible to bill the Medicare program for services delivered to beneficiaries, half are physicians. This half accounts for 90 percent of fee-for-service billing. The other half of the practitioners are nurse practitioners, physical therapists, podiatrists, clinical psychologists, and other professionals, who account for 10 percent of Medicare billing (MedPAC, 2011).[5] There is a growing body of evidence that shows improved outcomes for beneficiaries when their practitioners coordinate care and function in collaborative teams (e.g., Naylor et al., 2011), and a previous IOM committee described care coordination as "foundational" to quality improvement (IOM, 2011b).

There are many perspectives on what constitutes acceptable access to high-quality health care services. According to one definition, "health care quality is getting the right care to the right patient at the right time—every time" (Clancy, 2009). According to another definition, quality of care means being consistently safe, timely, effective, efficient, equitable, and patient centered (IOM, 2001).

In theory, if these aims are achieved, access to care will be achieved that is both effective and efficient. In practice, there are many influences on access that reflect local market and delivery system characteristics and that show a significant degree of geographic variation. The committee therefore decided to focus its attention on the factors related to Medicare's hospital and physician payment systems that may influence geographic differences in beneficiary access, and to discuss the implications of workforce distribution and mix for access to appropriate levels of care. However, the committee recognizes that geographic adjustment, while important, is a relatively small part of the Medicare payment system, and beneficiary well-being is also affected by the multipayer environment in which care is provided. The components of the larger environment and policy context for the study are reflected in Table 1-1.

Because geographic adjustment is part of a multipayer and heterogeneous delivery system environment, the committee's report is not limited to Medicare payment policies; it also considers the important role of other federal agencies and private organizations in training, recruiting, and retaining qualified practitioners across the country to provide quality care for Medicare beneficiaries.

RESULTS OF IMPACT ANALYSES FROM PHASE I RECOMMENDATIONS

The impact analyses were designed to determine the impact of the proposed changes in the hospital wage index and geographic practice cost indexes, and the direction and extent of their effects on provider payments. As will be described in Chapter 2, the committee found that the aggregated effects of its Phase I recommendations were generally small for the large majority of hospital and physician services. In aggregate, the payment simulations showed that 88 percent of Medicare discharges from hospitals and 96 percent of physician payments differed less than 5 percent in either direction (increase or decrease). However, the committee recognizes that percentages that may seem small net real differences in payments for clinical services and hospital margins. At the end of Chapter 2, the committee provides examples of

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[5] Because claims data analyzed by Medicare Payment Advisory Commission (MedPAC) typically reflect physician billing, these statistics may underestimate the amount of direct contact other health professionals have with patients.

TABLE 1-1 Policy Context for Evidence Review

Components of Quality Care	Cross-Cutting Issues: Equity and Value		
	Types of Care		
	Primary Care	Specialty Care	Chronic Condition Management
Effectiveness	✔	✔	✔
Safety	✔	✔	✔
Timeliness	✔	✔	✔
Patient centeredness/ family centeredness	✔	✔	✔
Access	✔	✔	✔
Efficiency	✔	✔	✔
Foundational	Care coordination		
	Health systems infrastructure capabilities		

SOURCE: Adapted from IOM, 2011b.

providers in different geographic areas who would experience a larger impact if the Phase I recommendations were implemented.

In approaching this report, the committee sought to identify vulnerable geographic areas, such as HPSAs, that might experience a disproportionate impact if the Phase I recommendations were implemented. After reviewing the findings from each component of the impact analyses, the committee discussed whether other existing policies could mitigate potential adverse effects of payment reductions. To the extent possible, the choice of policies was based on the committee's review of the evidence of effectiveness of various programs described in Chapter 4. The committee also recognized that some policies and programs have not been fully implemented or evaluated, and members agreed to consider some additional options where evidence was not current or otherwise incomplete.

Particularly because the committee's Phase I recommendations about improving payment accuracy appeared to place some providers in shortage areas at an added disadvantage, the committee included analysis of the potential impact of its recommendations on high-risk and vulnerable populations and of other public programs designed to address shortages, as part of its charge. While that analysis was not explicitly mentioned in the statement of task, the committee viewed it as a necessary part of its assessment of the impact of its Phase I recommendations. The committee thus sought to develop recommendations to help strengthen access and improve efficiency, particularly in vulnerable areas.

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Payment Simulations

INTRODUCTION

In its Phase I report, the committee made several specific recommendations to alter the ways in which the hospital wage index (HWI) and the physician geographic practice cost indexes (GPCIs) are computed. During the committee's second year, simulations were run to obtain the estimated payment impact for each of the committee's recommended changes, using the best available data. Methods used and detailed findings from the simulations are provided in Appendix A-1, and Appendix A-2 provides 10 annotated Excel files with the hospital and physician payment simulation data reviewed by the committee (see http://www.iom.edu/ GeoAdjustPaymentSimulations). This chapter presents highlights from the simulations and uses them to assess the effects that the committee's recommendations could have on health care shortage areas or at-risk populations and providers.

By definition, implementation of a geographic adjustment results in redistribution of payments but not a change in aggregate payment. The changes recommended in the Phase I report were made to improve the technical accuracy of the price adjusters as measures of market-level variation in health care input prices.

In areas where simulated payments under the proposed changes are higher than payments under current policy, the committee interprets this as evidence that current Centers for Medicare & Medicaid Services (CMS) prices have been underpaying providers by not accurately accounting for exogenous factor prices. Conversely, in areas where simulated payments are lower than payments under current policy, the committee interprets this as evidence that providers have been overcompensated for services delivered. Over- or underpayment may be due to correctable technical shortcomings in the current index construction. It may also reflect intentional cross-subsidization or other payment redistributions implemented by the Medicare program to achieve policy objectives that are unrelated to input price differences.[1]

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[1] An example of an intentional cross-subsidization is the rural floor for hospitals, a policy that states that hospitals in metropolitan areas must have indexes that are at least as high as the rural indexes in that state. Because this provision is budget-neutral, other hospitals not in these metro areas that benefit from the rural floor must essentially "fund" their higher index by accepting payment decreases. Notably, the frontier floors are not an example of an intentional cross-subsidization because the provision is budget-neutral.

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Seven of the committee's 15 recommendations from Phase I directly affected HWI or GPCI computations. These are listed in Box 2-1.

Some recommendations could not be included in our simulations due to lack of data.[2] For ease in following the material in this chapter, Table 2-1 lists the recommendations as proposed for the hospital index and for the physician price adjusters, or GPCIs. This table categorizes recommendations into three groups: those that reflect technical improvements to *data sources* and/or computation methods; those that affect the definitions of *labor markets* or payment areas; and those that reflect elimination of *policy adjustments* that are currently incorporated into the hospital and physician indexes.

It is important to keep in mind that the Phase I report did not take a position for or against the objectives underlying various policy adjustments. The committee has, however, made a clear statement that it does not believe that the HWI and GPCIs are effective vehicles for implementing policy-motivated payment redistribution. The recommendations in the Phase I report were intended to improve the technical accuracy of the indexes and ensure their integrity as measures of geographic variation in input prices. Under the committee's recommendations, the resulting hospital and physician indexes do not reflect any special treatment for providers located in areas currently affected by policy adjustments.

All of the committee's recommended changes to the indexes have been implemented in the simulation as "budget-neutral" to the estimated payments under current policy. This means that total payments estimated under the committee's proposed indexes must be the same as total payments estimated under current policy. The impact analyses thus focus only on the redistribution effects—that is, variation across areas or providers in the size of the payment impact. The hospital index findings present changes across hospitals or across labor markets (payment areas), while the physician index findings present changes across counties or across payment areas.

The committee believes that each of these changes improves the accuracy of the HWI or GPCIs as technical measures of variation in local input prices. The combined payment effects as presented in this chapter thus represent the committee's best estimate of the inaccuracy present in the current hospital and physician payment system, whether due to data shortcomings, market misclassification, or potentially mistargeted policy adjustments. By removing the policy adjustments from the index computations, the committee is not recommending the elimination of policy adjustments in the payment systems, only that policy adjustments should not be implemented through the geographic price adjusters.

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[2] For example, recommendations related to the rent component of the PE-GPCI could not be included in the simulations because the Phase I report indicated the data were not accurate and a reasonable proxy was not available. The Institute of Medicine (IOM) committee recommended developing new data on geographic variation in commercial rents, and although we reviewed survey data from other existing sources, none of them had sufficient geographic detail on a price-per-square-foot basis to be used as a next-best alternative for the computations in this chapter. Simulations therefore use the same Department of Housing and Urban Development rent data as CMS uses now. Other recommendations were included in the simulations using best available substitute data. For example, the committee also recommended that CMS work with the Bureau of Labor Statistics to obtain better data on geographic variation in employee benefits for health care workers, because benefit data as currently collected by that agency does not have sufficient geographic detail. In this instance, we do have a measure of market-level variation in hospital worker benefits through information on Medicare cost reports. The committee determined that an independent benefits index constructed from this information would be a reasonable proxy and would be preferable to constructing the wage indexes from base hourly wage data alone.

BOX 2-1
Phase I Recommendations Pertaining to Payment Simulations

The committee's Phase I report made 15 recommendations, of which 7 were directly related to the computation of the geographic price indexes and were able to be incorporated into the payment simulations.

- **Recommendation 2-1:** The same labor market definition should be used for both the hospital wage index (HWI) and physician geographic adjustment factor. Metropolitan statistical areas and statewide nonmetropolitan statistical areas should serve as the basis for defining those labor markets.
- **Recommendation 2-2:** The data used to construct the HWI and the physician geographic adjustment factor should come from all health care employers.
- **Recommendation 3-3:** The committee recommends use of all occupations as inputs in the HWI, each with a fixed national weight based on the hours of each occupation employed in hospitals nationwide.
- **Recommendation 4-1:** The committee recommends that wage indexes be adjusted by using formulas based on commuting patterns for health care workers who reside in a county located in one labor market but commute to work in a county located in another labor market.
- **Recommendation 4-2:** The committee's recommendation (4-1) is intended to replace the system of geographic reclassification and exceptions currently in place.
- **Recommendation 5-4:** The practice expense (PE) geographic practice cost index should be constructed with the full range of occupations employed in physicians' offices, each with a fixed national weight based on the hours of each occupation employed in physicians' offices nationwide.
- **Recommendation 5-7:** Nonclinical labor-related expenses currently included under PE office expenses should be geographically adjusted as part of the wage component of the PE.

SOURCE: IOM, 2011.

OVERVIEW OF FINDINGS

The two panels in Figure 2-1 show that the payment impact of the committee's recommendations is relatively small for the large majority of Inpatient Prospective Payment System (IPPS) hospital and physician services. With respect to the HWI, 88 percent of IPPS discharges are from hospitals where the overall payment impact is less than 5 percent in either direction, and for 61 percent of discharges from hospitals, the payment impact is between –1 and 5 percent.[3] Hospitals where payment drops by 10 percent or more represent 2.3 percent of discharges, and hospitals where payment increases by 10 percent or more represent 0.3 percent of discharges. With respect to the physician GPCIs, 96 percent of Part B relative value units (RVUs) are billed in counties where the overall payment impact is less than 5 percent in either

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[3] This represents 84 and 62 percent of hospitals respectively (for the –5 to 5 percent range and –1 to 5 percent range) and 88 and 25 percent of counties respectively (for the –5 to 5 percent range and –1 to 5 percent range) for the physician payments.

TABLE 2-1 Summary of Institute of Medicine Committee Phase I Recommendations Included in the Payment Simulations

Type of Recommendation	Institutional Payments: HWI	Physician Payments: GPCI
Changes in Data	• Replace hospital reported wages with BLS health care worker wages for hospital occupations • Incorporate benefits index from cost reports	• Use health care worker wages • Use BLS-constructed indexes for all occupations for physician offices • Incorporate benefits index
Changes in Payment Areas (Market Definitions)	• Smooth market boundaries using commuting patterns	• Use CBSA markets and single rest-of-state areas for nonmetropolitan counties • Smooth market boundaries using commuting patterns
Policy Changes in Exceptions and Adjustments	• Eliminate geographic reclassifications (all) • Remove rural floors for metropolitan areas • Remove frontier floors	• Remove frontier and work GPCI floors

NOTE: BLS = Bureau of Labor Statistics; CBSA = core-based statistical area; GPCI = geographic practice cost index; HWI = hospital wage index.
SOURCE: IOM, 2011.

direction, and for 67 percent of RVUs billed the payment impact is between –1 and 5 percent. Counties where payments are reduced by 10 percent or more represent 0.1 percent of RVUs, and counties where payment increases by 10 percent or more represent 0.3 percent of RVUs.

Although the aggregate payment impact is zero by design, the positive and negative effects are not randomly distributed across payment areas. Lower physician payments are estimated for 82 percent of counties, for example, and these counties tend to be smaller and located in rural areas. Forty-one percent of hospitals are located in areas with lower estimated diagnosis-
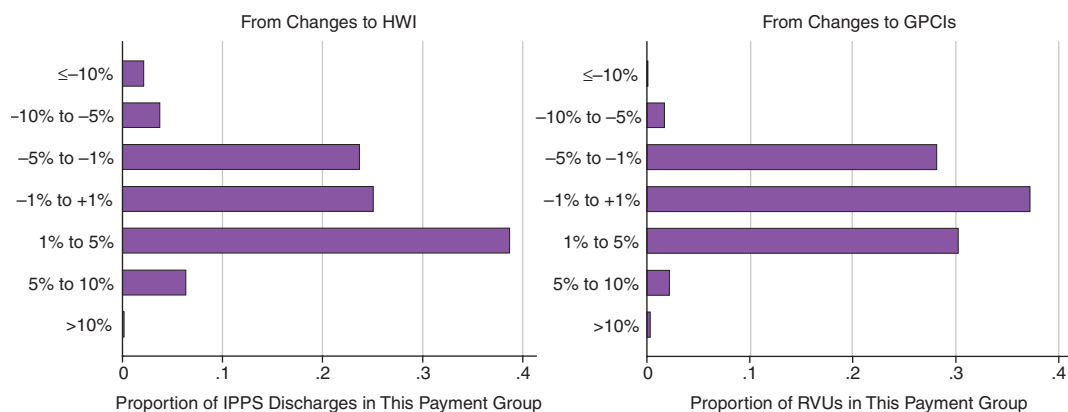
FIGURE 2-1 Payment differences between IOM committee recommended adjusters and current CMS policy: Distribution across measures of service delivery.
NOTE: GPCI = geographic practice cost index; HWI = hospital wage index; IPPS = Inpatient Prospective Payment System; RVU = relative value unit.
SOURCE: RTI simulations.

related group payments under the committee's recommendations, but these reductions are not concentrated in specific types of hospitals nor are they more severe in rural versus urban areas.

The remainder of this chapter provides additional information on the impact of changes to the HWI as well as the impact of changes to the GPCIs. Boxes are provided in each of these sections with a review of how the geographic price adjuster is computed under current policy. The final section of this chapter summarizes what the committee has identified as the key findings from the payment simulations.

EFFECTS ON HOSPITAL PAYMENTS

The distribution of estimated payment changes to hospitals paid under the inpatient prospective payment system is shown in Figure 2-2. The unit of observation in these graphs is the IPPS hospital. The upper frame identifies the impact of all recommended changes while the lower frame shows an estimate of the isolated impact of moving from the CMS hospital data source to the Bureau of Labor Statistics (BLS) data source. The two graphs together demonstrate that (1) hospitals in state nonmetropolitan markets tend to benefit under the BLS data change, but (2) the impact of other changes recommended by the committee offsets this effect in several areas. Under a comparison of simulated payments using the benefits-adjusted BLS-based index[4] versus simulated payments using the CMS occupation-mix adjusted wage index, 78 percent of nonmetropolitan hospitals have higher payments under the BLS-based index.[5] When all of the committee's recommendations for the HWI are included in the simulations, that figure drops to 64 percent, owing primarily to the elimination of hospital labor market reclassification. In total, however, the simulations show that the committee's recommendations have no effect on the aggregate rural–urban distribution of IPPS payments.

The move from hospital-reported data to BLS data affects individual market index values in both directions, but areas with the most extreme changes (those at either tail of the distribution in the lower frame of Figure 2-2) tend to be the smaller metropolitan markets where only one or two hospitals contribute to the CMS index. In larger markets where the CMS wage index value is derived from multiple hospitals, the relative wages computed from BLS data are more closely correlated with the occupation-mix adjusted relative wages from CMS data. To the extent that relative hospital wages are an unreliable proxy for relative wages in the health care industry as a whole, this suggests that the problem may lie in small or unstable samples of hospitals (in CMS's hospital reported data) more than with inherent differences between hospitals and other parts of the industry.

The only change to market areas that was recommended for the HWI is the use of commuter data to "smooth" the differences between indexes at borders where health care workers commute across market areas. (For a recap of the commuter smoothing method the committee has recommended, see Box 2-2.) Smoothing adjustments for the HWI are generally small (25th to 75th percentile is –0.1 to +0.1 percent, with a minimum value of –1.8 percent and a few counties with increases as high as 6 to 8 percent). They behave as expected: commuting is more common from lower to higher wage areas, such that adjustments are more often positive than negative, and adjustments are largest for rural counties located adjacent to metropolitan areas.

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[4] The term *BLS-based index* refers to the construction of the HWI and the GPCIs using BLS Occupational Employment Statistics wage data.

[5] Each wage index was first adjusted for budget neutrality such that total simulated payments remain equal to total estimated payments under current CMS policy.
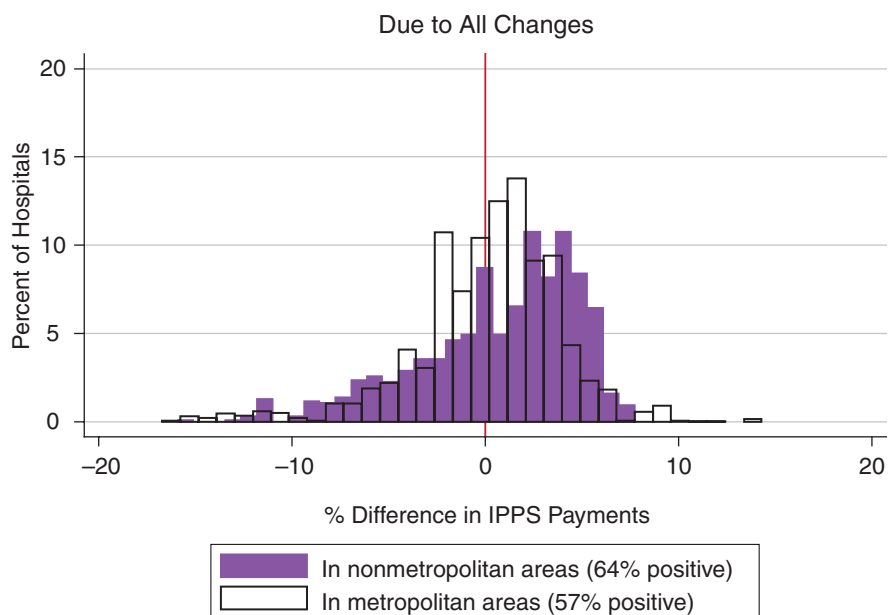
Differences are computed between payments under final benefits-adjusted BLS index and final post-reclassified post-floor CMS index.
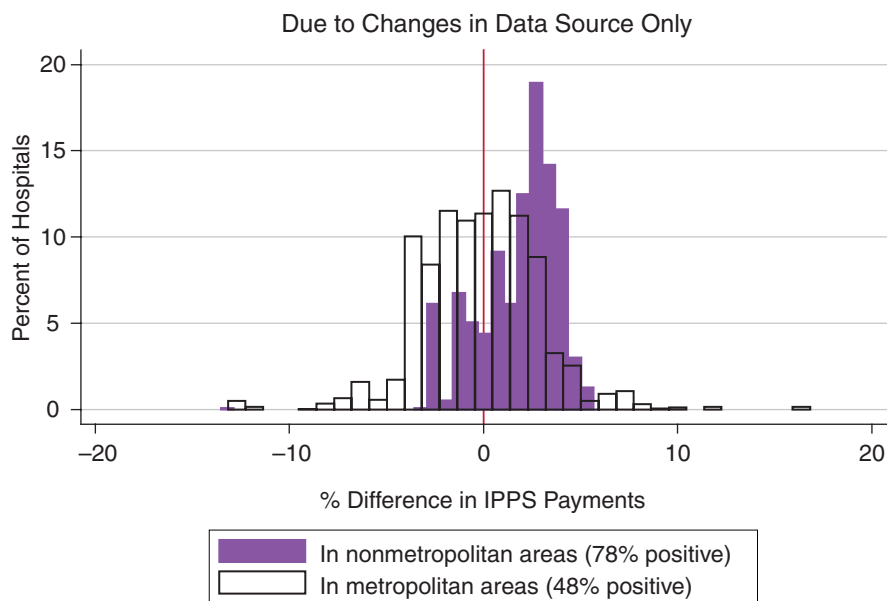
Differences are computed between payments under benefits-adjusted BLS index before smoothing and budget neutral CMS occupation-mix adjusted index.

FIGURE 2-2 Distribution of payment effects of IOM committee recommendations on the hospital index.
NOTE: BLS = Bureau of Labor Statistics; CMS = Centers for Medicare & Medicaid Services; IPPS = Inpatient Prospective Payment System.
SOURCE: RTI simulations.

BOX 2-2
Summary of the Committee's Commuter Smoothing Recommendation

The committee's recommendation: The committee recommends that wage indexes be adjusted using formulas based on commuting patterns for health care workers who reside in a county located in one labor market but commute to work in a county located in another labor market.

Justification for recommendation: The committee recommends commuting pattern-based smoothing because it is anchored in a solid conceptual framework linking commuting with economic integration and therefore with labor markets. It is also consistent with the way metropolitan statistical areas (MSAs) are defined. Commuting patterns of health care workers are an indication of overlap and economic integration of labor markets across their geographically drawn boundaries. Implementing the adjustments based on commuting patterns of all health care workers, as opposed to hospital workers only, would incorporate the contribution of labor employed by physician offices and other health providers, and acknowledge a growing degree of integration in the workforce across clinical practice settings.

The committee is in favor of adjustments based on outmigration rather than inmigration patterns to address the issue of hospitals competing for workers in surrounding higher-wage areas and because there is precedent in using an outmigration adjustment. However, the full range of options should be reviewed by the Department of Health and Human Services and CMS, given the level of complexity of the administrative details involved in implementation.

Commuting-based county smoothing methodology: To model commuting-based county smoothing, RTI used the same special census tabulation file that is used by CMS for outmigration adjustments. The file contains data for each combination of county of worker residence ("home county") and county of hospital employment ("work county"), identifying the number of hospital workers qualifying for both.

Each county where a hospital is located is a potential target for commuting pattern-based adjustment. For each target county, we computed the number of resident workers who commuted out of the county for a job in a hospital, and identified the wage index applicable to each of the counties to which resident workers were commuting. An adjusted wage index for the target county is computed as the worker-weighted average of the wage index values for each county where its resident hospital workers are employed. However, if workers commute to counties located within the same labor market as the county in which they reside ("within-MSA commuting"), then their "home counties" and "work counties" have the same wage index and commuting patterns have no effect on the wage index of the target county.

SOURCE: IOM, 2011.

The committee's recommendation that has the strongest impact on metropolitan hospital payments is the elimination of the wage index adjustment referred to as the "state rural floor." Under current law, no metropolitan market area can have a wage index lower than the nonmetropolitan index of its state. There are 29 states and 81 metropolitan labor markets where the state nonmetropolitan hospital index is higher than the computed metropolitan area index, and hospitals located in these 81 markets are assigned the higher nonmetropolitan index. Any overall increase in payments that results from assigning rural floors is offset by a budget neutrality factor applied to all wage index values. There were 261 affected hospitals in the FY

2012 files, with the states of California, Connecticut, Massachusetts, and Pennsylvania having the most hospitals benefitting from this rule.

In many areas, the state rural floor can raise hospitals' applicable wage index by 15 to 20 percent. There are a few markets where the final index recommended by the committee for a metropolitan market is actually closer to that state's applied rural floor than to the market's initial CMS index. In these cases, it is possible that the original CMS index for this area is abnormally low, possibly owing to a data anomaly where there are too few hospitals contributing to the market average. In the great majority of labor markets affected by the rural floors, however, the index under the committee's recommendations is much closer to the original (prefloor) CMS index. The committee interprets this as evidence that the rural floors are not a technical correction (i.e., a correction made with the intention of improving the accuracy of the HWI) but a policy adjustment (made with the intention of meeting a policy goal).[6]

Another important policy adjustment that is excluded from the hospital index under the committee's recommendations is the floor of 1.00 for "frontier states." Frontier states are defined as states where more than half the counties have a population density of less than six persons per square mile. The floor applies to the entire state, not just to the frontier counties. There are 5 frontier states (Montana, Nevada, North Dakota, South Dakota, and Wyoming), and these include 30 metropolitan and 42 nonmetropolitan IPPS hospitals. Forty-six of these hospitals benefit from the frontier floor because they are located in markets where the wage index is below 1.00. For hospitals benefitting from the frontier floor, payments estimated under the committee's proposed wage index can be as much as 12 percent less than payments under current policy.

Payment Effects on Hospitals with Special Payment Status

As discussed at length in the Phase I report, the Medicare program has created several classifications of hospitals that receive special payment adjustments under the IPPS. One group includes all those eligible for exceptions, reclassifications, or other adjustments to the HWI (as described in Box 2-3); another group includes rural hospitals with special treatment under the IPPS. The committee had a special interest in identifying the effects of its recommendations on these hospitals.

Table 2-2 summarizes payment effects for hospitals grouped by the type of wage index adjustment or exception they have. For hospitals that are currently reclassified, payments under the committee's recommendations are 1.8 percent lower (slightly less for the permanently reclassified "Lugar hospitals"). For metropolitan hospitals eligible for their state's rural floor, payments are 3.1 percent lower. For nonreclassified hospitals that are eligible for outmigration adjustments, payments are barely changed. For the 46 hospitals that benefit from the frontier floors (and do not qualify for any of the preceding adjustments), estimated aggregate payments are 7.4 percent lower. By comparison, the payment impact across hospitals that are not eligible for any of these exceptions or adjustments is an increase of 1 percent.

As expected, implementation of a more technically accurate wage index would reduce payments in hospitals currently benefitting from reclassification and floors. Notably, however,

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[6] Because the committee's recommendations in the Phase I report were all made with the intention of improving the accuracy of the GPCIs and HWI, all of the recommended changes are viewed as technical corrections. However, the committee recognizes that some of its recommendations would have the effect of changing the urban–rural distribution of funds. The committee interprets these effects as the results of inaccuracies in the current system that are systemically biased in favor of rural areas.

in many if not most cases, the BLS-based index is higher than the pre-reclassified, preadjusted CMS index. This can be interpreted as evidence that use of the BLS-based index reduces the need for such administrative adjustments.

Table 2-3 summarizes payment effects for rural hospitals grouped by special payment status under the IPPS, with an entry for "other nonrural" hospitals added for reference. The three categories of special rural status are sole community hospitals (SCHs); Medicare-dependent rural hospitals (MDHs); and rural referral centers (RRCs).[7] Table 2-3 also stratifies the columns by hospitals located in frontier states and hospitals located in other states.

There are 32 hospitals in the frontier states that are designated as SCHs, of which 23 are currently benefitting from the frontier state floor. (The wage indexes for the other nine are already above 1.0.) Based only on the simulated IPPS rates, the committee's recommendations would result in an estimated reduction of 6 percent in payments for these 32 SCHs, most of which is likely in the 23 facilities that would lose their index floor of 1.0. SCHs are, however, allowed to receive the higher of their own updated historical cost per discharge or the current IPPS rate. If these hospitals were to receive IPPS rates, payments for the group as a whole would decline, but since they are already the beneficiaries of an IPPS payment floor, the final payment effect of the committee's recommended hospital index changes is harder to identify. Among the 410 SCHs that are not located in frontier states, the aggregate payment effect is minimal (–0.3 percent). Among 211 facilities designated as MDHs, the aggregate payment effect is an increase of 2 percent. Among hospitals designated as RRCs that are not also designated as SCHs or MDHs, the aggregate payment effect is –1.1 percent. Among the rest of rural hospitals (those with no special status), the aggregate payment effect is an increase of 1.3 percent.

In conclusion, there is no evidence the committee's recommendations would place a particular burden on the subset of rural hospitals already identified under current regulation as needing special policy attention. Hospitals currently benefitting from the frontier floor that was implemented in 2011, however, would clearly lose that benefit.

For purposes of comparison, Table 2-4 shows the historic volatility in the HWIs for hospitals over the past 4 years as a result of changes CMS has adopted and compares this to the percent changes in their HWIs that hospitals would experience under the committee's recommendations. Notably, both the largest increases and decreases resulting from the committee's recommendations are similar to the largest annual increases and decreases resulting from changes over the past 4 years. In addition, while one-quarter of hospitals would experience somewhat larger decreases than has been typical, roughly half of hospitals would experience larger increases than has been typical. Thus, while some of these changes are potentially significant to individual hospitals, the HWI historically has been subject to fluctuations similar to those that would be experienced if the IOM recommendations were implemented.

EFFECTS ON PHYSICIAN PAYMENTS

Impact of Payment Changes to the GPCIs

Box 2-4 summarizes the components of the GPCIs. The distribution of estimated payment changes to physicians is shown in the two frames appearing as Figure 2-3. The unit of

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[7] Hospitals can qualify for RRC status in addition to qualifying for either of the other two, but for this table we assigned SCH or MDH status first, such that the number listed as RRC reflects the number of hosptials with RRC status only. (See Chapter 4 for further descriptions of these categories.)

BOX 2-3
Summary of the Hospital Wage Index (HWI)

The HWI reflects geographic differences across markets in the price of labor faced by hospitals. For purposes of constructing the index, labor markets are defined by metropolitan areas or statewide aggregations of all nonmetropolitan counties. Metropolitan areas are identified from core-based statistical areas (CBSAs).

Wage data for the HWI are taken from the annual Medicare Cost Reports submitted by all hospitals paid under the Inpatient Prospective Payment System (IPPS). Wage data include salaries and benefits for IPPS hospital staff (excluding patient-care physicians) plus certain contract labor costs.

Each hospital computes its own average hourly wage, and this hourly wage reflects both the prices paid per hour of labor and the mix of occupations contributing to that hospital's employment. Because the wage index is intended to reflect variation in prices but not variation in occupation mix, the Centers for Medicare & Medicaid Services (CMS) applies a partial occupation-mix adjustment to each hospital's hourly wage before computing the index. The adjustment is derived from nurse employment data on a survey completed by each IPPS hospital every 3 years. It serves the purpose of standardizing the individual hospitals' hourly wage figures to reflect what their average hourly wages would be if all hospitals hired the same proportion of nurses to other staff, and all of them hired the same proportion of aides, licensed practical nurses, and registered nurses.

After the occupation-mix adjustment is applied, the average hourly wage for every labor market is computed as an hour-weighted average of the occupation-mix adjusted hourly wage across all hospitals in the market. The numerical value of the HWI for any given labor market is then computed as the ratio of that area's average hourly wage to the national aggregate average hourly wage. Index values typically range from 0.75 to 1.50.

There are numerous exceptions and adjustments allowed to the HWI:

- **Geographic reclassification.** Hospitals can request to be regrouped into a neighboring labor market if they are within a minimum distance from that market and they meet specific criteria demonstrating similarity in wages with that market. Requests are granted for 3-year

TABLE 2-2 Differences in Payments by IPPS Hospital Reclassification

Hospital Reclassification or Adjustment Status for Hospitals with the Following:	IPPS Payments Under Current Policy ($ Billions)	Difference Under IOM Committee Recommendations	
		Number of Hospitals	Percent Difference in Payments
Reclassifications (MGCRB)	$19.5	608	−1.8%
Reclassifications ("Lugar" hospitals)	$0.5	53	−1.4%
Section 505 outmigration adjustments	$4.6	270	−0.5%
Frontier floors	<$0.05	46	−7.4%
Metropolitan area rural floors	$9.6	261	−3.1%
For comparison: no reclassifications or adjustments	$73.2	2,180	1.0%*

NOTE: CMS = Centers for Medicare & Medicaid Services; IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System; MGCRB = Medicare Geographic Classification Review Board.
*The 1 percent difference is because these simulations are made budget-neutral to CMS payments post-adjustments, and not all of the CMS adjustments are required to be budget-neutral.
SOURCE: RTI simulations.

periods. Some rural counties with historically high commuting patterns to a neighboring metropolitan area are permanently redesignated by Congress ("Lugar counties").

- **State "rural floors."** By statute, wage index values for counties in a metropolitan area cannot be lower than the wage index value computed for rural counties in their same state. In metropolitan areas that cross state lines, this can result in multiple wage index values within the same market.
- **"Frontier state" floors.** States where at least half the counties qualify as frontier counties (population density ≤6 per square mile) are called "frontier states." The HWI is subject to a floor of 1.00 in these states.
- **"Section 505 outmigration adjustments."** Many hospitals do not qualify for reclassification, but are located in counties where a substantial portion of the resident hospital workers are commuting to neighboring higher-wage markets. Hospitals located in these counties are given a positive adjustment to their index, as a way to recognize that hospitals at the outer boundaries of markets may face different levels of wage competition. The adjustment varies by the level of "outcommuting"; the median is a 1 percent increase in the index, but it ranges as high as 9.4 percent.

Because the HWI reflects price variation in labor costs but not nonlabor costs, the index is applied only to a portion of the hospital payment, known as the "labor-related share." In labor markets where the index is below 1.0, the labor-related share for IPPS hospitals is fixed at 62 percent. In all other markets, the labor-related share is equal to the sum of certain labor-related weights in the hospital market basket that is computed by CMS for annual payment update purposes, and is usually 68 to 70 percent.

The HWI is computed from IPPS hospital data, but it is applied as a price adjuster for all other types of institutional providers that are subject to other Medicare prospective payment systems. Occupation-mix adjustments are not done for other types of providers, and the various exceptions and adjustments are not applicable.

SOURCE: RTI, written for this report; and IOM, 2011.

TABLE 2-3 Differences in IPPS Payments by Special Rural Status

Special Rural Hospital Status	Payments Under Current Policy ($ billions)	Difference Under IOM Committee Recommendations			
		In Frontier States		In Other States	
		Number of Hospitals	% Difference	Number of Hospitals	% Difference
Sole community hospital (all)	$5.9	32	−6.0%	410	−0.3%
Medicare-dependent hospitals (all)	$1.6	0	–	211	2.0%
Rural referral centers (those not SCH or MDH)	$5.5	2	−8.0%	174	−1.1%
All other rural	$1.7	4	−10.4%	219	1.3%
For comparison: all other nonrural	$94.5	34	−3.3%	2,332	0.1%

NOTES: Payments for SCHs and MDHs area were estimated using full IPPS rates, without taking alternative hospital-specific rates into account. IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System; MDH = Medicare-dependent hospital; SCH = sole community hospital.
SOURCE: RTI simulations.

TABLE 2-4 Percent Changes in the Medicare Hospital Wage Indexes: Year-to-Year Actual Changes Compared to Simulated Changes from IOM Committee Recommendations

	Percent Change Over Previous Year in HWI						
		Percentiles (by Hospital)					
	Min.	10th	25th	50th	75th	90th	Max.
Actual Changes in HWI							
FY09 over FY08	–18.2%	–2.2%	–1.3%	–0.1%	1.2%	2.6%	25.1%
FY10 over FY09	–20.4%	–2.7%	–1.3%	0.1%	1.4%	2.3%	21.2%
FY11 over FY10	–21.0%	–1.9%	–0.7%	–0.1%	1.0%	2.0%	25.5%
FY12 over FY11	–17.8%	–2.6%	–1.5%	–0.6%	0.4%	1.3%	39.8%
Simulated HWI values from IOM committee recommendations over actual HWI values for FY12	–22.5%	–6.6%	–2.6%	1.1%	4.8%	7.7%	24.9%

NOTE: HWI = hospital wage index; IOM = Institute of Medicine.
SOURCES: CMS hospital wage index, IPPS Final Rules for FY 2008-2012, and RTI simulations.

observation in these two graphs is the county.[8] The upper frame identifies the impact of all recommended changes, and the lower frame shows an estimate of the isolated impact of the recommended move from the 89 GPCI payment localities to 441 CBSA markets equivalent to those used in the HWI. Data graphed in the lower frame also include the effects of commuter-based smoothing based on cross-market commuting patterns. Both frames reflect payment estimates made with the continued use of the 25 percent physician work adjustment.[9]

Isolating the separate effects of the three types of committee recommendations is somewhat more complicated for physician payments than it is for hospital payments, because in order to separate market effects from others it is necessary to compute payments holding other factors the same except for the market redefinition. This was accomplished by comparing payments simulated from indexes reflecting all of the committee's changes *except* the revised markets, to payments simulated using indexes reflecting all of the committee's changes including the revised markets.[10] It is the percent change in payments from this comparison that is graphed in the second frame.

Viewed together, the two graphs in Figure 2-3 demonstrate that (1) redefining the market

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[8] The unit of observation for physician payments is the county because the committee's recommended methodology results in county-specific GPCIs. While most of the data (e.g., the BLS wage data used in the nonphysician component of the PE-GPCI and the nonphysician proxy occupations in the work GPCI) are available at the MSA level, the decision to apply the commuter adjustment at the county level to smooth cliffs associated with using MSA as the basis for payment localities has resulted in GPCIs that vary across counties within MSAs, making counties the appropriate unit of observation when analyzing the effect of Phase I recommendations on physicians' payments. Moreover, using counties as the unit of observation allows for a more detailed HPSA analysis than using MSAs.

[9] The committee did not recommend a change in the use of proxy professions as a basis for the physician work GPCI, but it did recommend that further empirical analysis be conducted to test the correlation between the proxy professions and RVU-adjusted physician income. Findings from this analysis would then be used to review the current policy of using one-quarter of the proxy work adjustment. Throughout most of this chapter the committee assumes continuation of the one-quarter work GPCI in the physician payment simulations. In the final section, however, the impact of the work adjustment is addressed by simulating payments at the upper (100 percent) and lower (0 percent) bounds of the proxy index.

[10] All of the simulations were conducted using the payment rules in effect in the 2012 Physician Fee Schedule, published by CMS in the *Federal Register* in November 2011. Thus, the modeling did not include work floors, which were put in place by Congress in early 2012.

BOX 2-4
Summary of the Physician Geographic Practice Cost Indexes
(GPCIs) and Aggregate Geographic Adjustment Factor (GAF)

The physician geographic price adjusters are designed to reflect local or regional differences in the prices faced by local practitioners for both labor and other expenses. Under the Medicare physician fee schedule there are three separate adjusters for geographic price variation: one for nonphysician practice expenses (PEs) (the PE-GPCI); one for malpractice (MP) (the MP-GPCI); and one for physician work (WK) (the WK-GPCI). All practitioner payments are made on a per-procedure code basis, where each procedure code is also assigned three separate relative value units (RVUs): one for practice expenses (PE-RVU); one for malpractice (MP-RVU); and one for physician work (WK-RVU). Different procedure codes will have a different mix of these three types of RVUs, and each specialty will have a different mix of procedure codes. In aggregate, however, national billed RVUs are 47.4 percent practice expense, 4.3 percent malpractice, and 48.3 percent work.

The GPCIs are constructed around 89 "payment localities" rather than around specific markets. Payment localities can be defined as a single state or as individual urban areas within a state, with a single locality constructed from the balance of "rest-of-state" counties. The choice of using single versus multiple localities within a state has historically been a local decision rather than one made by CMS.

Data for the three GPCIs come from multiple sources. The PE-GPCI is composed of a wage index for nonphysician employees in physician offices using BLS data plus a "rent" index using relative residential rents from the Department of Housing and Urban Development. The MP-GPCI is derived from specialty-weighted averages of state-filed data on malpractice insurance premiums. The WK-GPCI is derived from BLS wage data on seven "proxy" professions (see the 2011 Institute of Medicine Phase I report entitled *Geographic Adjustment in Medicare Payment: Phase I: Improving Accuracy* for discussion of why proxy professions are used rather than wages for physicians). By statute, the WK-GPCI represents one-quarter of the variation in this proxy index.

Payments for each procedure are computed by summing the GPCI-adjusted payments of each of the three components, where each component payment is the product of a dollar conversion factor (CF) and the RVU multiplied by its respective GPCI:

- Procedure Payment = (PE-GPCI * PE-RVU * CF) + (MP-GPCI * MP-RVU * CF) + (WK-GPCI * WK-RVU * CF)

For ease of discussion CMS also publishes an aggregate measure called the GAF, which simply averages the relative shares of PE-, MP-, and WK-RVUs. The GAF values represent what each payment locality's average physician payment adjustment would be if each locality had a mix of PE-, MP-, and WK-RVUs that was equal to the national average. In practice, however, the relative shares of the three types of RVUs will vary by specialty and by geography; the GAF is a convenient measure for some purposes but it does not reflect the distribution of actual payments.

SOURCE: RTI, written for this report. Also see IOM, 2011.

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areas results in a redistribution of payments from rural to urban areas, and (2) other changes proposed to the GPCIs do not offset or exacerbate this effect. Separating the metropolitan and nonmetropolitan markets has a significant impact in many metropolitan areas, with payments going up in some and down in others, but it has a systematically negative effect on the index values for nearly all rural counties. Many of the existing payment localities incorporate both
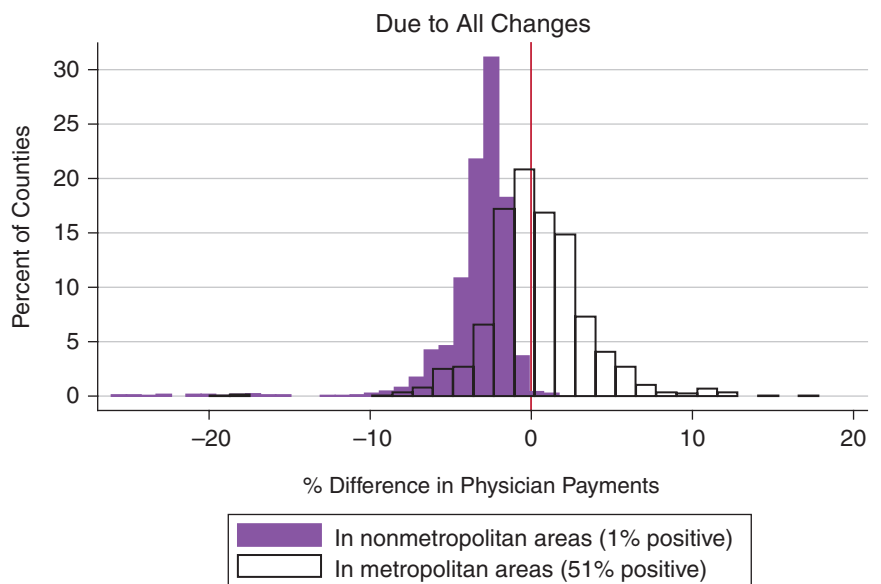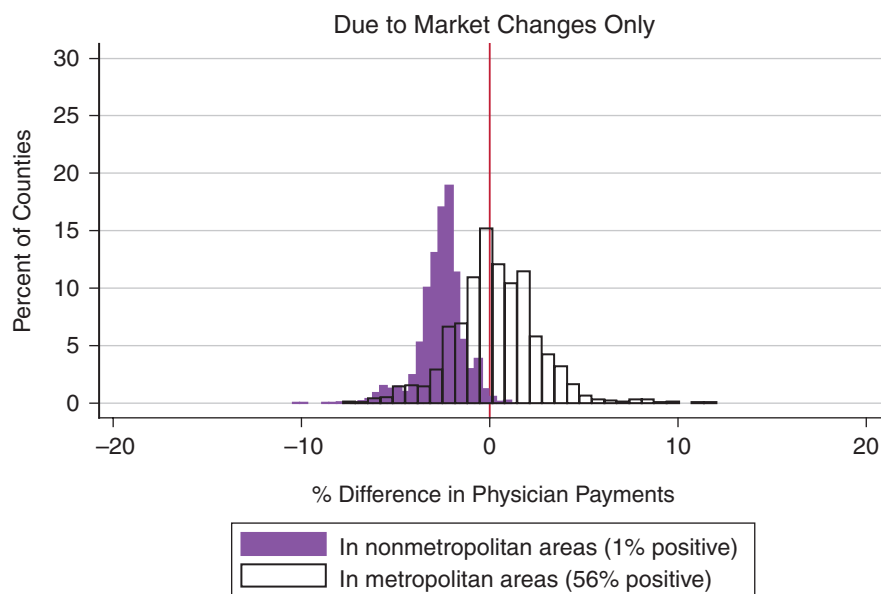
FIGURE 2-3 Distribution of payment effects of IOM committee recommendations on the GPCIs.
NOTE: CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index;
IOM = Institute of Medicine.
SOURCE: RTI simulations.

lower-wage rural and higher-wage urban areas into a single locality. To the extent that the areas do not represent integrated markets, this artificially raises index values in lower-wage areas above what they would be if markets were more locally defined.

The effects of the policy and data-related changes recommended by the committee are more limited than the effects of the market redefinition. Eliminating index floors has a negative impact on payments but only in a small number of areas, while changes to the GPCI data (including adding the benefits index) and the market smoothing adjustments by themselves have a relatively modest impact.[11] Committee recommendations for the GPCIs that are not related to redefined markets do not appear to have a systematic redistribution effect by rural or regional location.

Looking at the distribution of payments due to all changes, the counties with the largest total estimated payment reductions (from 15 to 26 percent) are all in Alaska, but these changes reflect the impact of removing the 1.5 Alaska work GPCI rather than the market change. Removing the GPCI floor of 1.0 in frontier states also magnifies the effects of market-related changes in rural counties for the four states affected by the frontier state policy.

Among metropolitan counties, roughly half would see a reduction in payment rates and half would see an increase. If all of the committee's GPCI recommendations were implemented, the aggregate payment effect across metropolitan counties would be an increase of less than one half of 1 percent. This contrasts with the impact among nonmetropolitan counties, where the aggregate payment effect would be a reduction of nearly 3 percent.

Effects in Statewide vs. Nonstatewide Payment Localities

There are states where the current payment localities are statewide. In these states, the effect of moving from payment localities to CBSA markets is predictable as higher-cost metropolitan areas are separated from the lower-cost nonmetropolitan areas.

There are 55 payment localities that represent parts of states, of which 14 are "rest-of-state" localities and 41 are specifically identified urban localities. The effects of market redefinition are still significant in these localities. In part this is because the urban localities are often larger than defined metropolitan CBSAs, either encompassing multiple metropolitan areas or encompassing outlying rural counties.

There are also instances where the urban localities do not include counties that are identified as part of metropolitan CBSAs. As a consequence, county-level effects of the market redefinition are not as predictable in the nonstatewide localities. A larger urban locality that encompasses two metropolitan areas will be separated into two metropolitan markets, with the result that one will see increased rates and another will see a decrease. A nonmetropolitan county currently grouped in an urban locality may see a large decrease in rates from the market redefinition, but a metropolitan county currently excluded from the urban locality could see substantially higher rates.

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[11] Cross-market worker commuting patterns resulted in smoothing adjustments to index values in nearly three-fourths of all counties, but the adjustments are small for all but a few areas. Commuter-based smoothing was applied to the wage and purchased services component of the PE-GPCI as well as to the physician work GPCI. It had the strongest impact on the wage component index (adjustment factors ranging from 0.9 to 1.2). Factors greater than 1.10 occurred in only 14 counties, and there was only one county with a factor of 0.90. Smoothing factors for the physician work GPCI ranged from 0.97 to 1.06. With respect to the effects of incorporating a benefits index, Puerto Rico is the only area where this resulted in a substantial reduction in the wage component index. A review of the data indicates that this could be due to underreporting of benefits on the Medicare Cost Report.

For rural counties, the average payment effect from moving to CBSA markets in the state-wide payment localities are very similar to those in nonstatewide localities, as shown in Figure 2-4.

Isolating the Effects of Removing Index Floors

The PE-GPCI values as computed under the committee's recommendations do not include any of the existing frontier state floors of 1.00, and they do not include the physician work floor of 1.5 for all of Alaska. While the committee is not opposed to the idea of targeting special payments or bonuses to create incentives to improve the supply of primary care practitioners, it has taken a position against making special adjustments available based solely on geographic location rather than demonstrated need.

Eliminating the frontier state floors reduces physician payments in four of the five eligible states. (In Nevada, the PE-GPCI is already higher than 1.0 due to the strong influence of Reno within the statewide payment locality.) In Montana, North Dakota, South Dakota, and Wyoming, the CMS PE-GPCIs without the frontier floor are 10 to 12 percent lower than they are with the floors, which would translate into payment reductions of 4 to 5 percent in the absence of any other changes to the GPCIs. In aggregate, physician payments to the remaining four frontier states under the committee's proposed GPCIs are also estimated to be 5 percent lower than payments under current policy.

In Alaska, current policy sets the physician work GPCI at 1.5. Without this limit, the work GPCI would be 1.015 for the statewide Alaska locality, or 32.3 percent lower. In the absence
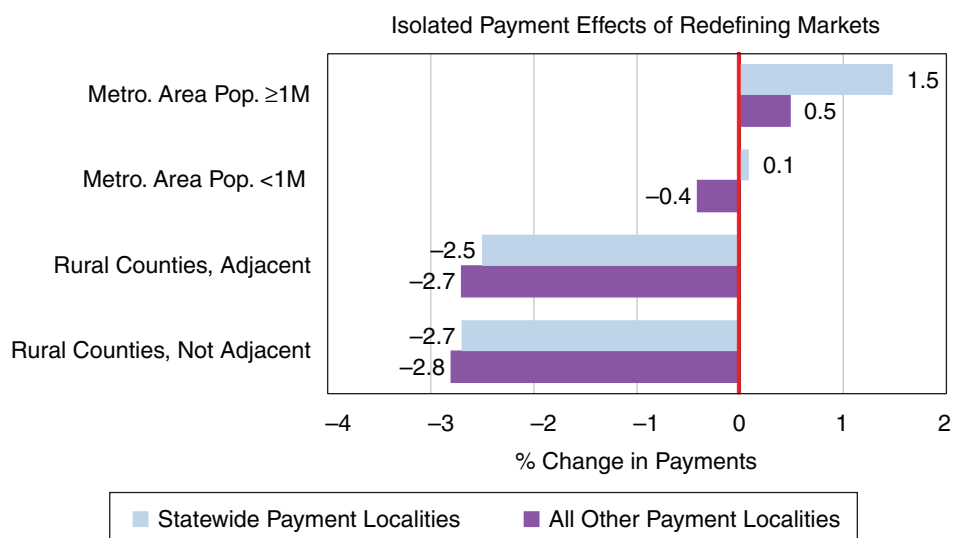
FIGURE 2-4 Payment effects attributed to market redefinition, by county status and type of payment locality.
NOTE: Values plotted are the percent difference between payments computed using geographic practice cost indexes with all Institute of Medicine committee recommendations vs. payments computed under current Centers for Medicare & Medicaid Services policy.
SOURCE: RTI simulations.

of any other changes to the GPCIs, eliminating the 1.5 floor would translate to a 19 percent reduction in the GAF (from 1.257 to 1.023) and an estimated 20 percent reduction in payments. In aggregate, physician payments in the state of Alaska under the committee's proposed GPCIs are also estimated to be 19 percent lower than payments under current policy.

Physician Payments Effects by Geographic and Demographic Subgroups

Technical corrections to GPCIs are intended to improve accuracy and have not been motivated by any a priori objective with respect to the rural–urban distribution of Medicare payments. Nevertheless, the negative effect of the committee's recommendations on payments to rural areas suggests that correcting the GPCIs could have a disproportionate effect on vulnerable or underserved populations. The frontier floors came into effect very recently, in 2011, and it is not clear whether they have had much of an effect yet or what would happen to the health of underserved or vulnerable populations if they were withdrawn.

The remainder of this section discusses estimates of the overall payment effects of the committee's recommendations across counties grouped by key geographic, demographic, and health care shortage area measures. Figure 2-5 shows the payment effects on counties grouped by the U.S. Department of Agriculture's (USDA's) Rural–Urban Continuum Codes (RUCCs).[12] Payments in counties in large metropolitan areas (population ≥1 million) increase by 0.8 percent, while payments to those in metropolitan areas of 250,000 to 1 million increase only 0.2 percent, and those to metropolitan areas with populations less than 250,000 decrease 0.9 percent. Across the six categories of nonmetropolitan counties, payments decrease somewhat more for those with the smallest urbanized populations.

Many measures of population demographics and health care supply are correlated with rurality. Thus, this differential impact on very rural areas is also reflected in differential impact on other measures. For example, payments in counties ranked in the bottom quartile of median household income (mostly rural) are estimated to decline by 2.6 percent, while those to counties in the highest quartile (mostly urban) show a marginal increase. Payments in counties with the highest proportion of minority populations (which also tend to be in larger urban areas) are virtually unchanged, while payments in counties ranking in the lowest quartile by percent minority population show a decline of 2 percent.

Physician Payment Effects by Health Professional Shortage Areas (HPSAs)

Primary care shortage areas are a key construct for the committee's deliberations in addressing its mandate to consider the impact of geographic payment adjusters on access to care. It was therefore important to the committee to analyze the payment impact of its recommendations using valid and up-to-date measures of underservice. The Health Resources and Services Administration's (HRSA's) HPSAs are identified both by geography (by census division or county) and by institution (for example, specific safety-net provider catchment areas). To implement the primary care bonus payment provisions of the Patient Protection and Affordable Care Act, CMS uses a file that maps HRSA's primary care service shortage areas to specific ZIP codes, and then pays the bonus to qualifying practitioners for services delivered in that ZIP code.

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[12] RUCCs group the metropolitan counties according to the size of the total population in the areas. The nonmetropolitan counties are classified by the size of the "urbanized" population (which can be in multiple towns) and by adjacency to a metropolitan area. RUCCs were last updated in 2003.

Payment Impact from All Changes to GPCIs

Category	% Change in Payments
Metro. Pop>1M	0.8
Metro. Pop<250K–1M	0.2
Metro. Pop<250K	−0.9
Nonmetro. Adj. u_pop>20K	−2.8
Nonmetro. Not Adj. u_pop>20K	−2.9
Nonmetro. Adj. u_pop 2.5K–20K	−2.9
Nonmetro. Not Adj. u_pop 2.5K–20K	−3.4
Nonmetro. Adj. u_pop≤2.5K	−3.0
Nonmetro. Not Adj. u_pop≤2.5K	−3.6
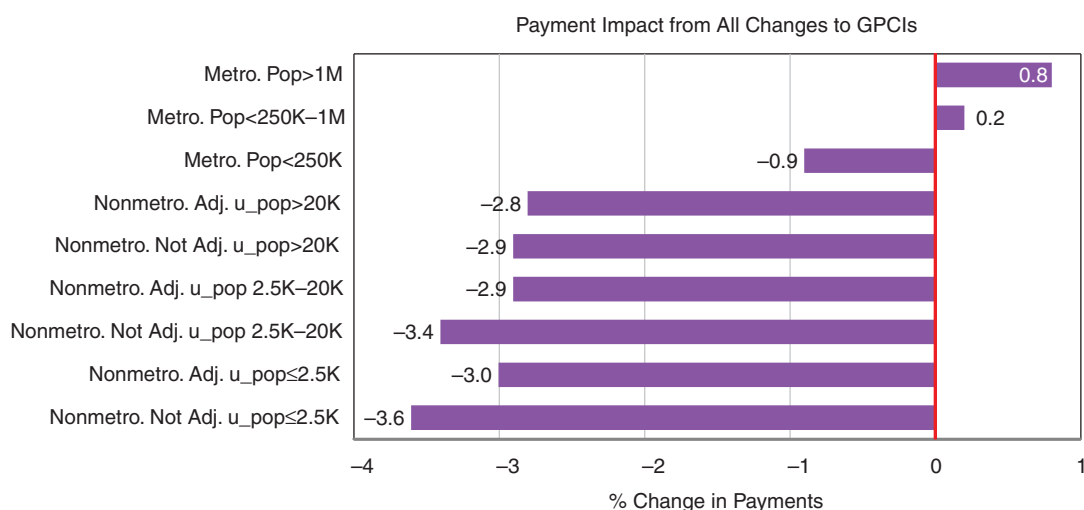
FIGURE 2-5 Combined physician payment effects by Rural–Urban Continuum Code.
NOTE: GPCI = geographic practice cost index.
SOURCE: RTI simulations.

The committee used HPSAs as a measure of access and underservice for several reasons. HPSAs are a recognized standard in workforce research in that they are the official national designation of shortage areas, and they are also being used for a new incentive payment program for primary care services and general surgery in underserved areas from 2011 to 2015, as described in Chapter 4. There are some recognized drawbacks to using HPSAs, including their degree of currency and accuracy as designated shortage areas compared with other nondesignated areas, the degree to which they affect access given that patients travel outside the HPSA to seek health care, their high practitioner vacancy rates and varying appeal to practitioners as practice locations, and the fundamental differences in access problems between rural and urban HPSAs. However, the committee viewed HPSAs as the generally accepted approach for its deliberations and its payment simulations.

The estimated payment effects for this study are computed at a county level, but linking the variously defined shortage areas to counties is not a straightforward task. HRSA's Area Resource File provides a three-level county shortage area indicator, where counties are identified only as a "full" shortage county, a "partial" shortage county, or "not a shortage county."[13] Many counties are identified as "partial," particularly in metropolitan areas, and linking the payment impact to this indicator did not provide a strong enough base to evaluate the impact of the committee's recommendations on actual shortage area populations.

To provide a county shortage variable with more information, a new indicator was constructed based on the CMS ZIP codes for the primary care bonus awards in 2012, using a commercial file that is organized by ZIP code/county subareas.[14] The next step was to compute

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[13] HPSA designations are discussed in more detail in Box 3-1 in Chapter 3.

[14] Roughly one in five ZIP codes crosses over more than one county. The database also provides a statistic to use as an approximate population weight for each subarea, allowing us to develop a measure of how much of any one county's population is included in the bonus-eligible ZIP codes. Further detail on this computation is provided in Appendix A-1.

an estimate of the proportion of each county's population located in the areas covered by the primary care bonus payments, review the distribution of this measure, and then construct a new five-level county indicator. Counties are identified as "nonshortage" if the county proportion of the estimated population in bonus areas is 0 percent; one of three levels of "partial shortage" if the county proportion in bonus areas is from 1 to 20 percent, 20 to 80 percent, or 80 to 99 percent; and "full shortage" if the estimated population in bonus areas is 100 percent. The results are shown below in Table 2-5.

Table 2-6 shows the combined payment effects of all proposed GPCI changes stratified by this new county HPSA variable. To identify any association between estimated payment effects

TABLE 2-5 Distribution of Counties and Beneficiaries Across Newly Constructed HPSA Categories

New HPSA County Categorical Variable	Number of Counties	Percent of Counties	Percent of Population*
Nonshortage counties	1,216	38%	44%
Partial shortage counties:			
Low ≤20%	1,065	33%	50%
Medium 20 to 80%	140	4%	2%
High 80 to 99%	549	17%	3%
Full shortage counties	255	7%	1%

NOTE: HPSA = Health Professional Shortage Area.
*Percent of 2009 population living in counties assigned to this row.
SOURCE: RTI analysis of CMS Bonus Area Files.

TABLE 2-6 Combined Physician Payment Effects by Health Professional Shortage Area Status and Metropolitan Location

HPSA County Status, by Estimated Share of County Population in CMS Primary Care Bonus Areas	Metropolitan			Nonmetropolitan		
	Percent Difference in Payments[a]	Share of Part B Enrollees[b]	Share of Total Primary Care RVUs[c]	Percent Difference in Payments[a]	Share of Part B Enrollees[b]	Share of Total Primary Care RVUs[c]
Non HPSA: 0%	+0.7%	0.365	0.384	–2.8%	0.089	0.063
Partial HPSA:						
≤20 percent	+0.1%	0.369	0.437	–3.0%	0.096	0.075
20 to 80 percent	–0.8%	0.011	0.008	–2.5%	0.010	0.005
80 to <100 percent	–1.3%	0.012	0.005	–3.0%	0.032	0.013
Full HPSA: 100%	–1.4%	0.004	0.003	–3.7%	0.012	0.006
All counties	+0.4%	0.762	0.836	–2.9%	0.238	0.164

NOTE: CMS = Centers for Medicare & Medicaid Services; HPSA = Health Professional Shortage Area; RVU = relative value unit.
[a]Defined as difference between payments estimated with GPCIs computed using all of the committee's recommendations, relative to payments estimated under current CMS policy, including all floors.
[b]Share of Medicare beneficiaries enrolled in Part B fee-for-service program, from calendar 2009 (most recent county data available for download as of January 2012).
[c]Share of national total Part B RVUS billed in 2010 by physicians identified as internists, geriatricians, family practitioners and pediatricians, plus RVUs billed by nurse practitioners and physician assistants.
SOURCE: RTI simulations.

and HPSA status that is independent of the rural–urban differentials already noted, the table also stratifies by metropolitan status. This table also includes columns showing the share of Part B enrollees in these county subgroups and the share of total primary care RVUs.

From this table there appear to be larger reductions in payments in the counties with HPSA shortage areas, but the number of counties in the higher shortage area categories is very small.[15] Overall, in metropolitan areas, the percent decrease grows smaller as the percent of the populations living in an HPSA increases, while in nonmetropolitan areas, the percentage difference does not vary with the HPSA measure. Specifically, payments to physicians in metropolitan non-HPSA counties are estimated to increase by 0.7 percent, while payments to physicians in metropolitan full HPSA counties (only 31 counties) are estimated to decrease by 1.4 percent. Payments to physicians in nonmetropolitan counties are estimated to decrease by 2.8 percent while payments to physicians in full HPSAs (224 counties) are estimated to decrease by 3.7 percent. It is also worth noting that despite their constrained resources, full HPSAs in nonmetropolitan areas shoulder the burden of three times more beneficiaries than full HPSAs in metropolitan areas and twice as many primary care RVUs.

The committee recognizes the importance of ensuring adequate Medicare funding to physician practices in both urban and rural shortage areas. The committee's Phase I principles state clearly that GPCIs should be used only to adjust for input cost differences, but reductions in payments to any shortage area potentially pose a policy problem that may need to be offset through other policy adjustments or programmatic interventions. For example, CMS could consider increasing the bonus payment for primary care practitioners in the primary care bonus ZIP codes, if those ZIP codes are located in a county where the GPCI changes result in a payment reduction.[16] To illustrate how this might work, Figure 2-6 is a county-level map for the state of North Dakota. Each county is shaded according to its shortage area category, from the lightest areas (no shortage) to the darkest areas (full shortage). Additional cross-hatching identifies metropolitan counties. The numbers shown on each county are the percent change in payments that are estimated as a result of the committee's recommendations.

The Medicare Part B primary care bonus is currently a 10 percent increase for any services delivered by an eligible provider in an eligible ZIP code. For purposes of illustration, suppose that CMS modified this to say that the bonus would be increased to $(10 + x)$ percent for any service delivered in a bonus-eligible ZIP code where the revised GAF is less than the current GAF. North Dakota is one of the five frontier states, and the proposed revised GAF is lower than the current GAF for all of its counties. There are 11 counties identified as "full shortage" counties (all rural), and combined they account for 1.4 percent of all billed RVUs in the state. The estimated payment impact of the committee's recommendations ranges from –4.5 to –9.6 percent, and all eligible primary care providers in these counties would be eligible for an offsetting increase to the bonus. There are 16 counties where less than 20 percent of the population is estimated to live in primary care bonus areas, three of which are metropolitan. These 16 counties account for 95 percent of all RVUs billed in the state, and the estimated payment impact of the committee's recommendations ranges from –2.7 to –7.9 percent. An offsetting increase to their bonus

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[15] We tested for significant differences across these groups using separate RVU-weighted regressions for metropolitan and nonmetropolitan counties. Some but not all of the differences in payment impact across HPSA county subgroups were significant when tested against payment impact in non-HPSA counties in both regressions, although there was no pattern of increasing impact by level of shortage.

[16] Section 413 in the Medicare Modernization Act of 2003 stipulates many of the details surrounding the current bonus payments. Adjustments to these bonus payments may therefore require congressional action. See http://www.cms.gov/Medicare/Medicare-Fee-for-Service-payment/HPSAPSAPhysicianBonuses/downloads//Overview.pdf.
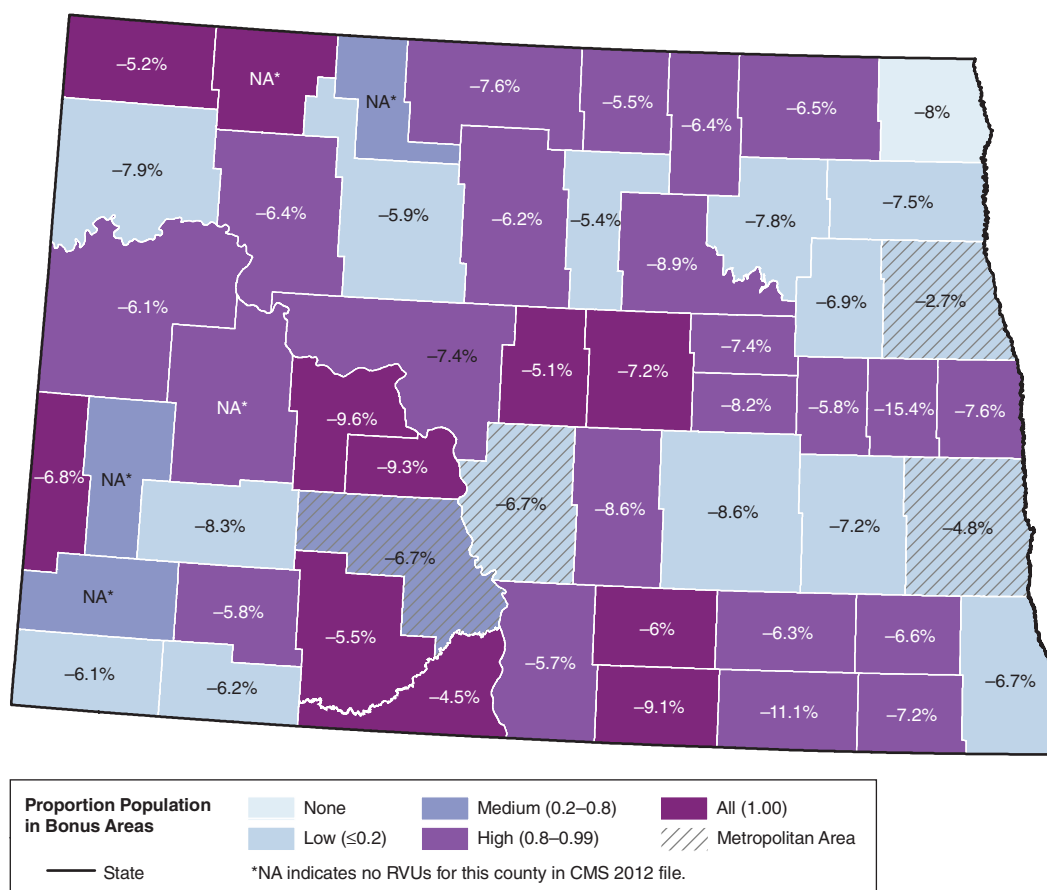
FIGURE 2-6 Sample state map identifying payment impact and HPSA status by county (North Dakota: Physician payment impact vs. HPSA county designations, by estimated proportion of population living in CMS primary care bonus areas).
NOTE: CMS = Centers for Medicare & Medicaid Services; HPSA = Health Professional Shortage Area; RVU = relative value unit.
SOURCE: RTI analysis of ZIP codes eligible for CMS primary care bonus payments in 2012.

payments would apply only to practitioners located in the bonus ZIP codes, while the other practitioners in the counties would be subject to the full reductions.

There are three key advantages to this type of approach over a market-wide adjustment, such as applying an index floor. The most important is that special payment bonuses remain targeted to areas in need—in this case, to geographic primary care provider shortage areas, where the purpose of increasing the payments is to encourage more practitioners to locate in these underserved areas. In this example, a small number of areas in Grand Forks, Fargo, and Bismarck metropolitan areas would receive offsetting bonus payments, but most practices in those metropolitan areas would not.

A second major advantage is that the bonus payments do not have to be funded from reduced payments elsewhere in the system. They represent new money to the system, but new money that is applied to a relatively small proportion of billed RVUs. The frontier floors were not made budget-neutral by Congress and therefore also represent new money, but these extra

payments were awarded across the board to all providers in the five states, whether or not the area is experiencing provider shortages.

Finally, a third advantage to this type of approach over something like the frontier floors is that the geographic price indexes remain an accurate (or at least more accurate) reflection of real market-level input price variation.[17]

Optional Assumptions for the Physician Work GPCI

In its Phase I report, the committee did not recommend a change in the use of proxy professions as a basis for the physician work GPCI, but it did recommend that further empirical analysis be conducted to test the correlation between the proxy professions and RVU-adjusted physician income. Findings from these recommended analyses would then be used to review the current policy of using one-quarter of the proxy work adjustment as the physician work GPCI.

All of the simulations discussed thus far have incorporated a continuation of the one-quarter work GPCI. This section addresses the impact of the work adjustment by simulating payments at the upper (100 percent) and lower (0 percent) bounds of the proxy index. Although the effect could be estimated as a simple proportional change, a full simulation was preferable because the share of work RVUs to total RVUs varies by county, and the correlation between the work GPCI and other GPCIs also varies by county.

Eliminating the physician work adjustment altogether clearly reduces the impact of the committee's other recommendations on all counties, reducing the slight estimated payment increase in metropolitan areas from +0.4 down to +0.1 percent, and reducing the estimated payment decrease in nonmetropolitan counties from –2.9 to –1.1 percent. Likewise, applying the full work adjustment increases the impact of the committee's other recommendations on all counties, raising the estimated payment increase in metropolitan areas from +0.4 to +1.1 percent, and the estimated payment decrease in nonmetropolitan counties from –2.9 to –8.4 percent.

The differential impact of the committee's GPCI recommendations would be seen primarily between urban and rural county designations rather than low-shortage and high-shortage area designations. The extent to which an area would be disadvantaged or benefit from the recommendations, once implemented, is partially dependent on the percentage work adjustment. The least impact would be felt with a 0 percent adjustment and the most with a 100 percent adjustment, with the impact of a 25 percent adjustment, the current level, falling within the two extremes.

EXAMPLES OF PROVIDER IMPACT

This section provides examples to illustrate some of the ways in which selected providers would experience significant changes as a result of the committee's recommendations. In the case of the GPCIs, the examples focus on how and why the payments differ under the CBSA markets as compared to payment localities. The first two are individual counties with large negative or positive payment effects, and the third describes statewide effects in Minnesota.

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[17] Notably, most of the policy adjustments, such as the frontier floors, the work GPCI floor in Alaska, and the rural floor for the HWI are congressional mandates. Standard reclassification rules were regulatory, originally contained in the enabling regulations for the Medicare Geographic Classification Review Board in the late 1980s, but over the years Congress has adopted various mandated changes. Thus, replacing the policy adjustments and reclassification rules would require congressional action.

The specific areas are chosen to illustrate how different the impact of market redefinition can be when the current payment localities cross multiple rural–urban designations.

In the case of the HWI, the examples focus on the effect of removing the rural floor on metropolitan areas in California, Massachusetts, and Ohio. These examples consider the degree to which these changes may be due to the rural floor distorting the accuracy of the HWI versus the switch from using hospital-reported occupationally adjusted wage data to BLS wage data. Finally, this section also gives examples of three of the largest adjustments that are made to the HWI as a result of applying the outmigration commuter smoothing method.

On the GPCI side, the largest decrease in payments attributable to the market redefinition is in Monroe, Florida, which is currently part of the Miami payment locality. Under the CBSA classification, however, it is a single-county micropolitan area south and west of Miami that incorporates the Florida Keys, the Big Cypress National Preserve, and parts of the Everglades. Because of the distance to the main population center (Key West), there is relatively little commuting to Miami and consequently only a small bump up in the CBSA indexes from smoothing adjustments (+0.4 percent for the wage component of the PE-GPCI, and +0.1 percent for the overall GAF). From the combined effects of market and smoothing adjustments, payments in Monroe, Florida, are estimated to decline by 10.4 percent.

The largest increase from the market redefinition is in Jefferson, West Virginia. This county is currently part of the West Virginia statewide payment locality, and West Virginia has historically had very low relative wages. Under the current CBSA designations, however, Jefferson is considered part of the Washington, DC–Arlington–Alexandria metropolitan area—where relative prices are considerably higher. Although the county is included in the DC–Arlington CBSA because of its strong commuting pattern into the area, later commuting data also indicate that more than a quarter of Jefferson County's resident health care workers have jobs in the adjacent Hagerstown and Winchester metropolitan areas, where the relative wages are not as high as those in the DC metro area. The estimated payment increase due to market reassignment would have been even higher if we had not applied smoothing adjustments (a negative 2.8 percent adjustment to the wage component of the PE-GPCI, and –1.8 percent for the overall GAF). From the combined effects of market and smoothing adjustments, payments in Jefferson, West Virginia, are estimated to increase by 12.0 percent.

Many of the counties with the largest payment reductions resulting from market redefinition are in Minnesota, which is currently under a statewide payment locality. Taking *all* of the committee's recommendations into account, the estimated payments for the state are about 1.6 percent higher than under current policy. If we isolate just the effect of the market redefinitions, state payments in aggregate are less than half of 1 percent higher under the CBSA markets. Part B services in this state are highly concentrated in a few urban areas, however, and separating rural from urban areas tends to have a modest impact on the urban areas but a larger one on the rural counties. There are 87 counties in Minnesota, 23 of which are included in eight metropolitan areas. The Minneapolis–St. Paul area accounts for more than half the RVUs generated in this state, and their payments under the redefined markets are 2 percent higher than they would be under a statewide locality. In the Rochester area, which accounts for 18 percent of the state's RVUs, payments under the redefined markets are 1.6 percent higher. For the other six metropolitan areas in the state, however, payments are lower, with aggregate decreases ranging from 2.1 to 6.3 percent.

Aggregate payments to nonmetropolitan counties under the CBSA markets are 5.6 percent lower than they are under a statewide locality, and would have been 6.5 percent lower had it

not been for smoothing adjustments based on commuting patterns into the metro areas. Across rural counties, the payment effects range from –3 to –7 percent. Commuter-based smoothing works to the advantage of 29 out of 64 rural counties; in Goodhue County, for example (just south of St. Paul) smoothing increased the PE-GPCI by 11.6 percent and the overall GAF by 3.2 percent. Fillmore, Mower, and Winona counties (surrounding the Rochester metro area) all have similarly large smoothing adjustments. There are only 10 rural counties where smoothing adjustments are negative, but most of these are state border counties to the east, and the adjustments are generally small (less than half a percent on the GAF).

On the HWI side, some of the largest decreases in payments attributable to removing the rural floor can be seen in the states of California, Massachusetts, and Ohio. Massachusetts is a unique example of the rural floor as a result of the "Nantucket effect." Prior to 2012, the Nantucket Cottage Hospital was classified as a critical access hospital and therefore did not figure into the computations for the states' IPPS HWI rural floor. However, as a result of being acquired by a large health system, the Nantucket Cottage Hospital converted to IPPS status, becoming the only rural IPPS hospital in the state of Massachusetts. This change resulted in the rural floor wage index being applied to 60 urban hospitals in the state of Massachusetts, increasing wage indexes for these hospitals from an average of 1.16 in FY 2011 to 1.35 in FY 2012.[18] It is therefore not surprising that the isolated effect of removing the rural floor in Massachusetts would result in a 9–29 percent decrease in the HWI for urban hospitals across the state. For the majority of metropolitan areas in Massachusetts, the original occupationally adjusted HWIs that are based on wage data reported from hospitals only differ from the committee's recommended wage indexes using BLS data by a few percentage points compared to the 19–29 percent difference between the pre- and postrural floor occupationally adjusted indexes. This underscores the importance of removing the rural floor in order to improve the accuracy of the HWIs for hospitals in Massachusetts.

While all of the metropolitan areas in Massachusetts are significantly affected by the rural floor, the impact of removing the rural floor would be more moderate in most states. In the state of Ohio, 11 of the 16 metropolitan areas would actually experience an increase in their HWI as a result of replacing the hospital reported occupationally adjusted wage data with wage indexes based on benefits-adjusted BLS data. Four metropolitan areas in Ohio would experience modest decreases of 0.1–2.6 percent in their HWIs as a result of removing the rural floor, while the metropolitan area of Wheeling would experience a larger decrease of 14.1 percent. Notably, in Ohio, three of the metropolitan areas cross state lines, which currently results in some of the counties benefiting from the rural floor more than others within the same MSA. This is likely the case in Wheeling, which sits right on the border of Ohio and West Virginia. By removing the rural floor, the HWI for counties in Wheeling that sit in Ohio will more accurately reflect local wages in both states, rather than just the rural floor in Ohio.

In the state of California, 26 of the 28 metropolitan areas would experience a decrease of between 2 and 20 percent in their HWIs as a result of moving from the occupationally adjusted HWI with the rural floor to the IOM committee's benefits-adjusted wage index based on BLS data. However, the decrease in the HWI value is attributable to the removal of the rural floor (versus the switch to BLS data with the benefit adjustment) in only half of these cases, as evidenced by the relatively large percentage differences between the committee's index using BLS data and the original occupationally adjusted index prior to applying the floor in these

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[18] MedPAC, June 17, 2011, letter to CMS. http://www.medpac.gov/documents/06172011_FY12IPPS_MedPAC_COMMENT.pdf.

markets. This is in contrast to Massachusetts, where the decrease in HWI was clearly caused by the removal of the rural floor for the vast majority of the metropolitan markets.

The effect of removing the rural floor is more dramatic in some states than others as a result of the differing degrees of inaccuracy that result from the current policy. In addition, the effect of applying the outmigration commuter smoothing adjustment is also larger in some counties than others. In the case of Yuba County, California, approximately three-quarters of the health care workers in that county commute to other counties that are in the same metropolitan statistical area, Yuba City. However, the other one-quarter of health care workers commute to counties in other metropolitan statistical areas (namely, the MSAs of Chico and Sacramento–Arden–Arcade–Roseville) that have higher benefits-adjusted indexes based on BLS data. The result is that the HWI for the one hospital in Yuba County, California, increases from 1.046 to 1.107 as a result of applying the smoothing adjustment, representing a 5.8 percent increase in payments. Thus, this is an example of where the commuter-adjustment method improves the accuracy of HWIs in areas where workers may commute across MSAs.

Similarly, the 39 hospitals in Monroe County, Pennsylvania, also experience a significant increase in their HWI of 9.5 percent as a result of the commuter smoothing adjustment. Two-thirds of health care workers commute to counties inside the same rest-of-state area in Pennsylvania. However, the other one-third of health care workers commute to MSAs that have significantly higher HWIs, including the relatively high wage area of New York–White Plains–Wayne, an MSA that crosses the New York and New Jersey borders. Thus, this is an example of an area in which the commuter smoothing adjustment appropriately results in an increase to the HWI for hospitals in a relatively rural area that must compete with hospitals in higher-wage metropolitan areas.

Finally, it is important to give an example of an area in which hospitals experience a decrease in their HWIs as a result of the outmigration commuter adjustment method. The majority of the decreases in HWIs as a result of health care workers commuting to other counties occur in counties where there are not any hospitals. This is not surprising, given that fewer jobs are likely to be available for health care workers in a county that has no hospital, forcing them to migrate to other areas. Tazewell County, Virginia, is an example of a county that would experience a decrease in its HWI, albeit a relatively small decrease of 1.6 percent. This decrease is the result of 22.7 percent of the health care workers in Tazewell County commuting from the rest-of-state area Virginia to a county in the rest-of-state area of West Virginia.

In Box 2-5, two examples of special circumstances are described in terms of the physician payment simulations. The first is the state of Alaska, which would experience the largest reductions in payments if the committee's recommendations were fully implemented as a result of the removal of the 1.5 work floor. The second example is Puerto Rico, whose reduced payments from the simulations are due primarily to the way missing data were handled in the simulations. Both examples would warrant additional consideration if the recommended changes were to be implemented.

KEY FINDINGS AND CONCLUSIONS

This chapter highlights the impact that the committee's recommendations would have on the HWI and the GPCI. The changes recommended in the Phase I report were made to improve the technical accuracy of the price adjusters as measures of market-level variation in health care input prices.

The committee believes that increases in payments reflect evidence that current CMS prices

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BOX 2-5
Further Narrative on Alaska and Puerto Rico

Under the committee's more technically accurate indexes, Alaska would experience the largest reductions in payments, with reductions of approximately 20 percent across CBSAs and the rest-of-state area. The implications of these reductions warrant further consideration of the issues surrounding the GAFs for this state. In addition, Puerto Rico is also a unique case. While its changes in payments are more modest (0.47 to –3.97 percent across CBSA areas), it is important to acknowledge concerns about missing data in this territory.

In Alaska, the final GAFs would decrease following the committee's recommendations as a result of the 1.5 work floor removal. The committee believes the work floor was an inaccurate reflection of the geographic input cost differentials in physician work in Alaska. Instead, moving to MSA-based payment localities would assign an appropriately higher GAF to metropolitan areas such as Anchorage, Fairbanks, and Matanuska-Susitna, relative to the rest of the state. Moreover, even with the removal of the work floor, all of the new payment localities in Alaska under the MSA-based system would still retain GAFs of over 1, reflecting the higher input costs in Alaska, relative to the rest of the nation.

While the GAFs under the committee's recommendations would be more accurate, the committee acknowledges the current access problem in Alaska and supports other policy mechanisms to help address this problem. A recent report interviewed Alaska physicians who had not accepted new Medicare patients in the previous year, and found that less than 20 percent of primary care physicians in Anchorage, Fairbanks, and Matanuska-Susitna were accepting new Medicare patients (Frazier and Foster, 2009). Primary care physicians in rural areas and medical specialists were more willing to see new Medicare patients. This report goes on to point to the reimbursement difference between Medicare and private insurance for physician services, concluding that primary care physicians in Alaska and Fairbanks are declining new Medicare patients because Medicare reimbursement is only 66 percent of private reimbursement. Notably, they also acknowledge that this differential in Alaska is the same as the national average, and portends a growing access problem for Medicare beneficiaries nationwide. While payment differentials between Medicare

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have been underpaying providers by not accurately accounting for exogenous factor prices. Conversely, reductions in payments are interpreted as evidence that providers have been overcompensated for services delivered. The committee also acknowledges that it is important to understand the implications that these changes may have on access to care. As part of this task, this chapter therefore also assesses the effects the committee's recommendations could have on health care shortage areas or at-risk populations and providers.

Key Findings from Hospital Payment Simulations

1. If the more technically accurate wage index were implemented, the change in payments would be between –5 and +5 percent for discharges in 88 percent of hospitals.
2. The most substantial differences in payments under the index as recommended by the committee as compared to payments under current CMS policy are the result of eliminating policy adjustments, such as the various exceptions, market reclassifications, and floors, rather than the result of technical corrections to improve accuracy.

and private insurers have significant policy implications, the committee does not believe that GAFs are the appropriate tool for addressing this. Rather, the purpose of the GAFs is to adjust for geographic differences in input costs across areas, but it is not intended to make Medicare competitive with private health insurance reimbursement levels. If there is concern that Medicare does not pay enough relative to private insurance, this may be because private insurance is overpaying, or because Medicare is underpaying, which reflects an issue with the relative value unit system and/or the payment updates (i.e., increases/decreases).

Unlike in Alaska, where the large reduction in payments results from the committee's recommendation to remove the work GPCI floor, in Puerto Rico payment changes result from the committee's treatment of missing data. Specifically, the committee deals with missing data by renormalizing, which assigns national weights to the occupations for which there are data, ensuring that the weights sum to one in each area. This method differs from the CMS' current practice of replacing missing data with national medians. Out of the top 25 occupations in the physician office industry, wage data across areas are only available for between 11 and 15 occupations in Puerto Rico. The committee's process of renormalizing assigns all of the weight to occupations for which local wage data do exist, thereby reflecting the weighted average wages of that area's occupation mix. Conversely, CMS's current method of assigning national medians to occupations with missing data holds the occupation mix constant, but biases the area wage index toward the national average. In the case of Puerto Rico, the large wage differences between areas in Puerto Rico and the national average therefore cause an inaccurately high wage index, resulting in a decrease when reassigning all of the weights in the index to occupations for which data exist in Puerto Rico.

In addition, Puerto Rico is the only area that experiences a substantial reduction in wage portion of the practice expense index as a result of the benefits add-on. For example, the isolated effect of the benefit add-on to the practice expense GPCI in Guanica Mun County, Puerto Rico, is −10.8 percent. This is likely also due to data limitations, reflecting the potential underreporting of benefits on the Medicare Cost Report. Thus, although the committee believes that its method of renormalizing is a more accurate way to treat missing data than assigning inflated national medians, concerns about missing wage and benefits data in Puerto Rico warrant further attention by CMS to ensure accurate indexes.

    a. The largest negative effect on payments in metropolitan areas is due to the elimination of state rural floors for metropolitan areas in states where the index for the rural area is higher than an index for a metropolitan area. For the majority of these areas the committee's revised index for metropolitan areas is lower than the index under the current system with the rural floor.

    b. Commuter-based smoothing adjustments have a modest effect on the HWI in the great majority of counties (99 percent of the HWIs after smoothing are between 0.99 and 1.04), but smoothing serves to partially offset the effects of eliminating reclassifications.

3. A HWI based on BLS data yields generally higher relative wages in rural areas, as compared to an index based on IPPS hospital data.

4. In general, relative wages computed from benefits-adjusted BLS data are not substantively different from relative wages computed from CMS hospital data. There are notable exceptions, however, in markets where few hospitals contribute to that market's CMS index.

5. Payments to rural referral centers are slightly lower under the index proposed by the committee. Payments to other rural hospitals with special payment status are generally higher (roughly 1 percent), except for those located in frontier states.

6. The committee found no specific types of hospitals (for example, by teaching status, disproportionate share status, size, or region) that appeared to be disproportionately advantaged or disadvantaged by moving to a more technically accurate index.

Key Findings from Physician Payment Simulations

1. If the more technically accurate GPCIs were implemented, the changes in payments would be between –5 and +5 percent in counties where 96 percent of RVUs are billed. Most of the redistribution would be from rural to urban areas and from small urban to large urban areas.
2. The most important intervention to improve accuracy of physician payment adjusters is the move from current payment localities to CBSA market areas.
3. GPCIs computed under CBSA markets yield lower relative wages in rural areas, as compared to GPCIs computed under the larger payment localities.
4. Commuter-based smoothing adjustments have a modest effect on the GPCIs for the great majority of counties (99 percent of the wage component of the PE-GPCIs after smoothing are between 0.98 and 1.07), but smoothing serves to partially offset the impact of changing to CBSA markets in rural counties that are adjacent to metropolitan areas.
5. Because many rural areas are also HPSAs, physician payments under the committee's proposed indexes are reduced in most of the rural primary care shortage areas that are currently eligible for Medicare primary bonus payments. Among medium, high, or full primary care shortage counties in rural areas, estimated payment changes range from a reduction of 26 percent to an increase of 1.7 percent.
6. The impact of the changes would vary primarily between metropolitan and nonmetropolitan county designations rather than across HPSA designations. The positive effects on metropolitan counties and negative effects on nonmetropolitan counties would be reduced with a 0 percent adjustment for physician work and increased with a 100 percent work adjustment. The impact of a 25 percent adjustment, the current level, would fall within the two extremes.
7. Under the committee's more technically accurate indexes, areas with the highest reductions in payments would be the frontier states, with Alaska experiencing the largest reduction.

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3

Evidence of Geographic Variation in Access, Quality, and Workforce Distribution

I n its Phase I report, the Committee on Geographic Adjustment in Medicare Payment (the committee) made several recommendations about changing payment policy to improve the accuracy of the geographic adjustment factors that are used to adjust payments to providers. During Phase II, in keeping with the statement of task, the committee focused on the potential effects of the proposed payment changes on Medicare beneficiaries' access to high-quality health care in designated shortage areas as a way to reflect defined geographic areas whose residents may be particularly likely to have problems accessing care.

This chapter describes the evidence of geographic differences in access to and quality of care provided to Medicare beneficiaries. It presents an original analysis of data from the Consumer Assessments of Healthcare Providers and Systems (CAHPS) survey suggesting that the effects of geographic adjustment are not associated with consumer-reported performance relating to access and timeliness of care or quality of care in different geographic areas. The chapter then describes the geographic distribution of the workforce that provides health care services to beneficiaries, including physicians, nurse practitioners, and physician assistants. It next discusses some new opportunities to improve access through telehealth and changes in scope of practice, which help to increase productivity and make better use of health professionals who are already part of the workforce. The chapter concludes with the committee's findings about what the evidence shows about access and quality of care.

In reviewing the evidence of geographic differences in access and quality of care for Medicare beneficiaries, the committee adopted accepted definitions of access and quality as defined by previous Institute of Medicine (IOM) committees (see Box 1-1). The committee recognized that access and quality are closely related concepts, and that the early quality measurement efforts relied on the Donabedian (1966) framework of structure (e.g., organizational factors, practice setting, staffing), process (the delivery of care), and outcomes (e.g., changes in health status) (see Table 3-1 for relevant measures from a Donabedian framework). Quality measurement efforts have now evolved into a highly differentiated set of more than 450 performance

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TABLE 3-1 Sample Measures Included in the Evidence Review

	Structure	Process	Outcome
Access			
Supply and distribution	• No. of practitioners per 10,000 population	• Waiting time to get an appointment with a new practitioner	• Population health
Geographic	• Travel time to nearest practitioner • Availability of transportation		
Affordability	• Copayment • Cost of transportation • Cost of time off from work	• Seek care on timely basis	
Quality			
Access	• Have a usual source of care	• Waiting time in office before appointment	
Organizational	• Nurse-to-patient ratio in hospital		
Leadership	• Presence of infection control program • Adherence to clinical guidelines		
Infrastructure	• Meaningful use of electronic health record • Videoconferencing	• Clinical decision support	
Clinical		• Percent of infections • Percent of post-MI patients who leave with prescription for beta blocker	• Hospital readmission • Survival 1 year post-MI
Patient experience		• Get care when needed	• Rating of care • Rating of practitioner • Rating of health status

NOTE: MI = myocardial infarction.
SOURCE: Developed by the committee for this report.

measures that are available to the public in a clearinghouse whose clinical quality measures include process, access, outcome, structure, and patient experience (AHRQ, 2012a).

Because of the vast number of studies that have addressed these topics over the years, the committee did a targeted search for recent studies that specifically compared access and/or quality of care for beneficiaries in different geographic areas, including regions of the country, metropolitan and nonmetropolitan areas, and local health systems. Those studies are summarized in the next section.

GEOGRAPHIC VARIATION IN ACCESS TO HEALTH CARE

In the committee's view, a well-functioning health care system has a foundation of primary care and includes the full continuum of care, from primary to secondary and tertiary care.

Primary care is defined by a 1996 IOM study committee as "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community" (IOM, 1996a, p. 1).

This definition describes primary care as neither a discipline nor a specialty. It cannot be understood as a list of problems, tasks, or services or by the credentials of the person providing the services. This function provides and integrates services for most health care problems, in the context in which the user of health care services lives (Green, 2004), and the health outcomes of many people can benefit from primary care management. Respondents from the 2000–2005 Medical Expenditures Panel Survey linked to the National Death Index through 2006 showed a reduction in mortality among those who reported more of three core attributes (comprehensiveness, patient-centeredness, and enhanced access) of primary care at their source of care (Jerant et al., 2012). Racial/ethnic minorities, poorer and less-educated persons, individuals without private insurance, healthier persons, and residents of regions other than the Northeast were reported to have less access to primary care attributes than others (Jerant et al., 2012).

The following sections review what is known about access to primary and specialty care and the quality of care, with an emphasis on underserved areas and racial and ethnic minorities.

Access to Health Care

Generally speaking, the majority of Medicare beneficiaries have good access to care (MedPAC, 2011), when access is defined as services that are readily available and that yield the most favorable outcomes possible (AHRQ, 2010a; IOM, 2010). Market-specific data are limited, but the 2007 National Ambulatory Medical Care Survey found that just over 90 percent of primary care physicians and 94 percent of specialists with at least 10 percent of their practice revenue coming from Medicare were accepting new Medicare patients[1] (MedPAC, 2009). The 2011 National Health Interview Survey found that more than 95 percent of Americans aged 65 and older said they had a usual place to go for medical care, which is one of the most frequently used measures of access to care (CDC and NCHS, 2011).

While these findings are generally encouraging, they indicate that significant numbers of beneficiaries still report barriers to accessing care in their own local geographic areas as measured by unwanted delays in getting appointments or in finding a new primary care physician or specialist. A 2003 Medicare Payment Advisory Commission (MedPAC) survey of beneficiaries targeted 11 sites with a history of access problems. Although the survey was not nationally representative, and thus may have been biased, it found that it was harder for beneficiaries to get an appointment with a physician if they were transitioning into Medicare or new to a geographic area, in poor or fair health, had functional limitations, low incomes, and were without supplemental insurance (Lake et al., 2004). The fall 2011 MedPAC beneficiary survey found that 74 percent of beneficiaries age 65 and older who needed an appointment for routine care and 83 percent of those who needed an appointment with a specialist for illness or injury never had

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[1] The National Ambulatory Medical Care Survey contacts randomly selected nonfederally employed physicians from 15 specialty groups who are involved in direct office-based patient care to ask about ambulatory care. It excludes radiologists, pathologists, and anesthesiologists. Primary care includes general/family practice and internal medicine, and specialties included obstetrics/gynecology, cardiology, ophthalmology, general surgery, orthopedic surgery, psychiatry, and others (NCHS Data Brief No. 41, August 2010).

to wait longer than they wanted (MedPAC, 2012a,b). Only a small proportion of those surveyed were looking for a new physician (6 percent for primary care and 14 percent for a new specialist).

Among the 6 percent of Medicare beneficiaries age 65 and older seeking a new primary care physician, the share of beneficiaries who reported "a big problem" almost doubled in 2011 compared to the 2 previous years (23 percent in 2011 compared to 12 percent in 2010 and 2009); this represented about 1.2 and 0.08 percent of these beneficiaries, respectively (MedPAC 2012b). In comparison, among the 14 percent of beneficiaries age 65 and older seeking a new specialist, the share of beneficiaries who had a "big problem" finding a new specialist was about 7 percent in 2011, compared to 5 percent in the 2 previous years, which represented 1.0 and 0.7 percent of these beneficiaries, respectively.

Out-of-pocket costs can contribute to access problems for beneficiaries. Most Medicare beneficiaries have premium-free coverage for inpatient care in hospitals, skilled nursing facilities, hospice, and home care under Part A, which requires deductibles and copayments for the services used. Beneficiaries who also wish coverage for Part B services, which include physician, laboratory, and home health services, pay an income-related premium for coverage, and deductibles and copayments for services (CMS, 2012b). In 2008, 90 percent of beneficiaries reported having supplemental coverage through employer-sponsored plans, Medicare Advantage[2] (Part C), Medigap[3] policies, and Medicaid (KFF, 2010a). Beneficiaries who reported annual incomes between $10,000 and $20,000, being in poor health, and being nonelderly disabled people are more likely to lack supplemental coverage (KFF, 2010a). However, beneficiaries with only Medicare coverage are just slightly (3.4 percent) less likely to have a consistent source of care than those who have additional private insurance, according to 2008 data from the National Health Interview Survey (CDC and NCHS, 2011).

In sum, the majority of beneficiaries have a usual source of care and are able to see practitioners when they choose. As the next sections show, where access problems exist, they are generally due to shortages of health professionals in a geographic area or region; specific shortages of local providers who accept Medicare, which may be temporary or persistent; or individual characteristics of beneficiaries, such as the inability to make copayments, lack of transportation, cultural health beliefs, personal preferences, or being members of racial and ethnic minorities.

Geographic Differences in Access

Supply of Health Professionals

An adequate supply of health professionals, a clinically appropriate mix of practitioners, and balanced geographic distribution of these practitioners are necessary to deliver health care to Medicare beneficiaries. The committee reviewed available evidence and had multiple discussions about the degree to which shortages of practitioners in certain geographic areas are due to shortages in the total numbers of clinicians, or whether location decisions are more influenced by factors such as population density that is sufficient to support a medical practice, the prac-

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[2] Medicare Advantage is health maintenance organization (HMO) or preferred provider organization (PPO)-style health care; includes Parts A and B; and may include extra coverage for vision, hearing, dental, and/or health and wellness programs (Medicare.gov/navigation/medicare-basics/medicare-benefits/part-c.aspx). Premiums and out-of-pocket costs may vary.

[3] Medigap policies help pay some of the "gaps" in original Medicare coverage, including copayments and deductibles (CMS, 2012c; Choosing a Medigap Policy, www.medicare.gov/publications/pubs/pdf/02110.pdf).

titioners' preferences about quality of life, and experience training in a medically underserved metropolitan or nonmetropolitan area. Chapter 4 reviews literature on location decisions and includes a review of the programs and strategies that have been used to recruit practitioners to shortage areas.

Medicare is the largest single source of health coverage in the United States, but because it is part of a multipayer system, local market factors such as prevailing payment rates, supply of practitioners, and percentage of uninsured in the local population may play a significant role in beneficiary access at the local level. In other words, if a local area has a large number of medically underserved individuals, Medicare beneficiaries are also likely to have more problems accessing care.

Health Professional Shortage Areas (HPSAs)

The committee used Health Professional Shortage Area (HPSA) designations to identify underserved areas for its payment simulations, as reported in Chapter 2. An HPSA is an administrative designation by the Health Resources and Services Administration (HRSA) that identifies areas with a low or insufficient primary care workforce (see Box 3-1) (HRSA, 2012). HPSA designations guide the payment policies behind bonus payments for primary care and general surgery and the workforce policies that determine the placements of participants in the National Health Service Corps and other loan repayment programs described in Chapter 4.

As of February 29, 2012, nearly 60 million Americans—approximately 1 out of every 5—live in one of 5,816 designated primary care HPSAs (HRSA, 2012). Although the exact number of HPSAs fluctuates, approximately two-thirds of the primary care HPSAs are in nonmetropolitan areas, and one-third are in metropolitan areas (see Figures 3-1 and 3-2).

As reported in Chapter 2, the committee's recommendations have little effects on the payments to hospitals in HPSAs and a downward effect of 3 percent or less on the payments to practitioners.

Access in Metropolitan and Nonmetropolitan Areas

Broadly speaking, Medicare beneficiaries in nonmetropolitan and metropolitan areas have similar levels of access to fee-for-service care (AHRQ, 2010b; MedPAC, 2011). Compared to beneficiaries in metropolitan areas, those in nonmetropolitan areas often travel long distances to see practitioners because they tend to live further away from a health care facility (Arcury et al., 2005). However, beneficiaries in metropolitan areas who rely on public transportation may also need to spend a significant amount of time traveling to appointments even when the geographic distances are comparatively shorter. For low-income beneficiaries, particularly those who also have disabilities or mobility challenges, the burden associated with travel may present ongoing challenges for achieving and maintaining access to care. The impact of travel time on access to care, and how many beneficiaries will miss appointments or forego care because of these challenges, is not well studied and needs further attention (Chan et al., 2006).

Metropolitan areas with greater population density are more likely to have racially, ethnically, and economically diverse populations and neighborhoods (Commonwealth Fund, 2012). Thus, metropolitan beneficiaries are disproportionately more likely to be members of racial and ethnic minorities (Balfour and Kaplan, 2002; Fitzpatrick et al., 2004). Compared with residents of large city suburbs, residents of large inner cities had worse access for about 35 percent of

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BOX 3-1
Health Professional Shortage Areas (HPSAs): History and Methodology

HPSAs (originally referred to as the Health Manpower Shortage Area) were developed in the 1970s to identify geographic areas eligible to hire physicians under the National Health Service Corps program. Legislation in 1976 allowed special populations and facilities to be designated as HPSAs in addition to geographic areas.

HRSA develops the shortage designation criteria, which may apply to shortages of primary medical care, dental, or mental health providers. By statute, HPSAs are determined by identifying areas where the delivery of primary care would be "rational, have a shortage of primary care professionals, and where primary care professionals surrounding these areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration. A shortage is when an area has either

- a population-to-physician ratio greater than 3,500 people per 1 full-time physician*; or
- a population-to-physician ratio fewer than 3,000 people per 1 physician* and there is
  - an unusually high need for primary care services, or
  - an insufficient capacity of existing primary care providers."

The HPSA designation has not been substantially changed since its inception. HRSA presented two proposed rule changes that would modify the process, but they were withdrawn after substantial public input. The Affordable Care Act charged a Negotiated Rulemaking Committee with developing a revision, but a consensus for change could not be reached. The Secretary of the Department of Health and Human Services may, however, take the committee's recommendations and issue a proposed rule.

Because an agency or organization must apply for HPSA status, many areas with primary care shortages are not designated as HPSAs. A public or private nonprofit organization must first apply to HRSA in order for a county or group of counties to be considered a HPSA. Therefore, many counties with a less than adequate number of primary care professionals may not be designated as a HPSA, if there is insufficient political or administrative power or agreement to do so.

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*When calculating population to physician ratios, physicians—who are practicing within a HPSA because of programs based on HPSA designations—are excluded.

SOURCES: 42 CFR Part 5, Appendix A; also see Shortage Designation: Health Professional Shortage Areas and Medically Underserved Areas/Populations (http://bhpr.hrsa.gov/shortage) (HRSA, 2012).

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the 22 measures included in a core set of access measures used by the Department of Health and Human Services (HHS). Residents of micropolitan areas (counties with an urban cluster of 10,000 to 50,000 inhabitants) had worse access for 50 percent of access measures compared with residents of large fringe metropolitan areas (outlying counties in metropolitan areas of more than 1 million inhabitants) (AHRQ, 2010b).

Medicare Participation Rates

Centers for Medicare & Medicaid Services (CMS) data from 2009 show that the national average participation rate for Medicare Part B is 96 percent and varies from a high of 99 percent in Maine, Massachusetts, and Rhode Island to a low of 82 percent in Minnesota (KFF, 2010c).
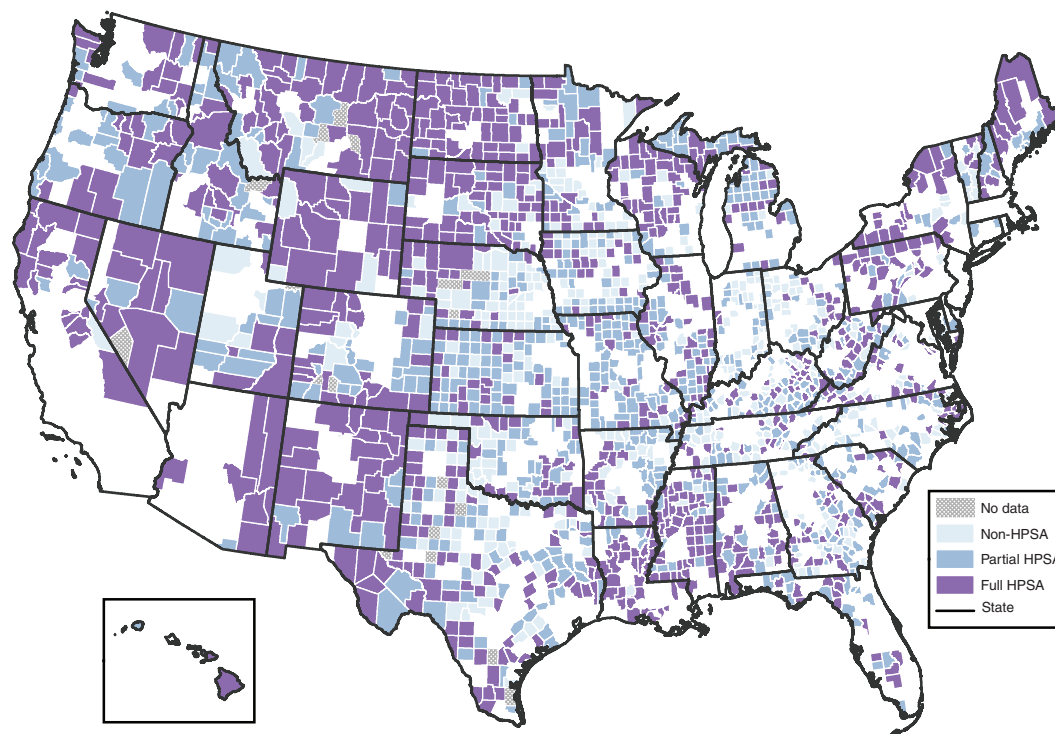
FIGURE 3-1 County designations for nonmetropolitan primary care service shortage areas.
NOTE: HPSA = Health Professional Shortage Area.
SOURCE: ARF, 2009.

An analysis of physician[4] responses to the 2008 Health Tracking Physician Survey by the Center for Studying Health System Change reported that 11 percent of metropolitan and 8 percent of nonmetropolitan physicians were not accepting any new Medicare patients (MacKinney et al., 2011). A University of Alaska survey of primary care physicians[5] found that almost all physicians in smaller communities were taking new Medicare patients, but that 1 out of 10 primary care physicians had opted out of Medicare, and most of them were in Anchorage, an urban area where private payments are significantly higher (Frazier and Foster, 2009). This lower participation rate in turn creates access problems for beneficiaries who often have a longer wait time before an appointment. Accordingly, MedPAC will continue to monitor the areas in which access disparities have been identified in its previous surveys of beneficiaries.

Access for Racial and Ethnic Minorities

Racial and ethnic minorities consistently face more barriers when trying to access care (AHRQ, 2010b). In its 2011 physician access survey, MedPAC found that members of racial and

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[4] Responses were from 1,937 physicians from family medicine, general practice, general internal medicine, obstetrics/gynecology, geriatric medicine, and general surgery.

[5] A 2008 survey identified all licensed primary care physicians who could see the general population of Medicare patients in Alaska and reached 85 percent of them for interviews (N = 229). Those who were not taking new Medicare patients in 2008 were followed up with another survey in 2009.
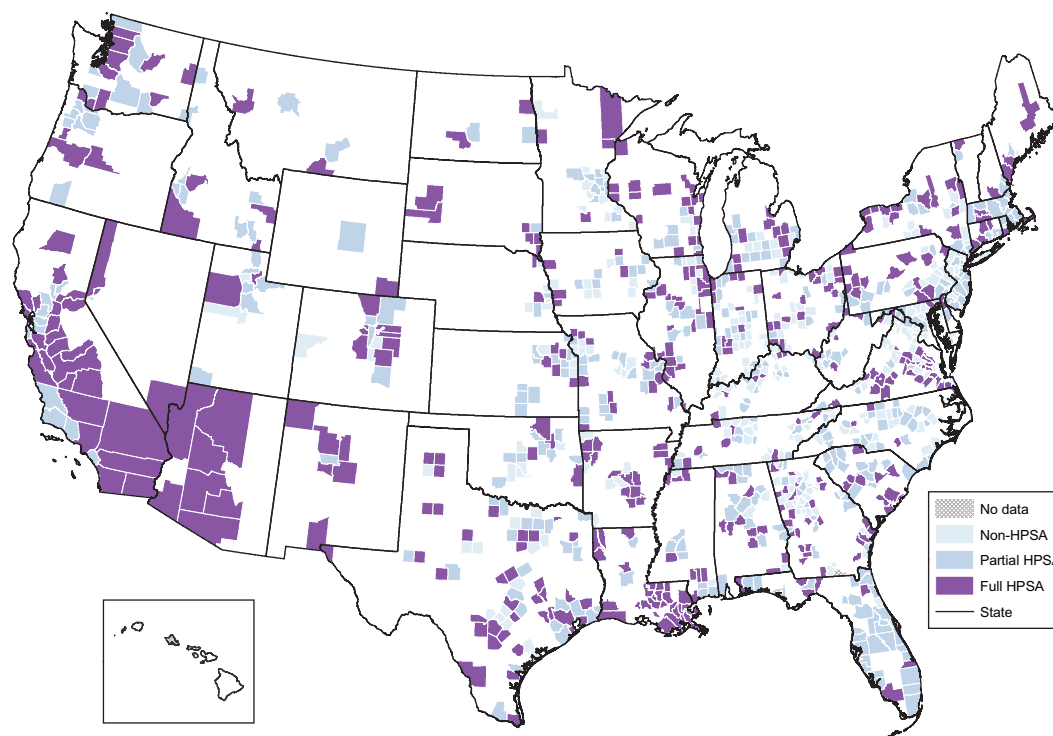
FIGURE 3-2 HPSA county designations for metropolitan primary care service shortage areas.
NOTE: HPSA = Health Professional Shortage Area.
SOURCE: ARF, 2009; HRSA Area Resource File and CMS Hospital Labor Markets.

ethnic minorities experienced more access problems than nonminority beneficiaries whether they had Medicare coverage or were privately insured. The same survey also found that the share of minority beneficiaries who reported problems finding a specialist had increased since its previous survey (MedPAC, 2012a). In the future, MedPAC plans to add survey questions to help improve understanding of the causes of these disparities and to identify possible policy options for improvement.

The MedPAC findings of access disparities for beneficiaries mirror the problems in the larger population, which have been documented since 2003 in a series of reports by the Agency for Healthcare Research and Quality (AHRQ) (2010a,b). Disparities in access to care for Medicare beneficiaries who are members of racial and ethnic minorities cannot be addressed by the Medicare program alone; a coordinated national strategy will be required, and such a strategy is discussed in Chapter 5.

GEOGRAPHIC VARIATION IN QUALITY OF CARE

One of the primary goals of the Medicare program is to ensure that beneficiaries are able to receive medically appropriate, high-quality care when they need it. The quality of care for fee-for-service Medicare beneficiaries has been improving slowly over time for multiple conditions in hospital and outpatient settings (AHRQ, 2010a; Jencks et al., 2003).

HHS measures access to care in terms of the availability of health coverage; availability of

a usual source of care; patient assessments of how easy or difficult it is to gain access to health care; and the successful receipt of services (AHRQ, 2010b). To measure quality, HHS uses a core set of evidence-based quality measures[6] to make standardized comparisons of the quality of care for different groups and regions (AHRQ, 2010a,b). Quality measures are typically classified as either process or outcome measures. Process measures may be derived from administrative (e.g., claims), clinical, or survey data that assess performance in the delivery of preventive services, acute care, and chronic disease management (e.g., time in waiting room, availability of medication history at time of the appointment) (AHRQ, 2010a). Outcome measures are often disease specific and include clinical outcomes, such as changes in health status after treatment, as well as patient satisfaction with practitioners and the care experience.

The Relationship of Access and Quality of Care

Access and quality of care are closely related, in that better access to care and higher rates of insurance coverage are closely associated with higher quality of care (Commonwealth Fund, 2012). In geographic areas where more people have health coverage and are better able to access health care, they are also more likely to have a usual source of primary care and to receive higher-quality hospital care, as reflected by receiving more of the recommended care processes and reporting better patient care experiences during hospitalization (Commonwealth Fund, 2012). Areas with very high poverty rates tend to have more people who are uninsured, who go without care because of cost, lack a regular source of primary care, and have worse health outcomes (Commonwealth Fund, 2012).

Disparities in access to and quality of care have not improved over several years of tracking and reporting by HHS. They continue to be a national policy priority (AHRQ, 2010a), as discussed in Chapter 5 of this report. In 2010, an IOM committee assessing the *National Health Disparities Report* (NHDR) and the *National Health Quality Report* (NHQR) recommended a harmonization and expansion of both reports (IOM, 2010). The NHDR will include the dimensions of quality covered by the NHQR, and the measurement of quality in both reports will consider care coordination and health systems infrastructure capabilities as "foundational components" that must be in place before any of the objectives in other quality areas can be achieved (IOM, 2010). Chapter 4 includes sections on current efforts for public reporting of performance by hospitals and clinical practitioners.

Geographic Payment Factors and Beneficiary-Reported Quality in Fee-for-Service Medicare

The committee recognized there is considerable concern, reflected in stakeholder testimony at public sessions,[7] that variations in health care quality and access across geographic areas could be influenced by variations in payment rates. In particular, there was concern that lower payment rates in rural and underserved areas could exacerbate quality and access issues in these areas (see Appendix E). Little published research was found that established an empirical foundation for evaluating this concern.

Therefore, the committee conducted an analysis of data collected as part of the 2010 CAHPS survey of Medicare beneficiaries in the traditional Medicare (fee-for-service) sector (see Table 3-2 for a description of CAHPS items used). CAHPS is widely viewed as a good data source

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[6] The core set of quality measures is available at http://www.ahrq.gov/qual/nhdr10/Core.htm.
[7] See IOM, 2011, Chapter 1.

for ambulatory (mainly primary) care, and the committee found CAHPS data to be a reasonable choice for the modeling of quality associations with payment factors for physician offices. While a different analysis might have been conducted using hospital quality data and payment factors in a parallel analysis, the committee lacked the resources to do both.

The committee focused on CAHPS measures of access/timeliness of care, experiences with care, and clinical quality (measured by immunizations). The measures were controlled for education, general and mental health status, age, Medicaid dual eligibility, low-income supplement eligibility, and assistance by a proxy in completing the CAHPS questionnaire. The CAHPS measures were supplemented with five clinical measures following specifications of the Health Plan Employer Data and Information System, constructed from a 20 percent sample of fee-for-service Medicare claims from 2009 for breast cancer screening and recommended testing for cardiac patients and diabetics. Rurality was measured by the Rural–Urban Continuum

TABLE 3-2 Description of CAHPS Items, Number of Responses, and Rate of "Top Box" (Most Favorable) Responses

Measure	Number of Responses	Overall Rate	Item Text or Description
Have personal doctor	46,505	93.1	A personal doctor is the one you would see if you need a checkup, want advice about a health problem, or get sick or hurt. Do you have a personal doctor?
Timely routine care	37,695	62.3	In the last 6 months, not counting the times you needed care right away, how often did you get an appointment for your health care at a doctor's office or clinic as soon as you thought you needed?
Timely care in illness	15,349	70.7	In the last 6 months, when you needed care right away, how often did you get care as soon as you thought you needed?
Wait <15 minutes	39,447	59.0	Wait time includes time spent in the waiting room and exam room. In the last 6 months, how often did you see the person you came to see within 15 minutes of your appointment time?
Easy specialist appointment	26,682	62.4	In the last 6 months, how often was it easy to get appointments with specialists?
Rating of care overall	39,417	39.0	Using any number from 0 to 10, where 0 is the worst health care possible and 10 is the best health care possible, what number would you use to rate all your health care in the last 6 months?
Rating of doctor	36,309	51.0	Using any number from 0 to 10, where 0 is the worst personal doctor possible and 10 is the best personal doctor possible, what number would you use to rate your personal doctor?
Doctor communication	36,087	59.2	[Composite of four items] In the last 6 months, how often did your personal doctor explain things in a way that was easy to understand?/ listen carefully to you?/ show respect for what you had to say?/ spend enough time with you?
Get needed care	26,617	70.6	In the last 6 months, how often was it easy to get the care, tests, or treatment you thought you needed through Medicare?
Influenza immunization	46,624	68.2	Have you had a flu shot since September 1, 2009?
Pneumovax immunization	44,054	69.1	Have you ever had a pneumonia shot? This shot is usually given only once or twice in a person's lifetime and is different from the flu shot. It is also called the pneumococcal vaccine.

NOTE: CAHPS = Consumer Assessment of Healthcare Providers and Systems.
SOURCE: A. Zaslavsky, developed for this report.

Code (RUCC), while HPSA designations, grouped by county percentages as in the Chapter 2 payment simulations, were used to identify areas with possibly inadequate supply of health care providers. This section summarizes the findings, and details of the analysis are provided in Appendix C of this report.

Do Medicare CAHPS Data Identify Access Issues and Quality Issues Related to Rurality of a County and/or the County's HPSA Status?

The data do suggest some differences, with metropolitan areas doing better on measures of timeliness of access, on immunizations, and on some of the screening/testing measures, and nonmetropolitan areas scoring higher on communication with doctors and overall satisfaction with physicians. Variations related to HPSA status are weaker, but when significant they are generally consistent with declining quality as the percent of a county designated as a HPSA area increases (with exceptions in the 100 percent HPSA counties).

Are Payment Factors Associated with Beneficiary-Reported Measures of Access to and Quality of Care?

The associations of payment factors with beneficiary reports are statistically significant, especially as reflected in the physician work geographical practice cost index (GPCI). However, these differences do not support concerns from several stakeholders expressed in Phase I testimony that smaller geographic payment adjustments are associated with shortages or lower-quality services. If anything, the results show the opposite to be the case, as *higher* payment factors are associated with poorer beneficiary-reported quality.

To What Extent Do Variations in Geographic Payments Explain Variations in Access and Quality by Rurality and/or HPSA Status?

No evidence of this was found in this analysis of the CAHPS data. Introducing either the GPCI or the physician practice geographical adjustment factor (GAF) measure as an explanatory variable had almost no effect on estimated access and quality differences along the RUCC or HPSA coverage dimensions.

Would Use of the New Adjustment Factor Methodologies Proposed in the Committee's First Report Increase or Decrease Payments in Areas with Generally Better or Worse Current Quality of Care, as Reflected in CAHPS Survey Responses?

The evidence on this point is mixed. One reason for this is that, while the switch to Consolidated Metropolitan Statistical Areas instead of whole states (as recommended by the committee) would tend to reduce payments to nonmetropolitan areas, these areas score better on some CAHPS measures and worse on others.

While this analysis of CAHPS data contributes to the sparse existing literature on the relationship between levels of payment and geographic variation in quality, the findings should be viewed only as suggestive, for several reasons. For example, the CMS's GAF and GPCI are defined for only 89 payment areas, which implies that each area is a state or a large and pos-

sibly heterogeneous portion of a state; the coarseness of the payment factor variables limited the variation required to even cross-sectionally identify their associations with quality outcomes. On the other hand, the very fact that in states (or large substate areas) the current physician services payment factors do not vary between urban and rural (or HPSA and non-HPSA) counties implies that payment factors could not be responsible for observed quality differences along those dimensions within those areas.

While there is much regional variation in quality, this analysis used only two county-level variables (RUCC and HPSA) of particular policy interest to categorize geographic areas. While appropriate techniques were used to model unexplained variation, further research might reveal other variables that would cause a reinterpretation of the effects that were observed here. Furthermore, the criteria used to define HPSAs are complex; while counties were categorized by the percentage of population covered by HPSA designation, there were no available data on the bases for designation typical for each category, much less for individual counties, nor could health system performance be distinguished in the HPSA and non-HPSA areas in the partially designated counties. It is also important to note that HPSAs are by definition areas in which nonmarket interventions (such as bonus payments) are implemented to correct perceived failures of the health professional market. Such adjustments might have changed the relationships between payment and supply of health personnel that would have existed without these interventions. Another possibility is that nonmarket interventions that affect HPSAs may be positively correlated with market factors, given the ability of applicants to select their locations. Nonetheless, some trends in the data were suggestive of unmet needs in areas with moderate to high HPSA coverage.

Finally, most CAHPS measures are subjective by their very nature as patient-reported data. CAHPS contains very few measures of clinical quality, and beneficiary responses to the CAHPS may be affected by regional differences in reporting tendency due to differences in culture or expectations regarding care. In these analyses, case mix was adjusted across areas using models similar to those used in national comparative CAHPS reporting. While CAHPS measures have received some validation relative to more "objective" clinical measures (Schneider et al., 2001), there is no practical alternative measure to patient reports for many health system characteristics. However, patterns for claims-based measures did not contradict the findings from CAHPS measures.

While these are important cautions for drawing conclusions from our analysis of CAHPS data, the most important finding for the purposes of this report relates to relationships that we did not find in the data. Specifically, there was little evidence in the analysis to suggest that revisions in the geographic adjustment factors proposed by the committee would systematically favor either areas now experiencing superior or inferior patient-reported performance relating to access/timeliness of care or quality. This analysis, however, must be viewed as suggestive and not as definitive; other data sets and methods might have yielded different insights (e.g., Fenton et al., 2012).

Variation in Quality Across Geographic Areas

Geographic Regions

Strong regional patterns of performance have been observed. New England and Western and Pacific Northwestern states tend to perform better on most quality measures, although

New England communities have high costs and high rates of potentially avoidable hospital use (AHRQ, 2010a; Commonwealth Fund, 2012). Many communities across the upper Midwest also have consistently strong performance; simultaneously, some integrated delivery systems and multispecialty practices in that region have made chronic care management a core competency, although these integrated models are not exclusive to that region (Commonwealth Fund, 2012). Areas in the south, particularly along the Gulf Coast, tend to perform poorly on many of the core measures. When health system data are aggregated at the state level, many states show substantial variation across local areas (Commonwealth Fund, 2012).

The economic climate in a local area does not seem to consistently predict quality of care. Performance varies as much within low-poverty areas as it does within high-poverty areas (Commonwealth Fund, 2012). However, individuals whose incomes are below the federal poverty level receive worse care than higher-income people for 80 percent of the core measures used in the annual national quality and disparities reports produced by AHRQ (2010a).

Metropolitan and Nonmetropolitan Areas

There is a considerable degree of variation in quality of care within local metropolitan and nonmetropolitan areas, and there is no strong evidence to suggest clear differences in quality of care between metropolitan and nonmetropolitan areas in aggregate (AHRQ, 2010a; Commonwealth Fund, 2012). However, in using more refined rural–urban classifications,[8] HHS has found that compared to residents of large city suburbs, residents of central metropolitan areas receive poorer care for 25 percent of the core measures of quality, and residents of micropolitan and noncore areas receive poorer care for 30 percent of the core measures of quality[9] (AHRQ, 2010b).

Residents in large inner cities are disproportionately more likely to be racial and ethnic minorities. Using the same core set of quality measures, African Americans received worse care than whites for about 40 percent of the core measures. and Hispanics received worse care than whites for about 60 percent of the core measures (AHRQ, 2010b).

An analysis of national data for more than 3.1 million hospitalized Medicare fee-for-service recipients who were discharged between 2006 and 2008 found that African American patients were more likely to be readmitted for three common conditions (acute myocardial infarction, congestive heart failure, and pneumonia). The gap was related both to race and to the site where care was received, either minority-serving[10] or non-minority-serving hospital (Joynt et al., 2011).

Summary

It is apparent that there are geographic pockets with persistent access and quality problems and that many of those problems are more likely to be experienced by beneficiaries who are members of racial and ethnic minorities. The committee's analysis of CAHPS data yielded little evidence that Medicare payment policy drives differences in quality of care received by beneficiaries; however, the analysis did suggest that metropolitan areas tended to do better on

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[8] The NHQR and NHDR both use four classifications of metropolitan (large central, large fringe, medium, and small) and two categories of nonmetropolitan (micropolitan and noncore) for comparison purposes.

[9] See *National Healthcare Quality Report*, 2009, for a list of core quality 365 measures (http://www.ahrq.gov/qual/nhdr09/Core.htm).

[10] The researchers determined the proportion of each hospital's Medicare patients who were African American and classified those in the highest decile of proportion of African American patients as minority-serving institutions.

measures of timeliness of access to care, while nonmetropolitan areas scored higher on communication with physicians and overall satisfaction with physicians. The CAHPS findings also suggested that consumer-reported quality declines as the percentage of a county designated as a HPSA area increases.

As will be discussed in Chapter 4, health professionals may choose to set up practice in more affluent areas of the metropolitan and suburban areas rather than where the majority of underserved populations live and work. Because the committee's approach to geographic adjustment in Medicare fee-for-service payment is based on labor markets that are much larger than neighborhoods, the committee concluded that geographic adjustment cannot be targeted to address access and quality issues at the local level. In other words, adjustments for underserved and shortage areas are important but should be addressed by another policy mechanism that is targeted to areas of particular need, and not by the process of geographic adjustment to payments.

WORKFORCE DISTRIBUTION AND SUPPLY

A total of 60 million Americans, or about 1 in 5, live in geographic areas that are designated as primary care shortage areas (HRSA, 2012). Improving this situation will be difficult with an anticipated overall shortage of physicians being predicted for the coming decades (Baker Institute, 2012; Kirch et al., 2011). According to the Bureau of Labor Statistics (BLS), between 2008 and 2018 the health care sector is projected to grow by nearly 23 percent, with more than 3 million new jobs being created (Bipartisan Policy Center, 2011; see Figure 3-3). However, only a small proportion of these jobs are clinical and will be distributed in shortage areas. For example, the greatest concentration of the primary care workforce is currently in metropolitan areas, while the majority of HPSAs—about 65 percent—are located in rural areas (HRSA, 2012).

The traditional view of delivering efficient and high-quality care calls for distributing the growing workforce to underserved areas (CRS, 2010). To this end, many rural and urban primary care training programs and broader workforce policies have used a variety of strategies to increase the supply of rural health professionals, including scholarships, loan repayment incentives, specialized training, and targeted recruiting (HRSA, 2012; Ricketts and Randolph, 2007).

Although less published information is available about recruiting practitioners for the 34 percent of HPSAs in metropolitan underserved areas, there are some indications that the best predictors of an individual choosing to practice in these urban areas are being a member of an ethnic minority, having a National Health Service Corps obligation to repay, and having had training in urban areas (HRSA, 2012; Rabinowitz et al., 2000). These factors will be discussed in greater detail in Chapter 4.

Most policy makers and practitioners agree that delivering efficient, quality health care to beneficiaries not only depends on an adequate supply of clinicians and administrative and technical support personnel but also on developing an appropriate mix and the proper distribution of personnel (Berwick et al., 2008; CRS, 2011). Although the general public may think about the health care workforce as comprised of physicians and nurses, it encompasses a much broader range of health professions. According to MedPAC (2011), half of the health professionals in Medicare's clinical registry are physicians, and the other half include nurse practitioners (NPs), physician assistants (PAs), pharmacists, podiatrists, chiropractors, physical therapists, psychologists, and many other categories of professionals who are licensed and regulated by states and who can bill Medicare independently or as part of a medical practice (MedPAC, 2011).
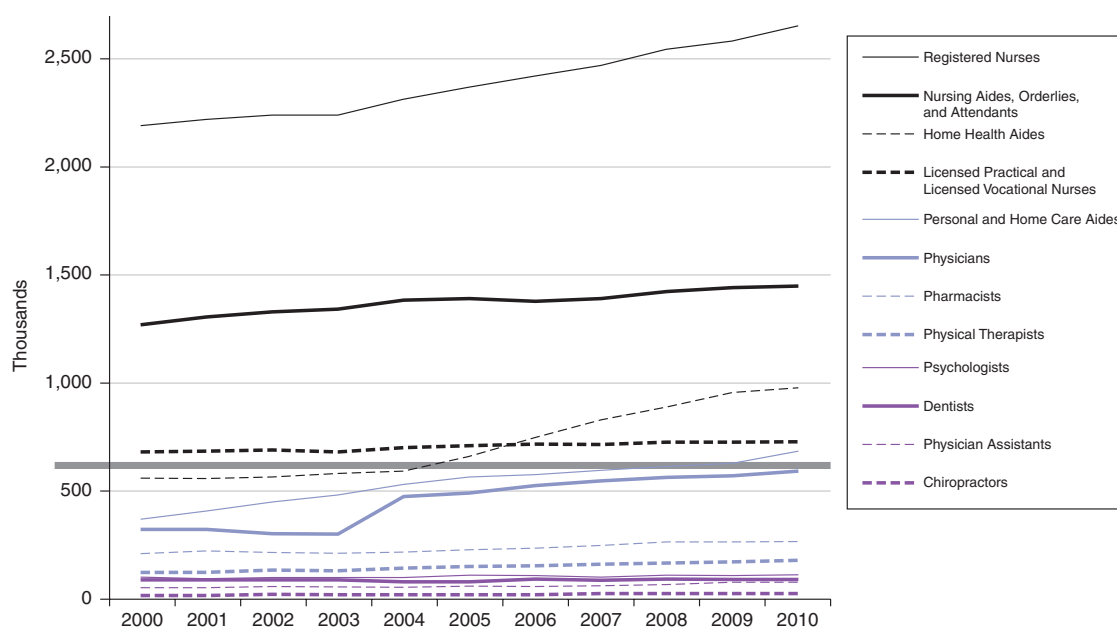
FIGURE 3-3 National occupational employment estimates, 2000–2010, for selected professions.
NOTES: Dental categories were changed in 2004 to incorporate two categories: "dentist, general" and "dentist, all other specialties." "Physicians" work in one or more of several specialties, including, but not limited to, anesthesiology, family and general medicine, general internal medicine, general pediatrics, obstetrics and gynecology, psychiatry, and surgery (Bureau of Labor Statistics, http://www.bls.gov/oco/ocos074.htm). In 2004, the category "Physicians and surgeons, all other" was added (Bureau of Labor Statistics, Standard Occupational Classification Category 29-1060. Subcategory 29-1069 covers all physicians and surgeons not separately listed http://www.bls.gov/soc/2000/soc_j0a0.htm). "Psychologists" include clinical, counseling, and school psychologists. In 2004, the category "Psychologists, all others" was added. "Registered Nurses" includes advanced practice registered nurses.
SOURCE: Bipartisan Policy Center, 2011. Occupational Employment Statistics, Bureau of Labor Statistics; in thousands. Produced by Deloitte Center for Health Solutions, ©2012 Deloitte Development LLC.

An emerging view of the workforce asks whether the appropriate response to shortages is to continue to try to move clinicians into those shortage areas, or whether access is sufficient if beneficiaries travel to see clinicians in surrounding areas. Another view, discussed later in this chapter, would promote access to clinicians via telehealth, using communications technology in addition to face-to-face clinical encounters.

Data and Data Sources on the Health Care Workforce

The extent to which policy makers can assess the current supply and distribution of the health care workers is limited by the lack of current data and by conflicting data from different sources. Most studies determining the number and geographic distribution of the health care workforce focus on a few key professions—physicians, nurses, dentists, mental health professionals, and a few other health professionals—but not the entire health care workforce (Baker Institute, 2012; Bipartisan Policy Center, 2011). Although studies on these selected professions have published information and projections about the supply of various types of providers, most

have been conducted by professional associations and interest groups that base their projections on assumptions and perspectives that apply primarily to their discipline. Specific data tend to be collected by profession, such as the American Medical Association (AMA) Master File (for physicians), the HRSA National Sample of Registered Nurses, and the American Academy of Physician Assistants (AAPA) Physician Assistant Masterfile. While these are valuable sources for those professions, the differences in methods and timeliness of data collection make it difficult to make cross-professional comparisons by linking datasets.

Estimating the size of the current primary care workforce is fraught with data problems. The BLS Occupational Employment Statistics (OES) data provide a single source of comparable data across states for certain key professions, including nurses and employed physicians (self-employed physicians are not included). However, there is no consensus over the exact number of practicing physicians and no single national registry or inventory that provides a current accurate count of totals or even local supply (The Lewin Group, 2010). Estimates of the total physician workforce range from 850,085 (Young et al., 2010) to 972,376 (Smart, 2011). The differences depend on mode of data collection as well as definitions of active status (i.e., part-time practice). Estimates regarding the total primary care workforce also vary, ranging from a total of approximately 295,000[11] (AHRQ, 2012b) to 378,000 (Kaiser Commission on Medicaid and the Uninsured, 2011). In these estimates, physicians make up approximately 75 percent of the total, NPs represent about 20 percent, and PAs make up the rest (see Figure 3-4) (AHRQ, 2011b,c).

Regardless of the source of data used, the supply and distribution of primary care providers and specialists have been found to vary from region to region, and between metropolitan and nonmetropolitan areas (Bodenheimer and Pham, 2010; Rosenthal et al., 2005). The extent to which patients travel across geographic boundaries to see clinicians is not well documented.

A recent microsimulation study projected the need for an additional 8,000 nurse practitioners and 2,400 physician assistants in primary care, particularly in areas with low physician supply (Baker Institute, 2012; Dall, 2010). Across medical specialties, shortages of 85,000 to 200,000 have been forecast by 2020 by different groups (Cooper et al., 2002; Council on Graduate Medical Education, 2005; Dill and Salsberg, 2008).

In general, residents of metropolitan areas have better geographic access to physicians, but information on access to different specialists is limited. Nearly all medical specialties are growing, but a cross-sectional study using alternative measures of geographic access to physicians in 23 states found that smaller-sized specialties, such as pathologists, urologists, ophthalmologists, and otolaryngologists are more unevenly distributed than larger specialties, such as cardiology (Rosenthal et al., 2005). The study also found that distance to the nearest physician is an important criterion for analysis, given that patients will cross county lines or travel to metropolitan areas to seek care (Rosenthal et al., 2005). An additional discussion of patient travel is found in Chapter 4.

The ratio of practitioners to the population is often used as an indicator of practitioner supply to standardize comparisons across regions. These ratios, however, are usually simply calculated based on person counts, not full-time equivalents (FTEs) or services able to be provided. The emphasis in workforce policy has traditionally been on alleviating shortages to improve access to care, and supply is generally thought to be associated with the amount of care provided, whether or not the care is necessary and appropriate. Overuse of services, meaning the provision of services that are not medically necessary, is also considered to be a quality problem (AHRQ,

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[11] Based on an estimated 209,000 physicians, 56,000 NPs, and 30,000 PAs.
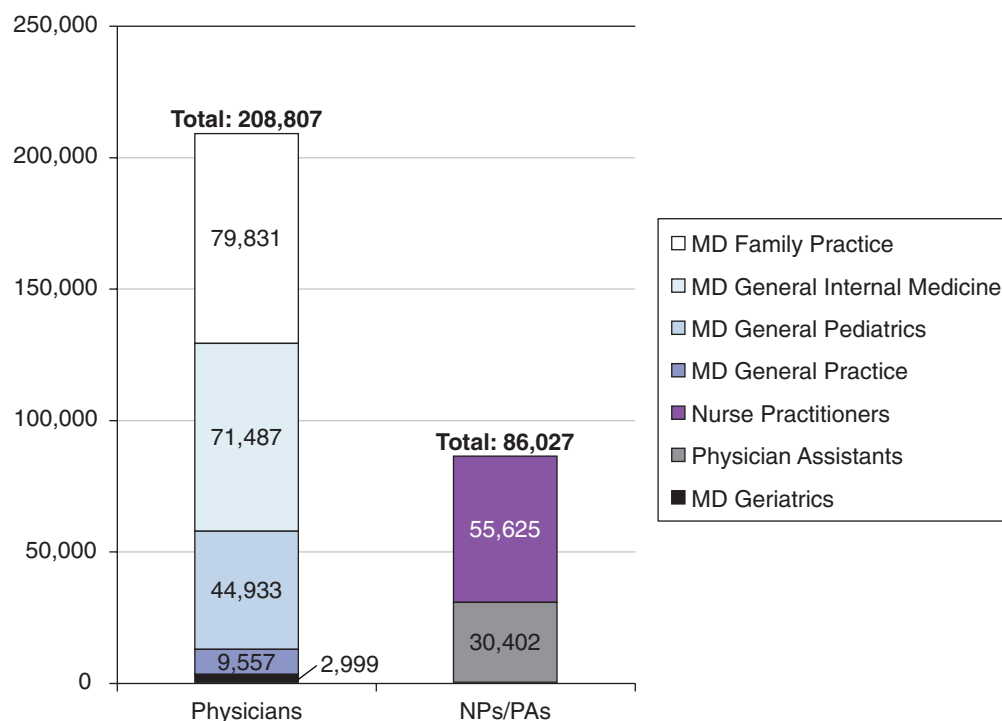
FIGURE 3-4 Number of primary care professionals.
SOURCE: AHRQ, 2011b,c.

2010a). However, the relative supply of practitioners is not directly related to either access to care or to the quality of care provided (Goodman and Grumbach, 2008).

Geographic Distribution of Physicians

Primary Care Physicians

The distribution of primary care physicians has been identified as a policy problem for many years, and a previous IOM report specifically identified primary care shortages in rural areas and inner cities (IOM, 1996a). That study recommended that state and federal agencies monitor the supply of and requirements for primary care physicians as well as primary care NPs and PAs. It also called for studies of integrated health care systems to include underserved rural and inner-city areas, and attract physicians, NPs, and PAs through "financial incentives, relationships, and telecommunications capabilities" (IOM, 1996a).

After that report was published, the overall percentage of physicians choosing to practice general medicine increased by only 2 percent in approximately 10 years (Auerbach et al., 2011; Morgan and Hooker, 2010). From 1995 to 2005, the number of primary care physicians per capita increased 12 percent compared with a 5 percent increase for specialty care physicians per capita (GAO, 2008). In 2005, there were 90 primary care physicians per 100,000 people and 189 specialty care physicians per 100,000 people (GAO, 2008). Between 2004 and 2009, almost half (45.4 percent) of all counties experienced an increase in their population without a relative increase in the primary care ratio. Forty-one counties lost all primary care physicians,

and a total of 130 counties (4.2 percent) had no primary care physicians in either year (see Figure 3-5).

Census and AMA data showed there were roughly twice as many physicians per 100,000 people in urban areas than in rural areas in 2005—209.6 compared with 113 (Fordyce et al., 2007). While nearly 1 out of 5 Americans resides in a rural area, fewer than 1 in 10 physicians practice in rural areas (0). As of 2010, about 13 percent of primary care physicians practiced in rural areas (see Figure 3-6) (AHRQ, 2011d). The distribution of rural physicians is also uneven, with practitioner to population ratios varying from 58.5 per 100,000 in small areas to as few as 35.7 per 100,000 in isolated rural areas (Fordyce et al., 2007).

It is estimated that the growth rate of physicians will be slower than most other health care professions (Auerbach et al., 2011) (see Figure 3-3). Between 2004 and 2009, 1,559 counties (50.2 percent) saw their population-to-physician ratio decrease. This included 31 counties that had no physicians in 2004 and had at least one in 2009. Ninety-four counties (3.0 percent) had no physicians in either year (see Figure 3-5). Figure 3-6 shows the distribution of primary

Percent Change in Physicians
(# of Counties)

- 100% Increase or Greater (56)
- 50% to 99% Increase (111)
- 5% to 49% Increase (929)
- Neutral (–5% to 5%) (812)
- 5% to 49% Decrease (948)
- 50% to 99% Decrease (80)
- Lost All Physicians (47)
- No Physicians Either Year (94)
- No Physicians in 2004, at Least 1 in 2009 (31)

Alaska and Hawaii not to scale
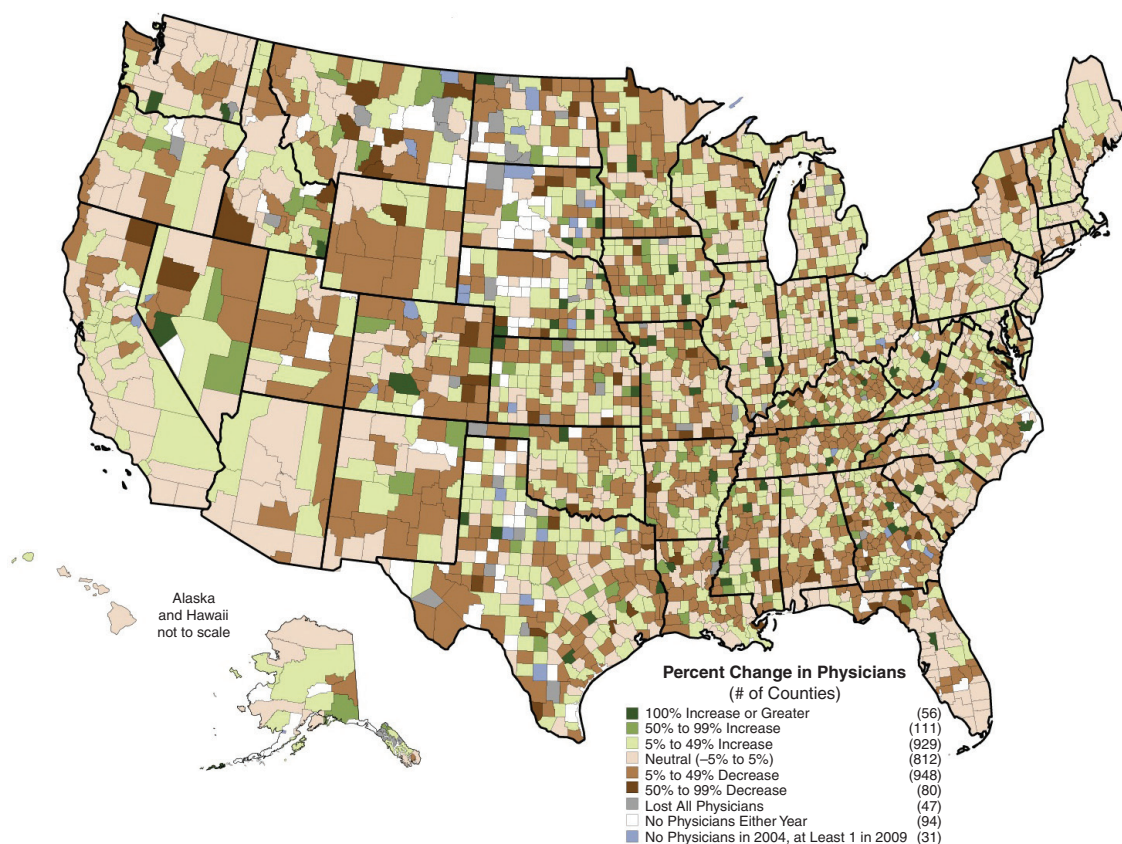
FIGURE 3-5 Change in physicians per 100,000 population, 2004–2009.
NOTE: Data include nonfederal, nonresident, clinically active physicians less than 70 years old.
SOURCE: Produced by American College of Surgeons Health Policy Research Institute, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, using data from AMA Physician Masterfile, 2004 and 2009.
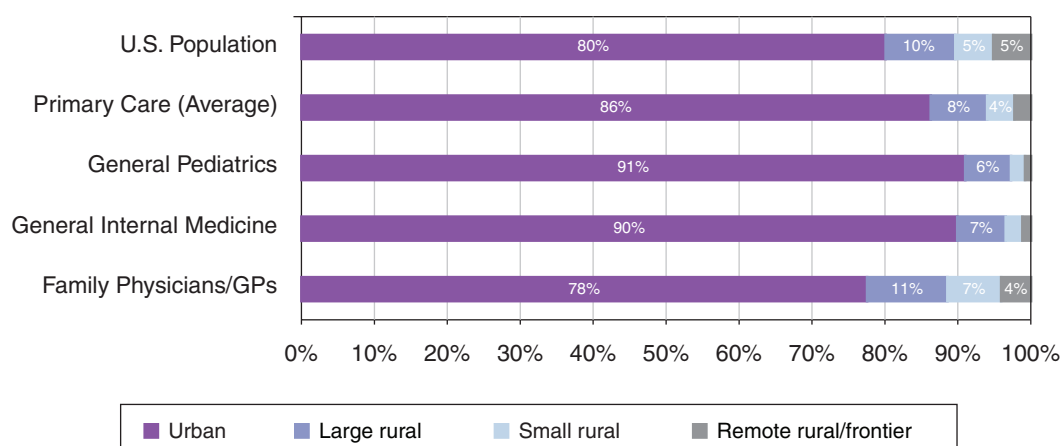
FIGURE 3-6 Distribution of primary care physicians among urban and nonurban areas.
NOTE: GP = general practitioner.
SOURCE: AHRQ, 2011d.

care physicians among urban and nonurban areas, and Figure 3-7 shows the national changes in the distribution of primary care physicians from 2004 to 2009.

General Surgeons

Although the total number of general surgeons has only slightly declined, the general surgeon–to-population ratio has dropped in both rural and urban areas. Between 1981 and 2005 there was less than a 5 percent decrease in the total number of general surgeons, while the number of general surgeons per 100,000 people decreased by more than 25 percent. Although the urban areas have experienced the greatest drop in general surgeon–to-population ratio, rural areas still have significantly fewer general surgeons per 100,000 people (see Figure 3-8) (Christian Lynge et al., 2008).

There is no agreement about whether there is an overall shortage of general surgeons, a maldistribution, or both (Neuwahl et al., 2011). The declining general surgeon–to-population ratios may be an indication that more surgeons are specializing. However, there have been reports that practice patterns are different in metropolitan and nonmetropolitan areas, and that nonmetropolitan surgeons have a broader scope of practice. For example, the American Board of Surgery reported that nonmetropolitan surgeons do more procedures in a year and have a greater variety of cases than their metropolitan counterparts (Ritchie et al., 1999). However, a more recent study found rural surgeons have a more focused practice (King et al., 2009), suggesting that practice patterns may be changing. A national survey of surgeons found that metropolitan surgeons reported significantly greater volume for general, laparoscopic, and vascular surgery, and nonmetropolitan surgeons reported higher volumes for endoscopy, gynecology, obstetrics, and urology (Heneghan et al., 2005). General surgeons in nonmetropolitan areas also provide trauma and critical care and may be viewed as the economic driver for small nonmetropolitan hospitals, which also serve as key employers in those areas (Dickson, 2011; Hart et al., 1994; Heneghan et al., 2005).
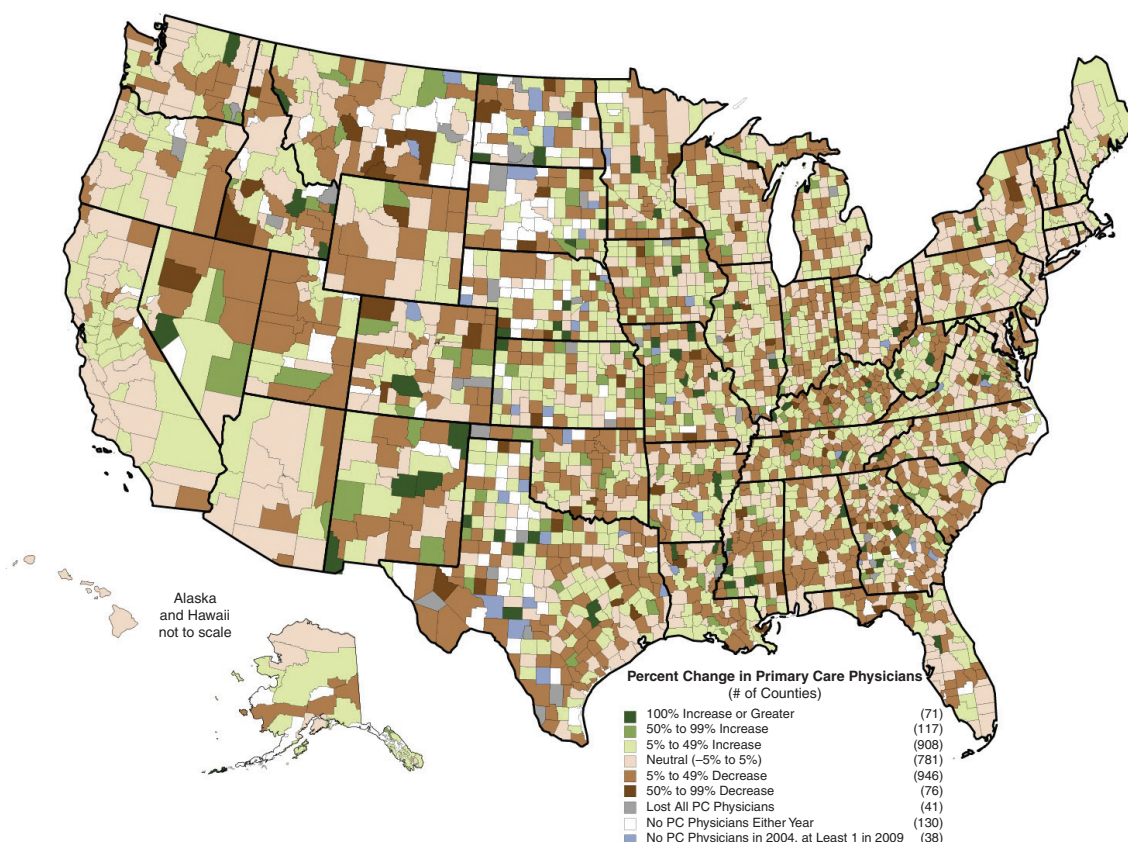
FIGURE 3-7 Change in primary care physicians per 100,000 population, 2004–2009.
NOTE: Data include nonfederal, nonresident, clinically active physicians less than 70 years old reporting a primary specialty classified by the American College of Surgeons Health Policy Research Institute as "primary care." PC = primary care.
SOURCE: Produced by American College of Surgeons Health Policy Research Institute, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, using data from AMA Physician Masterfile, 2004 and 2009.

Geographic Distribution of Registered Nurses and Nurse Practitioners

Registered Nurses

Registered nurses (RNs) are the largest occupational group in health care, and 2.7 million RNs were employed in the United States in 2010 (BLS, 2012a). The states with the lowest population ratio of nurses are generally located in the south central, mountain state, southwest, and northwest regions of the United States, with higher ratios in the north central and northeast (see Figure 3-9). Between 2002 and 2009, the number of FTE RNs ages 23–26 increased by 62 percent (Auerbach et al., 2011), which indicates that younger health professionals may be entering the workforce and helping to offset shortages created by the numbers of nurses who are retiring.
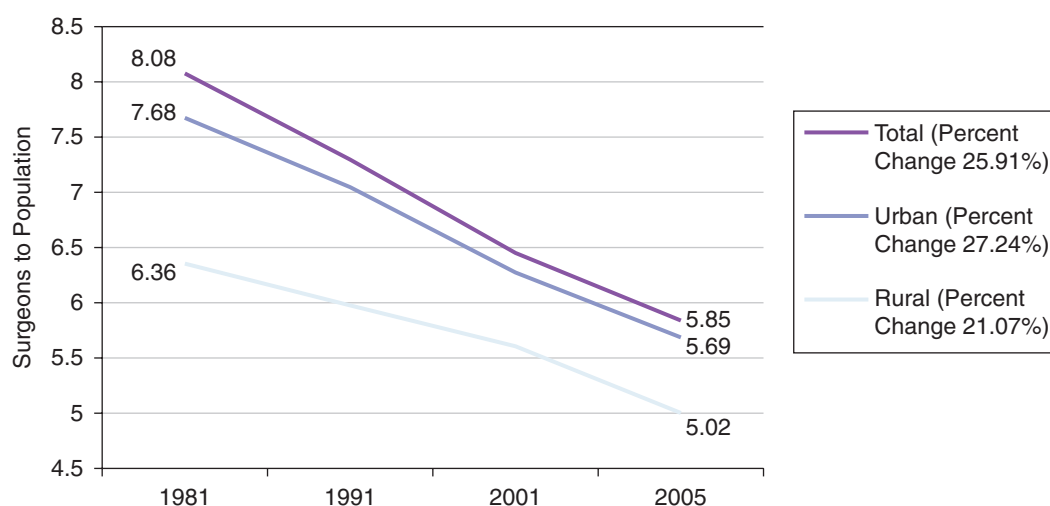
FIGURE 3-8 Change in general surgeons–to-population ratios.
SOURCE: Christian Lynge et al., 2008.

Nurse Practitioners

NPs are registered nurses who have completed graduate-level education and clinical train-ing[12] to provide a wide range of preventive and acute health care services, including primary, specialty, and subspecialty care (AANP, 2012; ACNP, 2012). They are licensed in all states and the District of Columbia and practice under the laws and regulations of the state in which they practice, with prescription privileges in 49 states. NPs diagnose and treat many common acute and chronic health problems; provide care management, health education and counseling; and refer to other health professionals as needed (AANP, 2012). They also are part of care teams in outpatient medical specialty practices, where they help to improve access and reduce wait times (UCSF Center for the Health Professions, 2009).

Two recent reports have been published regarding the numbers of NPs practicing in rural and urban areas, both using the National Provider Identifier (NPI)[13] file from 2010. One report identified primary care practitioners including physicians, NPs, and PAs (AHRQ, 2012b). Based on NPI numbers, primary care physicians were more likely to practice in rural areas than non–primary care specialists. Within primary care, family physicians and general practitioners were distributed more closely to the U.S. population and were found to be more likely than either general internists or pediatricians to practice in rural areas (Table 3-3). In this same report, NPs and PAs were found to be more likely than physicians to practice in rural areas (16 vs. 9 percent), and primary care NPs and PAs were much more likely to be rural than physicians (28 and 18 percent, respectively) (AHRQ, 2011d, Table 2). This rural distribution of NPs and PAs, although higher than all primary care physicians, was more similar to family physicians (22 percent). NP distribution is very state dependent and highly correlated with state scope-of-practice laws, which will be discussed later in this chapter. NP practice choices also will be discussed below.

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[12] Most NPs have master's degrees and many have doctorates.
[13] A National Provider Identifier is a unique 10-digit identification number issued to health care providers in the United States as required under the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

Legend:
- 605–798
- 800–938
- 945–1,040
- 1,051–1,728
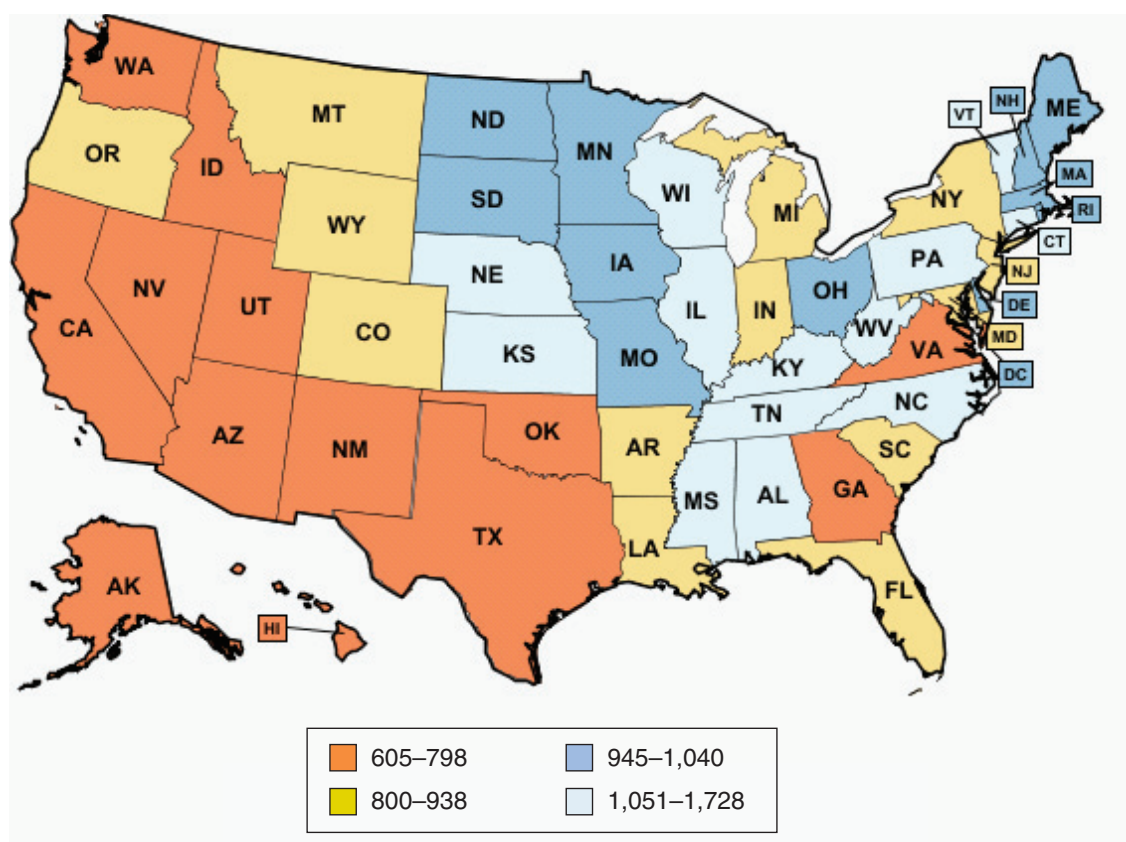
FIGURE 3-9 Registered nurses per 100,000 population, 2011.
NOTES: The number of registered purses per 100,000 population was calculated using the population estimates provided by the U.S. Census Bureau as of July 1, 2011. U.S. total estimate excludes the territories. Estimates for detailed occupations do not sum to the totals due to rounding. Estimates do not include self-employed workers. The Occupational Employment Statistics survey is a semiannual mail survey measuring occupational employment and wage rates for wage and salary workers in nonfarm establishments in the United States. For further details please see http://www.bls.gov/oes/2009/may/methods_statement.pdf. Definitions: *registered nurses* include advance practice nurses such as nurse practitioners, clinical nurse specialists, certified nurse midwives, and certified registered nurse anesthetists; *employment* refers to the number of workers who can be classified as full- or part-time employees, including workers on paid vacations or other types of paid leave.
SOURCES: KFF, 2010b. Calculations based on the Bureau of Labor Statistics, State Occupational Employment and Wage Estimates, May 2011, available at http://www.bls.gov/data/#employment; and U.S. Census Bureau 2011 Population Estimates, available at http://www.census.gov/popest/.

The second recent study, conducted by the University of Washington Rural Health Research Center, addresses only NPs and does not differentiate across specialties (primary care versus other specialties) (Skillman et al., 2012). Thus, the number of NPs in the AHRQ report is smaller than in the Skillman et al. report. However, both reports are likely to be undercounts because many NPs do not have NPIs yet. Skillman and colleagues (2012) examined the distribution of advanced practice registered nurses across the United States and examined factors associated with choosing a rural practice location. NP data are based on all 106,113 NPs with NPIs (versus only primary care NPs).

TABLE 3-3 Geographic Distribution of Primary Care Health Care Professionals, 2010

Geography	All			Primary Care					
	NP	PA	Physicians	NP	PA	Family Medicine	General Internal Medicine	General Pediatrics	U.S. Pop.
Urban	84.3%	84.4%	91.0%	72.1%	75.1%	77.5%	89.8%	77.6%	80%
Large Rural	8.9%	8.8%	6.5%	11.0%	11.6%	11.1%	6.7%	9.6%	10%
Small Rural	3.9%	3.7%	1.7%	7.7%	6.9%	7.2%	2.4%	7.3%	5%
Isolated Rural, Frontier	2.8%	3.0%	0.7%	9.1%	6.3%	4.2%	1.1%	5.5%	5%

NOTE: NP = nurse practitioner; PA = physician assistant.
SOURCE: AHRQ, 2011d.

HRSA's 2008 National Sample Survey of RNs reported a total of 158,348 NPs, and the American Academy of Nurse Practitioners reported 140,000 practicing NPs in 2011 (AANP, 2012). In each of the past 2 years there have been about 10,000 NP graduates with about 9,000 of those prepared in primary care (AACN/NONPF 2010 and 2011 graduation and enrollments). Using data from Skillman and colleagues, of the 106,113 NPs, 84.4 percent were practicing in urban areas and 15.2 percent in rural areas. The ratio of NPs to 10,000 population in urban areas was 3.6 and in rural areas 2.8. Two states reported higher ratios in rural areas than urban areas—New Hampshire (7.7) and Alaska (5.2). The range of NPs per state was from 33 (Nevada) to 812 (Mississippi). Of the rural NPs, a majority (57.5 percent) were practicing in large rural areas, about a quarter (26 percent) were in small rural areas, and another 16.4 percent were in isolated small rural areas (see Figures 3-10 and 3-11 for distribution of NPs across urban and rural areas).

Skillman and colleagues (2012) found two factors among those available for study from the NPI data set associated with NPs practicing in rural areas: the degree of practice autonomy in the state (this approached significance, $P = .06$) and NP gender. Male NPs were more likely to choose rural practices ($P < .0001$). While the authors call for further studies to better understand the role of state regulation in NP location choice, they suggest that undoing restrictive state regulations be considered as a strategy to encourage rural practice. Another recommendation from the study was to recruit more men into NP programs since they are more likely to practice in rural areas.

Geographical Distribution of Physician Assistants

PAs provide diagnostic, therapeutic, and preventive services as delegated by a physician and often are part of a care team (Hooker and Everett, 2012). In underserved areas where physicians are only available 1–2 days per week, PAs may be the primary clinical practitioners (BLS, 2012b). Approximately 30–40 percent of PAs work in primary care, with higher proportions in primary care in rural areas (Hooker and Everett, 2012).

Over the past 30 years, the number of PAs has been growing, and an estimated 81,000 certified PAs currently practice in the United States, nearly a fourfold increase since 1991 (see Figure 3-12) (Larson and Hart, 2007). PAs are more likely to work in urban areas, but in some
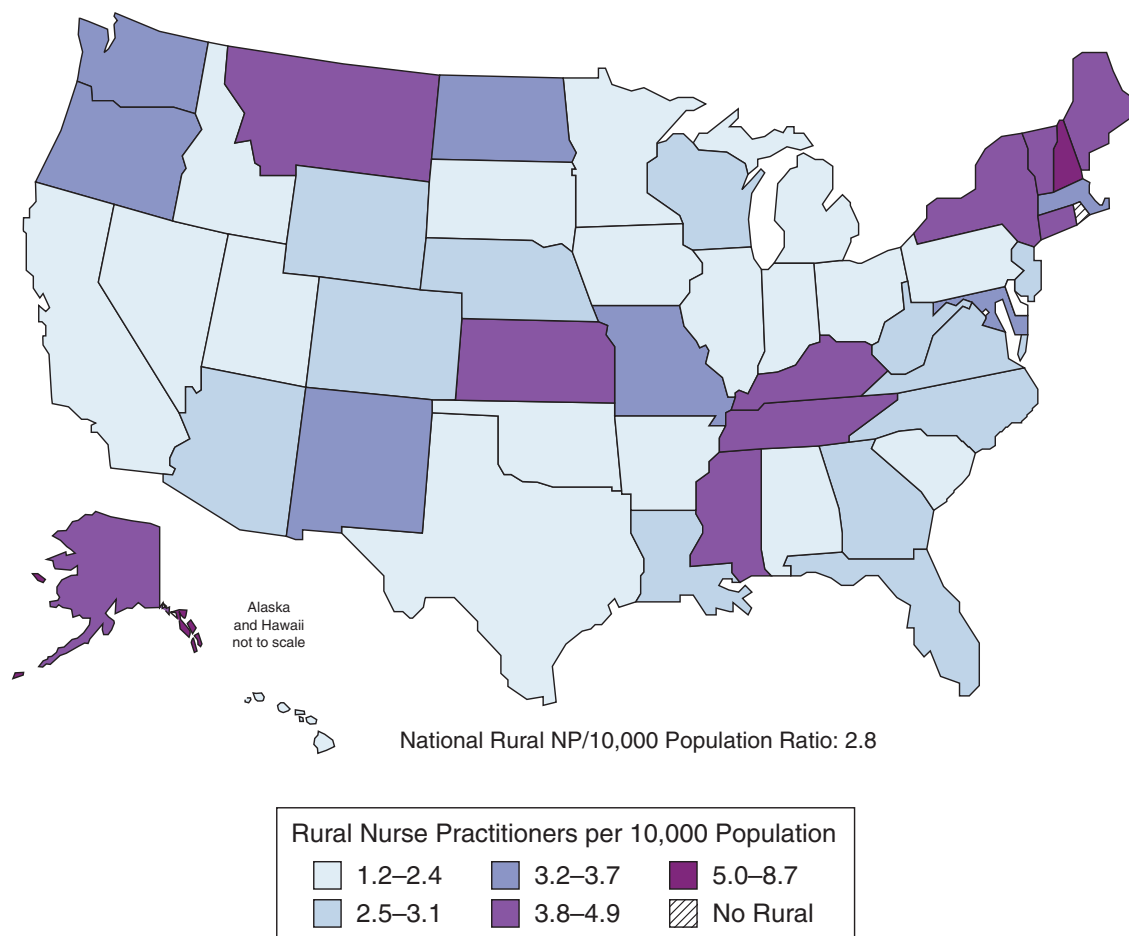
FIGURE 3-10 Rural per capita supply of nurse practitioners by state, 2010.
NOTE: Map date: November 2011. NP = nurse practitioner.
SOURCE: Skillman et al., 2012. Data sources: March 2010 National Plan and Provider Enumeration System data file, 2011 Neilson/Claritas Population Estimates.

nonmetropolitan areas in California and Washington state, the ratio of PAs and NPs to the general population is higher than that of physicians (Grumbach et al., 2003). Still, 20 percent of all counties in the United States (627 counties) have no practicing PAs (see Figure 3-13). Most of those counties are located in nonmetropolitan or small metropolitan areas (Hooker and Everett, 2012; Sutton et al., 2010).

EXPANDING OPPORTUNITIES TO IMPROVE ACCESS

Recent Developments in the Use of Telehealth Services

One very promising and rapidly developing strategy to improve access to care for beneficiaries is to provide practicing clinicians with new resources and technology tools that enable them to reach more patients. Traditionally, telemedicine has been defined as using information and

National Urban NP/10,000 Population Ratio: 3.6

Urban Nurse Practitioners per 10,000 Population

1.2–2.4	3.2–3.7	5.0–8.7
2.5–3.1	3.8–4.9	

FIGURE 3-11 Urban per capita supply of nurse practitioners by state, 2010.
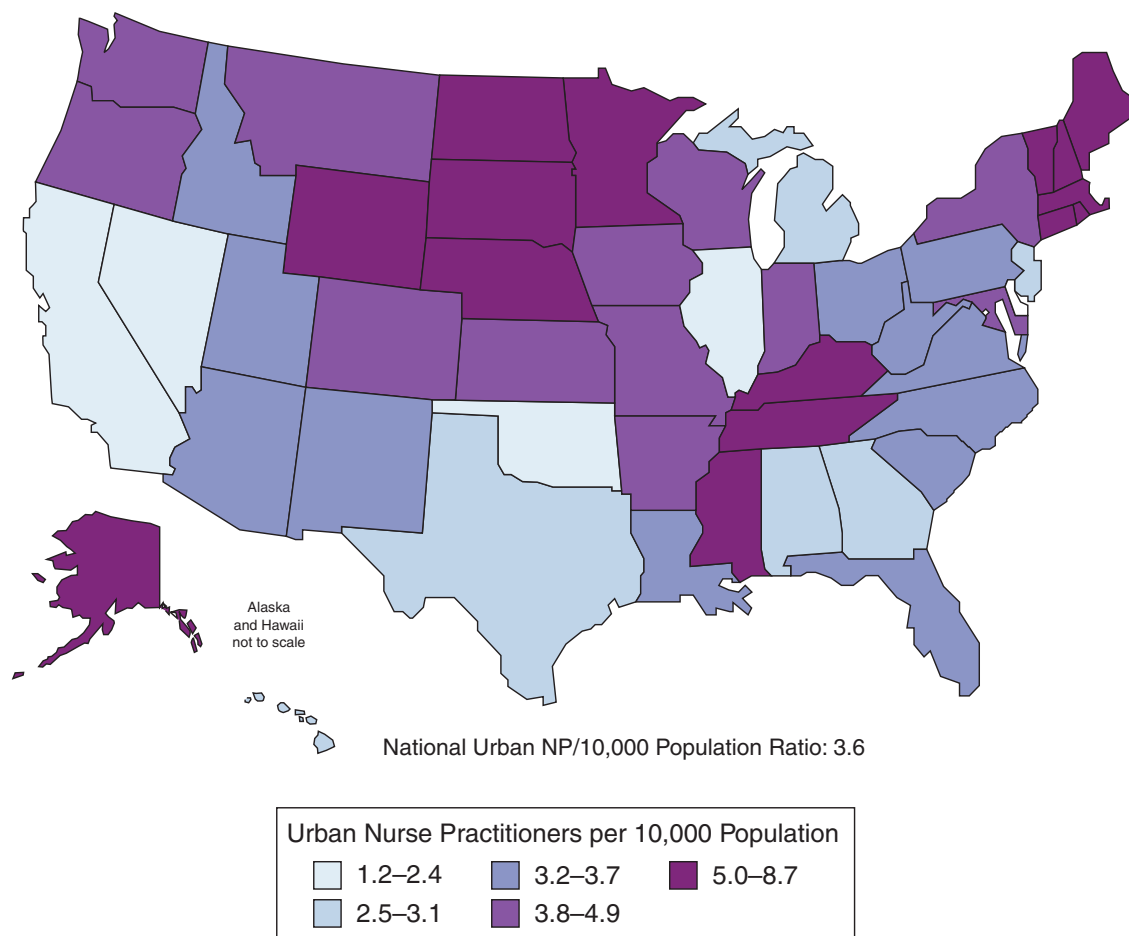NOTE: Map date: November 2011. NP = nurse practitioner.
SOURCE: Skillman et al., 2012. Data sources: March 2010 National Plan and Provider Enumeration System data file, 2011 Neilson/Claritas Population Estimates.

communication technologies to exchange personal health information and provide health care when distance separates the patients and providers (Hersh et al., 2006; IOM, 1996b). Among the more familiar telemedicine applications are specialist referral services and remote consultations, in which videoconferencing or teleconferencing abilities enable primary care physicians and/or community-based medical teams to consult with specialists who are working at other locations. Table 3-4 summarizes the current Medicare payments for telehealth.

Increasingly, the term *telehealth* is replacing telemedicine terminology with expanded definitions that refer to the use of technology-enabled delivery of services to facilitate the monitoring, diagnosis, treatment, management, care, and education of patients who are at a distance from the providers. Telehealth services are delivered through an increasing number of mechanisms such as videoconferencing, transmission of images, patient portals, consumer health education, remote monitoring of vital signs, and nursing call centers, and it is evolving toward remote provision of rehabilitation.
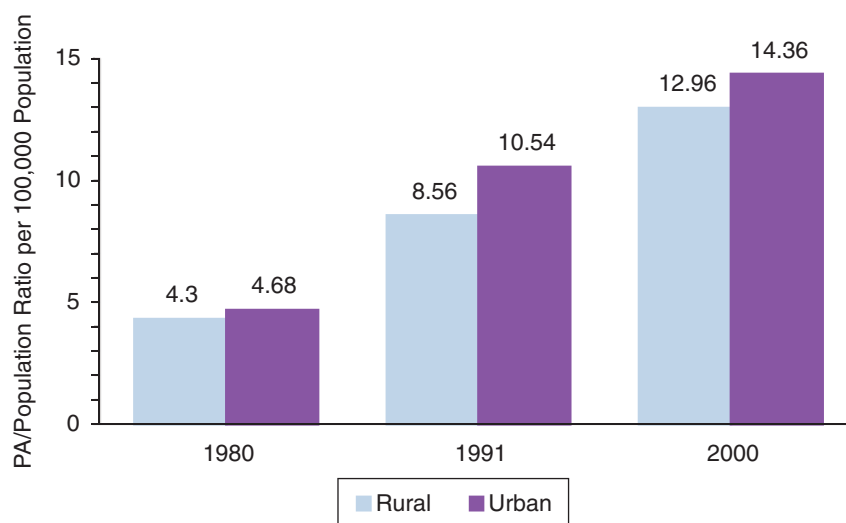
FIGURE 3-12 Growth of PAs per 100,000 population.
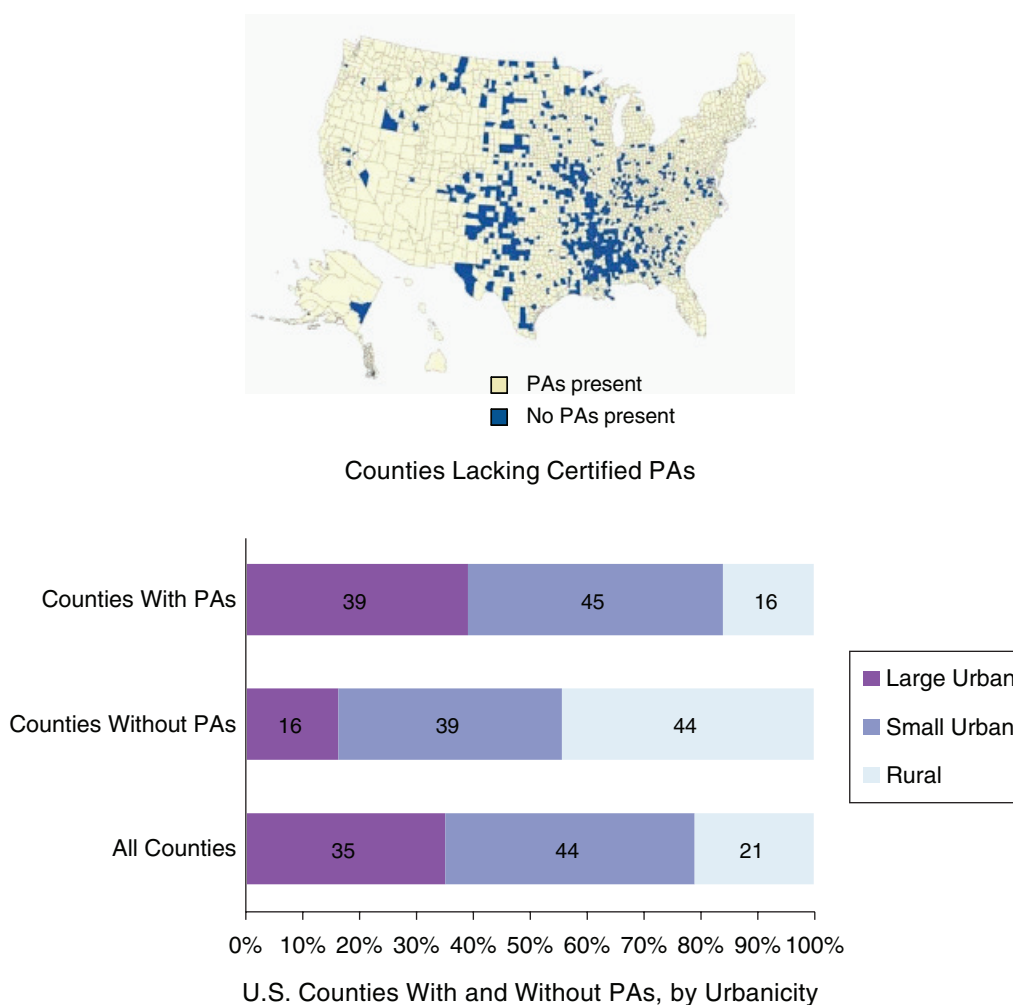NOTE: PA = physician assistant.
SOURCE: Larson and Hart, 2007.

As of October 2011, 13 states support telehealth technology to make payments consistent between health care services delivered in person and via telehealth. The most recent measure, approved in California in 2011, expands opportunities for telehealth with the specific goals of addressing inadequate provider distribution through increased use of telehealth services to help "reduce costs, improve quality, change the conditions of practice, and improve access to health care, particularly in rural and other medically underserved areas."[14] Before the California bill was passed, 12 states had already required all health benefit plans (i.e., except Medicare) to pay for covered services provided through telehealth. Nearly 50 recognized medical subspecialties now use telehealth services, ranging from teleradiology to teledermatology, teleophthalmology, telemental health, and telecardiology (Dixon et al., 2008).

"Store and forward" technologies, also referred to as asynchronous applications, are another prominent and popular type of service. These technologies are used to connect primary care providers and specialists via high-speed, high-definition communications systems without requiring the patient to be physically present. The applications enable specialists in one location to read and interpret images such as X-rays, retinal scans, high-resolution photos of dermatologic lesions and other images, and to report their findings in a timely manner to the health professionals requesting those services for their patients.

More than half of all Medicare beneficiaries have chronic medical conditions such as diabetes, arthritis, and kidney disease for which regular monitoring is becoming part of the standard of care. Patient monitoring, in which electronic devices are used to remotely collect and send real-time clinical data to a monitoring service, is increasingly being used to replace office or clinic visits or to supplement the use of visiting nurses (Hersh et al., 2006; Jones and Brennan, 2002). An increasing body of evidence shows that telemedicine/telehealth care management of beneficiaries with chronic diseases, such as diabetes and congestive heart failure, can help reduce access barriers related to geographic distance, weather, disability, lack of transportation,

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[14] California Assembly Bill 415, 2011.

Counties Lacking Certified PAs

U.S. Counties With and Without PAs, by Urbanicity

FIGURE 3-13 Counties with no PAs.
NOTE: PA = physician assistant.
SOURCE: Sutton et al., 2010.

or shortages of practitioners in rural areas and other medically underserved urban areas (Chan et al., 2006; Chou et al., 2007; Gellis et al., 2012; Palmas et al., 2008; Wootten et al., 2011). Because Medicare beneficiaries are particularly vulnerable to these barriers, expanded use of telemedicine-based care management services offers current opportunities for improving access (Jones and Brennan, 2002; Palmas et al., 2008).

Telehealth screenings offered in urban community settings offer an additional resource for improving access and health outcomes for at-risk individuals. A study of 341 participants at urban soup kitchens in New Jersey showed that high-resolution ophthalmic screenings (for offsite second-opinion image evaluation) provided effective detection of vision-threatening disease for high-risk individuals (Shahid et al., 2012). Positive findings were identified for 105 (31 percent) of individuals, of whom 78 percent were African American, 73 percent male, and 62 percent smokers. These positive screenings resulted in detection of glaucoma (34 percent),

TABLE 3-4 Medicare Payments for Telehealth Services

Who Does Medicare Reimburse?	*Where* Can Services Be Furnished?	*What* Services Does Medicare Pay For?
• Physicians • Nurse practitioners • Physician assistants • Nurse midwives • Clinical nurse specialists • Clinical psychologists • Registered dietitians or nutrition professionals	• Office of a physician or practitioner • Hospitals • Critical access hospitals (CAHs) • Rural health clinics • Federally Qualified Health Centers • Renal dialysis centers in hospitals or CAHs • Skilled nursing facilities • Community mental health centers	• Initial inpatient consultations or follow-up inpatient telehealth consultations for beneficiaries in hospitals • Office/outpatient visits, subsequent hospital care services (1 visit every 3 days at most) • Subsequent nursing facility services (1 visit every 30 days at most) • Kidney disease education services • Diabetes self-management training services • Health and behavior assessment and intervention • Individual psychotherapy • Pharmacologic management • Psychiatric diagnostic interview examinations • End-stage renal disease related services • Medical nutrition therapy • Neurobehavioral status examinations

SOURCE: CMS, 2012a.

cataract (21 percent), diabetic retinopathy (5 percent), and other findings. Community-based services such as these offer a particularly valuable service for low-income, homeless, and other medically underserved groups who, for a variety of reasons, face barriers to access.

Quality and Patient Satisfaction

Clinical differences in quality of care and patient experience are currently a major area of focus for reducing hospitalization readmission rates as a national policy goal. As discussed earlier in this chapter, hospital readmissions were estimated to cost Medicare $17.5 billion in 2004 (Jencks et al., 2009). Poor coordination of care following discharge from the hospital is among the recognized preventable causes of readmission (CRS, 2010).

Posthospitalization home monitoring with health coaching offers a mechanism for reducing readmissions, and in one study it was found to reduce rehospitalization by 72 percent (Weintraub et al., 2005). In a review of several telehealth technologies, the Veterans Health Administration found that they reduced the number of hospital bed days by 25 percent and hospital admissions by 19 percent (Darkins et al., 2008). These and other strategies for reducing readmission rates contribute to improved quality of care and patient satisfaction. Payment for remote telemonitoring services is required in 13 states, with outcomes showing that these services help to reduce readmissions (Duckett, 2011). A New York state study of diabetic patients also found that telemedicine/telehealth case management resulted in significant clinical improvements compared to usual sources of care and enabled the clinical teams to detect and remediate medically urgent circumstances more effectively (Izquierdo et al., 2007).

Expanding Infrastructure for Telehealth

While the lack of technology infrastructure has been previously identified as a barrier to adopting telehealth services, public investments are helping to steadily expand the availability of broadband access in rural communities. In 2006, for example, the Federal Communications Commission (FCC) established the Rural Health Care Pilot Program to encourage the develop-

ment and use of broadband networking services by health care providers serving rural communities throughout the nation. The goals of the initiative recognize that broadband networks can significantly improve rural Americans' access to health care information, consultation, and other telehealth services. In November 2007, the FCC selected 69 entities to participate in the pilot program. Entities eligible for support include (but are not limited to) not-for-profit hospitals, rural health care clinics, community health centers, postsecondary institutions offering health care instruction, including teaching hospitals and medical schools. Total funding for the 69 selected participants is approximately $417 million over 3 years (FCC, 2012).

The American Recovery and Reinvestment Act of 2009 (ARRA) made a historic investment in health information technology by providing billions of dollars in incentive payments for certain Medicare (and Medicaid) providers who adopt and become meaningful users of certified electronic health records (ONC, 2012). The primary goal of these and other federal major investments is to build the infrastructure and technical capacity to support the exchange of health information—whether through videoconferencing, home monitoring, remote reading of images, or other means—as tools for improving access and quality of care (Mostashari, 2010).

Although initial investments in special hardware and software for telemedicine/telehealth can be significant, especially for small groups or those in geographic locations where the technology infrastructure for broadband (Web-based communications) is not yet available, recent infrastructure investments are reducing previous barriers. The rapid increase in the availability of consumer electronics such as smartphones, the proliferation of free and low-cost health-related "apps," the increase in web-based tools for conferencing via laptops, and many other consumer friendly devices have also made telehealth far more technically accessible for beneficiaries, caregivers, and family members. While there are still some areas of the country where broadband is not available, and some beneficiaries many not have Internet access, the infrastructure required to support telehealth has been rapidly expanding.

Medicare Payment Provisions for Telehealth

It is important to emphasize that payment limitations are significant barriers to broader expansion and use of telehealth services. Medicare does, however, pay for telehealth services when provided by qualified providers to beneficiaries in rural areas (CMS, 2012a). Specifically, Medicare pays for a limited number of Part B services furnished at a distant site by physicians, NPs, PAs, clinical nurse specialists, and others, but only if the originating site is located in a rural HPSA or a county outside of a metropolitan statistical area (MSA).

Notwithstanding the transportation and mobility burdens faced by many elderly and disabled beneficiaries, individuals and facilities in medically underserved metropolitan areas are not eligible for Medicare payment for telehealth services. In commenting on the new CMS rules for accountable care organizations, the American Telemedicine Association called for a waiver to the current requirements so that 35 million beneficiaries in metropolitan areas could access video conferencing, and to permit telehealth services originating from a beneficiary's home, a hospice, or anywhere else a beneficiary might be located (ATA, 2011).

Under current payment provisions, an interactive telecommunications system must be used and permit real-time communication between the practitioner at the distant site and the beneficiary at the originating site. For these services, the use of a telecommunications system substitutes for an in-person encounter. Currently, as shown in Table 3-4, Medicare telehealth services include initial inpatient consultations; follow-up inpatient consultations for beneficiaries

in hospitals or skilled nursing facilities, office, or other outpatient visits; certain patient educational services (including kidney disease management and diabetes self-management); and a limited number of other services. Payment for asynchronous "store and forward" services is provided only in federal telehealth demonstration projects in Alaska and Hawaii and is otherwise not reimbursed (CMS, 2012a).

Under current payment provisions, originating sites include the office of an eligible practitioner, hospitals, rural health clinics, federally qualified health centers, hospital-based or critical access hospital-based renal dialysis centers, skilled nursing facilities, and community mental health centers. Originating sites are also paid a facility fee, which is separately billable under Part B. Services provided in other locations, including home health and hospice settings, are not eligible for reimbursement.

Credentialing of Health Care Providers

In May 2011, CMS reduced a significant barrier to providing telehealth services related to the credentialing of the practitioners by allowing the originating site's credentials to be recognized by the receiving site. Previously, CMS regulations had required that the facility receiving the telehealth services follow the same credentialing procedures as it would with its local practitioners. This was not only duplicative, but also burdensome on small facilities. These new CMS regulations are expected to expedite approvals of practitioners and reduce expensive and often cumbersome credentialing processes.

Conflicting scope-of-practice requirements in different states have also made credentialing difficult for some clinicians who were providing telehealth services to out-of-state facilities. The new requirements simplify the process by allowing the receiving hospitals and other facilities to rely on the credentialing and privileging decisions of other institutions. This change was described by CMS administrator Donald M. Berwick as "an innovative practice in delivering care to all patients, especially those in rural or remote parts of the country" (CMS Office of Public Affairs, 2011).

Expanding Opportunities in Telehealth

Although it is beyond the statement of task for this committee to identify best practices in telehealth, or to detail recent changes in state laws, opportunities clearly exist for expanding the use of telehealth technologies to improve access and quality of care for beneficiaries in settings and locations where services are needed. For example, as mentioned above, reimbursement for asynchronous "store and forward" technologies (i.e., involving the secure sharing and reading of images) is currently permitted only in federal demonstration programs in Alaska or Hawaii. Improving access to these services offers both an opportunity to expand the geographic reach of providers in a growing number of specialties and a valuable resource for primary care providers seeking those services for their patients. Expanded use of telemonitoring services, including home health monitoring, is another example that is proving successful in helping providers remain "connected" to their patients when they are at home or at a distance (Duckett, 2011). As described earlier in this section, although initial evidence of improved outcomes and patient satisfaction is positive, Medicare does not currently provide reimbursement for remote monitoring (also referred to as telemonitoring), nor does it include home health settings as approved "originating sites" for care—only as receiving sites (CMS, 2012a).

Finally, although Medicare does provide reimbursement for a limited number of telehealth services, this reimbursement is provided for services *only* when they are presented from an originating site located in a rural HPSA or in a county outside of an MSA. No reimbursement for services is provided for beneficiaries living in urban health professions shortage areas or for those who face other barriers to access, yet who may not live in a formally designated HPSA. Expanding the current list of authorized locations (e.g., to include urban health profession shortage areas) and sites of care (e.g., to include home health settings) offers further opportunities to improve access and to help ensure that the right care is provided, at the right time, and in the right place.

While there are significant concerns about the costs of the initial investments in the technology, technical challenges in using it, the security of personal health information transmitted over the Internet, the qualifications of the remote providers billing Medicare, the potential for legal liability issues, and potential competition with providers located at a geographic distance from beneficiaries, the benefits to patients of remote monitoring seem increasingly clear and worth further exploration. The Center for IT Leadership reported that savings owing to reduced transportation costs and face-to-face visits could potentially cover the cost of implementing telehealth (Dixon et al., 2008), and the New England Healthcare Institute (2009) estimated an annual national cost savings of up to $6.43 billion in reduced hospital readmission. AHRQ and HRSA have been funding telehealth research projects for several years (Dixon et al., 2008), and additional opportunities for demonstrations could be developed through the CMS Center for Medicare and Medicaid Innovation.

Scope of Practice

As the number of Medicare recipients increases due to demographic changes in the population, beneficiaries will have increasing needs to access primary and specialty care from qualified providers. Previous sections of this chapter documented the geographic variation in practice locations for certain primary care practitioners, showing that advanced practice RNs and NPs are more likely than physicians to provide primary care services and to choose to practice in shortage areas (AHRQ, 2011a,c; IOM, 2011; Skillman et al., 2012). Traditionally, discussions of workforce supply in primary care have focused on how to recruit and retain physicians into primary care rather than specialty care and to provide incentives for physicians to practice in underserved areas (Salinsky, 2010). As discussions of new care models have evolved, more attention is being paid to the functions and roles of members of care teams and to the nature and extent of their collaborations and working relationships. A particular area of concern and disagreement is whether physicians must always provide direct, onsite supervision to advanced practice RNs or nurse practitioners, physician assistants, pharmacists, and other licensed health professionals (National Health Policy Forum, 2011).

The scope of practice of various health professions is often seen solely as a disagreement over professional autonomy between physicians and other health professionals, but it is also a regulatory and payment policy issue (Safriet, 2011). The current scope-of-practice laws, credentialing requirements, and payment policies may be considered overly restrictive by health professionals who have been trained to provide certain services but who are prohibited from doing so by state laws or by payment policies. For example, states vary extensively on the independent authority of nurse practitioners to diagnose, order tests, and make referrals (UCSF Center for the Health Professions, 2007). Sixteen states and the District of Columbia have passed

laws granting full plenary authority for nurse practitioners to practice under their own license without requiring physician supervision or collaboration. The IOM (2010) report *The Future of Nursing* recommended a joint federal and state effort to establish standard practice acts, and a Josiah Macy Foundation report on primary care recommended removal of regulatory barriers inhibiting NP options (Cronenwett and Dzau, 2010).

Because the focus of this report is on geographic adjustment factors and how they affect both metropolitan and nonmetropolitan providers and access to care, it is important to note that issues related to scope of practice present some unique challenges for physicians, nurses, and other practitioners. Physicians in nonmetropolitan primary care practices, for example, may actually need to practice at a broader level than their metropolitan counterparts. NPs practicing in rural areas may find themselves the sole provider in a community, needing to practice to the fullest extent of their educational preparation, yet limited by a particular state's requirement of physician supervision that may be very difficult to achieve (Baker Institute, 2012; Safriet, 2011) (see Box 3-2).

Scope-of-practice issues and payment policies are also related. For some years now, Medicare Part B services provided by NPs are paid 85 percent of the amount physicians receive under the Medicare Fee Schedule for the same visit code. NPs may bill "incident to" a physician and receive 100 percent of the physician rate, but this assumes physician supervision and requires that the patient must have been seen first by a physician.

There are exceptions to these payment rules under federal programs. Rural Health Centers funded by CMS actually require an NP or PA to be part of the rural practice, and reimbursement is not differentiated or based on provider type. Federally Qualified Health Centers, under HRSA's Bureau of Primary Care, also have unique policies for practice and billing for primary care services which are not provider specific, but based on the service. Some of the new performance-based payment initiatives and care delivery models designed to improve the efficiency of health care delivery and care management also may also affect the mix of health care practitioners. For example, the primary care bonus payment to NPs and PAs only occurs when they are supervised by a physician. These new initiatives should be evaluated to determine their impact on interprofessional collaboration and health outcomes for beneficiaries (Baker Institute, 2012).

SUMMARY

Most Medicare beneficiaries have reasonably good access to care and most have a usual source of care. However, those who need to find a new primary care practitioner or specialist have some challenges. Minority beneficiaries in the most recent MedPAC beneficiary survey reported more problems finding specialists than in previous years, and that is a source for concern and additional monitoring in future surveys.

Quality of care for Medicare beneficiaries has been improving slowly over the past several years, but as is true with the rest of health care, it is still notable for wide geographic variation as well as racial and ethnic disparities in outcomes. Previous studies have identified strong regional patterns of performance, but the committee's recommendations are focused at the profession and practitioner levels. Analysis of CAHPS data conducted for this report found that metropolitan areas tended to do better on measures of timeliness of access to care, while nonmetropolitan areas scored higher on communication with physicians and overall satisfaction with physicians. There was little evidence in the analysis to suggest that the committee's Phase I recommendations, if implemented, would have a systematic impact that would either favor or disadvantage

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BOX 3-2
State Variations in Nurse Practitioners' Scope of Practice

The issue of restrictive state practice influencing where NPs practice is unique to NPs in that there is such wide variation by state as to regulation. Currently 16 states and the District of Columbia (see below) allow full plenary authority to NPs, meaning that they have independent authority to practice and to write prescriptions in clinical practice. These states tend to be inclusive of large rural areas (e.g., Alaska, Hawaii, Iowa, North Dakota, Oregon, and Washington). However, there are states with significant rural areas and provider shortages that have very restrictive regulations for NPs (e.g., Georgia and Alabama) where such regulations may be impacting the workforce and numbers of potential providers.

Additionally, findings indicate that states with more progressive regulations actually have higher enrollments in NP programs compared to those with more restrictive laws (Kalist and Spurr, 2004). The more restrictive states also lose potential NPs to states that have more progressive practice acts and regulations that govern NP practice (Wing et al., 2005). The jurisdictions granting full plenary authority to NPs are

- Alaska
- Arizona
- Colorado
- District of Columbia
- Hawaii
- Idaho
- Iowa
- Maine
- Montana
- New Hampshire
- New Mexico
- North Dakota
- Oregon
- Rhode Island
- Vermont
- Washington
- Wyoming

SOURCE: AANP, 2011.

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geographic areas based on their current levels of performance related to access and timeliness of care or quality. However, quality measurement is not a definitive science, and much more needs to be learned about the relationships between payment and quality.

It seems apparent that there are geographic pockets with persistent access and quality problems for Medicare beneficiaries, and that many of these pockets are in medically underserved rural and inner metropolitan areas. However, geographic adjustment of Medicare payment is not an appropriate approach for addressing problems in the supply and distribution of the health care workforce. The geographic variations in the distribution of physicians, nurses, and physician assistants and local shortages that create access problems for beneficiaries need to be addressed through other means.

FINDINGS

1. Racial and ethnic minorities and low-income individuals face more barriers when trying to access care and receive a lower quality of care.
2. Health Professional Service Areas are the prevailing standard for representing underserved areas and thus are useful for comparing access, quality, and workforce supply across

geographic areas. Racial and ethnic minorities tend to be overrepresented in Health Professional Service Areas.

3. The available evidence does not show a strong positive relationship between changes in the level of payment and quality of care at the geographic level.
4. The geographic areas used for payment adjustment are large relative to the locations of specific underserved populations. Thus, geographic payment adjustment is a blunt instrument for resolving these more localized disparities and is not sufficiently targeted to be an appropriate use of resources.
5. General surgeons tend to have different patterns of practice in metropolitan and nonmetropolitan areas. Those in nonmetropolitan areas tend to provide more trauma and critical care for small hospitals.
6. Adequate access to primary care services is essential to a well-functioning health care system.
7. Nurse practitioners and physician assistants comprise major portions of the primary care workforce. They also provide a great deal of subspecialty and procedural care that also benefits beneficiaries.
8. Access to high-quality primary and specialty care for beneficiaries in medically underserved metropolitan and nonmetropolitan areas would be improved by increasing the availability and use of telehealth technologies.
9. The supply of and access to primary care services in underserved areas could be improved if state licensing and credentialing laws were consistent and allowed the full primary care workforce to practice to their full scope of educational preparation.

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4

Programs and Policies to Improve Access and Quality of Care for Beneficiaries

INTRODUCTION

This chapter examines available evidence on the extent to which various programs and policies have influenced the ability of U.S. communities to attain adequate access to services appropriate to meet their health care needs. Previous chapters have established that access to high-quality health care services, including primary care services delivered by physicians and other practitioners, is not uniform across the United States. The health care workforce varies in size relative to population, and it varies in composition both across and within metropolitan and nonmetropolitan areas. In spite of this variability, broadly speaking, access to health services and Medicare beneficiary satisfaction with access are generally adequate and comparable in rural and urban areas.

The differences in health workforce size, distribution, and composition have been recognized for many years, and programs have been developed, mostly within the Public Health Service, to address them. The evidence reviewed by the committee suggests that geographic access to health care services has been improving, most likely as a result of market forces as well as various workforce policies, but that the distribution of practitioners continues to be a concern (Ricketts and Randolph, 2007, 2008; Rosenthal et al., 2005).

At the same time, factors that affect practitioner compensation, including payment policies of the Medicare program, may also have had an effect on the health care workforce's ability to provide acceptable access in different geographic areas. Among the newest Medicare payment policies are those that move practitioner compensation from traditional fee-for-service models to bundled payments and other incentives for care teams to coordinate care across organizations and settings. These policies are encouraging new delivery models that are intended to improve efficiency and provide a better quality of patient experience, but their likely influence on the workforce supply, distribution, and training programs is not yet clear.

In the statement of task for Phase II, the committee was asked to evaluate and consider the effect of the geographic adjustment factors on the level and distribution of the health care

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workforce, including recruitment and retention, mobility between urban and rural areas, and the ability of hospitals and other facilities to maintain an adequate and skilled workforce in order to maintain access for beneficiaries. The committee was also asked to consider the effect of the adjustment factors on population health, quality of care, and the ability of providers to furnish efficient, high-value care.

Historically, policies and programs supported by the Centers for Medicare & Medicaid Services (CMS) and the Health Resources and Services Administration (HRSA) have sought to improve access to care in many different ways. In general, however, the policies have influenced the workforce directly, through training programs and payment policies to increase supply, or they have been targeted to maintain access through influencing the geographic distribution of facilities and health professionals. Medicare payment policies have also been tied to quality improvement for several years, originally for hospitals and increasingly also for ambulatory care and primary care providers, primarily physicians. The committee did not find sufficient evidence about the effect of payment policies on population health and high-value care to be able to include in its review, but it did discuss value-based purchasing and the workforce implications of new models of care that focus on care coordination.

Given the breadth of the committee's charge, the committee chose to do a targeted review that focused on Medicare payment policies to address access, quality of care, and workforce supply and distribution and that also have a geographic component, such as a comparison of metropolitan and nonmetropolitan areas. This chapter begins with a review of Medicare policies and programs intended to promote beneficiaries' access to hospital and primary care services provided by a variety of health professionals, and then it reviews policies intended to promote quality of care. The chapter then reviews workforce programs intended to improve the geographic distribution of practitioners through recruitment and retention efforts, focusing on program evaluations and other evidence that the programs are successful in improving access, especially in Health Professional Shortage Areas (HPSAs). The chapter then discusses the many gaps in the evidence it reviewed and the need for a coordinated approach to collecting workforce data, designing programs, and setting national workforce targets and goals. The chapter closes with the committee's findings related to access, quality of care, and workforce programs and policies.

MEDICARE PAYMENT POLICIES INTENDED TO MAINTAIN ACCESS TO HOSPITAL CARE

Given the committee's focus on the impact of geographically based payment adjustments on access in medically underserved areas, hospitals that are important or sole sources of hospital care for Medicare beneficiaries were of particular concern. Medicare's payment policies that are intended to preserve access to hospital care in geographically isolated areas focus on five types of hospitals: critical access hospitals, sole community hospitals, Medicare-dependent hospitals, low-volume hospitals, and rural referral centers (see Table 4-1). However, the policies that apply to these hospitals tend to be inconsistent, and there is no mechanism for ensuring that the policies serve their stated purpose.

Nearly 1,300 hospitals have been designated as critical access hospitals, based on their size and the lack of another hospital within a specified distance.[1] The critical access program is

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[1] Medicare Payment Advisory Commission. Payment Basics: Critical Access Hospitals Payment System, revised October 2011. Available at http://www.medpac.gov/documents/MedPAC_Payment_Basics_11_CAH.pdf. Critical access hospitals are limited to 25 acute care beds and must be at least 35 miles by primary road or 15 miles by secondary road from the nearest hospital; until 2006, hospitals also could qualify as critical access hospitals if they were designed a "necessary provider" by their state.

TABLE 4-1 Access to Hospital Care in Geographically Isolated Areas

Type of IPPS Hospital	Eligibility Criteria	Payment Adjustment
Critical access hospital (CAH)	**A Medicare participating hospital is eligible if it meets the following criteria:** 1. It is located in a rural area; 2. It is located either more than 35 miles from the nearest hospital or CAH or more than 15 miles in areas with mountainous terrain or only secondary roads; 3. It maintains no more than 25 inpatient beds; 4. It maintains an annual average length of stay of 96 hours or less per patient for acute inpatient care; or 5. It furnishes 24-hour emergency care services 7 days per week.	The CAH is paid for most inpatient and outpatient services at 101 percent of its Medicare-allowable costs.
Sole community hospital (SCH)	**A hospital must meet one of the following criteria:** 1. It is at least 35 miles from other acute care hospitals; 2. It is located in a rural area 25–35 miles from another acute care hospital, and it accounts for at least 75 percent of Medicare discharges in its service area; 3. It is located in a rural area between 15 and 25 miles from other acute care hospitals that are inaccessible at least 30 days each year because of local topography; or 4. It is located in a rural area and the travel time between the hospital and the nearest acute care hospital is at least 45 minutes.	The SCH is paid whichever amount results in the greatest aggregate payment in a cost reporting period: 1. The applicable IPPS rate, or 2. A hospital-specific rate based on the hospital's Medicare-allowable highest cost per discharge in FY 1982, 1987, 1996, or 2006 (adjusted for input price inflation and case mix)—whichever is highest.
Medicare-dependent hospital (MDH)	**For discharges occurring before October 1, 2012, a hospital must meet all of the following criteria:** 1. It is located in a rural area; 2. It has 100 or fewer beds; and 3. At least 60 percent of its inpatient days or discharges were attributable to Medicare beneficiaries during its cost-reporting period ending in FY 1987 or FY 1988 or for at least two of the last three most recent cost-reporting periods.	An MDH is paid whichever of the following amounts results in the greatest aggregate payment in a cost reporting period: 1. The applicable IPPS rate, or 2. The applicable IPPS rate plus 75 percent of the difference between the IPPS rate and the hospital's updated hospital-specific rate (as described above) based on its Medicare-allowable costs per discharge in FY 1982, 1987, or 2002.
Low-volume hospital	**To qualify as a low-volume hospital a hospital must meet both of the following criteria:** 1. It is at least 25 road miles from the nearest acute care hospital; and 2. It had fewer than 200 total discharges in the most recent year for which data are available. For FY 2011 and FY 2012, the volume and distance criteria were loosened considerably.	Low-volume hospitals with 200 or fewer total discharges receive a 25 percent increase in their Medicare payments.

continued

TABLE 4-1 Continued

Type of IPPS Hospital	Eligibility Criteria	Payment Adjustment

Rural referral center (RRC)	**To qualify as an RRC, a hospital must meet one of the following criteria:**
	1. It has 275 or more beds;
	2. It meets all three of the following criteria:
	  a. At least 50 percent of the hospital's Medicare patients are referred from other hospitals or from physicians who are not on the staff of the hospital;
	  b. At least 60 percent of the hospital's Medicare patients live more than 25 miles from the hospital; and
	  c. At least 60 percent of all services the hospital furnishes to Medicare patients are furnished to patients who live more than 25 miles from the hospital; or
	3. It is located in a rural area and
	  a. Its case-mix index in the year prior to seeking eligibility is at least equal to the lower of the median CMI value for all urban nonteaching hospitals nationally or in the hospital's region;
	  b. It had at least 5,000 discharges or the median number of discharges for urban hospitals in the census region in which the hospital is located, if lower. For an osteopathic hospital, its number of discharges is at least 3,000; and
	  c. Either (i) more than 50 percent of the hospital's active medical staff are in specialties, or (ii) at least 60 percent of its inpatients live more than 25 miles from the hospital, or (iii) at least 40 percent of inpatients are referred from other hospitals or from physicians not on the hospital's staff.
		Relative to other rural hospitals:
		1. There is a 12 percent cap on additional payments other hospitals can receive for serving a disproportionate share of low-income patients; an RRC is not subject to that cap on those payments.
		2. An RRC has less stringent requirements for geographic reclassification.

NOTE: CMI = case-mix index; FY = fiscal year; IPPS = Inpatient Prospective Payment System.

designed to maintain access to emergency care and limited hospital inpatient services in isolated rural communities that are unable to support a full-service hospital. Critical access hospitals are paid based on their current Medicare allowable costs; because the committee's recommendations apply only to those hospitals that are paid under Medicare's inpatient prospective payment system for hospital services, critical access hospitals are not affected by the committee's recommendations on the hospital wage index.

The special protections afforded to about 400 sole community hospitals are intended to support their unique role in providing access to inpatient hospital care to the residents of a geographic area. Medicare's payment to sole community hospitals is based on the higher of the applicable standard Inpatient Prospective Payment System (IPPS) rate or a hospital-specific rate derived from the hospital's own historical costs updated for inflation (using the Medicare hospital market basket index) and adjusted for case-mix changes. Sole community hospitals

currently paid at their hospital-specific rate generally are not affected by the committee's recommendations; for sole community hospitals that currently are paid their standard IPPS rate, the committee's recommendations could reduce or increase their payments, but in any case they could not be paid less than their hospital-specific rate.

The approximately 160 Medicare-dependent hospitals are afforded similar but more limited protection, to recognize their presumed inability to cover any difference between their Medicare costs and the standard IPPS rates. If the IPPS rate is lower than the hospital-specific rate (derived as for sole community hospitals, as described above), a Medicare-dependent hospital is paid 75 percent of the difference between the IPPS rate and its higher hospital-specific rate. Unlike critical access hospitals and sole community hospitals, Medicare-dependent hospitals are not designated based on the lack of alternative sources of care available to Medicare beneficiaries, but only on their small size and high proportion of Medicare patients. As a result, this program is not as well targeted to preserving access to care in geographically isolated areas.

The rural referral hospital designation was established when it was determined that large rural hospitals that served as tertiary referral centers were disadvantaged by IPPS rate-setting policies that did not adequately account for their more complex patient population and infrastructure costs. Rural hospitals received a lower standard payment rate than urban hospitals; the patient classification system used to determine payment did not adequately account for differences in severity; and the hospital wage index reflected relative wage levels with no occupational mix adjustment. The current prospective payment system, however, applies the same payment rate to hospitals located in rural areas and urban areas with less than 1 million population, has improved its ability to account for differences in patient severity, and provides for a limited occupational mix adjustment to the hospital wage index (which the committee's recommendations would further improve). The approximately 130 rural referral centers also benefit from less stringent geographic reclassification standards (which the committee's recommendations would eliminate, in any case) and they also may receive higher disproportionate share payments than small urban and most other rural hospitals. The changes in Medicare payment over time would seem to weaken the rationale for the establishment of this category of hospitals for purposes of payment.

The Medicare Modernization Act of 2003 established a payment enhancement for low-volume hospitals located more than 25 road miles from another hospital and having fewer than 800 total discharges. On the grounds that they cannot achieve the economies of scale and scope of larger hospitals and therefore tend to have higher costs per discharge, they can receive up to a 25 percent increase in their IPPS payments based upon volume.

While these payment policies may be intended to preserve access to needed hospital care, they could potentially be better targeted to efficiently and effectively meet this objective. For example:

- The standards used to identify geographically isolated hospitals vary from one provision to another. The definition of road miles has been standardized, but the number of road miles differs from 35 miles under the sole community hospital policy to 25 miles under the permanent low-volume adjustment (and 15 miles under the temporary policy). The criteria for sole community hospitals consider the reliance of Medicare beneficiaries on the hospital while the low-volume adjustment criteria do not. Some hospitals receiving the low-volume adjustment may not be needed to preserve Medicare beneficiary access to care.

- There is no periodic review to confirm whether hospitals designated as sole community hospitals and rural referral centers continue to meet the qualifying criteria for the higher payments. Moreover, rural referral centers located in a county that is redesignated from rural to urban by the Office of Management and Budget are permitted to retain their rural referral designation regardless of whether there are other hospitals in close proximity.
- In general, several of these policies may not be fulfilling their intended purpose. The hospital-specific rate for a sole community hospital is based on the highest cost per discharge from 1982, 1987, 1996, or 2006 updated for inflation in input prices. Using a hospital's costs in a more recent year to establish the hospital-specific rate would result in a better match between the hospital's current cost structure and Medicare's payment amount. As described above, the rationale for rural referral centers is substantially weaker than it was when the IPPS was first implemented. With regard to the low-volume adjustment, the temporary discharge criterion based on Medicare (rather than total discharges) eliminates the empirical underpinning for the adjustment and disadvantages hospitals with high Medicare utilization relative to hospitals of comparable size with low Medicare utilization rates.
- There is some redundancy among the policies. Sole community hospitals (and Medicare-dependent hospitals) are eligible to receive a low-volume adjustment on their hospital-specific rates as well as their IPPS rate. Because the former should already reflect the cost effect of providing a low volume of services, a low-volume adjustment to the hospital-specific rate is unnecessary.

The committee is concerned that these considerations diminish the effectiveness of Medicare policies in ensuring access of Medicare beneficiaries in different areas to appropriate care.

PROGRAMS THAT ENCOURAGE CLINICAL PRACTICE IN UNDERSERVED AREAS

Community Health Centers

Since 1965, the U.S. government has funded community health centers (CHCs) to provide primary care services to underserved populations in metropolitan and nonmetropolitan areas, including low-income and uninsured populations. More than 1,100 CHCs operate more than 8,100 delivery sites that care for a total of 19.5 million individuals in every state, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and the Pacific basin (HRSA, 2012d).

As of 2006, primary care physicians accounted for 89 percent of all physicians working in CHCs (Rosenblatt et al., 2006). CHCs also rely on advanced practice nurses and physician assistants (PAs) for staffing. In 2010, CHCs employed more than 131,000 staff nationally, including 9,600 physicians; 6,400 nurse practitioners (NPs), physician assistants, and certified nurse midwives; 11,400 nurses; 9,500 dental staff; 4,200 behavioral health staff; and more than 12,000 case managers, health educators, outreach workers, and transportation staff (UDS, 2012; The White House, 2012).

CHCs substantially rely on the incentives for health professionals to work in these settings provided by loan forgiveness programs and J-1 visa waivers, which will be discussed later in this chapter. In 2006, CHCs had large numbers of unfilled positions, notably for family physicians, obstetricians/gynecologists, and psychiatrists (Rosenblatt et al., 2006).

A substantial amount of research has been conducted on quality of care in CHCs, but there

are no direct comparisons of CHC quality relative to comparison groups of private practices. The limited evidence that exists indicates that quality of chronic disease care is comparable to other settings (e.g., Hicks et al., 2006; Landon et al., 2006). However, similar to general practices, the quality of care in CHCs varies across settings, with some outcomes comparable to national benchmarks, while others do not always meet quality-of-care standards and guidelines (Chin et al., 2000). Studies of CHC interventions to improve clinical workflow and patient education for diabetes patients have resulted in some improvements in clinical outcomes (Chin et al., 2007).

Area Health Education Centers

Area Health Education Centers (AHECs) recruit, train, and retain health professionals to work with underserved populations by developing partnerships among medical, nursing, and allied health schools to help meet local health care needs (HRSA, 2012c). Fifty-nine AHEC programs and more than 245 rural and urban centers operate in 48 states, 2 territories, and the District of Columbia.

The federal government has supported AHECs since 1971 and administers the program through HRSA. The AHEC program grantees are medical and nursing schools who contract with CHCs to provide clinical rotations and training opportunities for health professionals who seek experience providing clinical care, health education, and preventive services for underserved communities. They also provide infrastructure and a combination of support services, including medical library resources, continuing education courses, and telecommunications technology linking clinical practices in rural areas with personnel in an academic medical center or nursing school.

The Office of Inspector General (OIG) (1995) of the Department of Health and Human Services (HHS) conducted a short-term management and program evaluation of four AHECs in Arkansas, Florida, and Texas. The key results, somewhat dated given that the evaluation was performed over 15 years ago, were that the AHECs were responding to clinical needs of practitioners in rural areas but that there was a need for greater emphasis on educating practitioners about innovations in health care delivery, such as clinical practice guidelines, and opportunities for use of telecommunications technology already available at the time were not being sufficiently used.

To the committee's knowledge, there has been no systematic evaluation of AHECs, although there are qualitative reviews of specific aspects of particular programs (see e.g., Rooks et al., 2001) on a primary care preceptorship for first-year medical students coordinated by an AHEC based at the University of Florida.

Incentive Payment Program for Primary Care Services in HPSAs

A total of almost 60 million Americans, or about one in five, live in geographic areas that are designated as primary care shortage areas (HRSA, 2012a). Since 1987, Section 1833(m) of the Social Security Act has provided bonus payments for all services for physicians in locations designated as primary medical care HPSAs under Section 332 (a)(1)(A) of the Public Health Service Act. In 1991, the original 5 percent bonus was increased to 10 percent. This bonus is applied to cover Medicare Part B services provided in designated geographic HPSAs. For claims with dates of service on or after July 1, 2004, psychiatrists providing services in mental health HPSAs are also eligible to receive bonus payments.

From 2011 through 2015, participating Medicare Part B primary care practitioners will receive an additional bonus payment equal to 10 percent of the amount paid for primary care services.[2] Eligible primary care practitioners include physicians (family medicine, internal medicine, geriatric medicine, or pediatric medicine), NPs, clinical nurse specialists, and PAs. In addition, the primary care services they provide must account for at least 60 percent of allowed charges under the Physician Fee Schedule in order to receive the 10 percent bonus payment (CMS, 2011b). The threshold for the bonus excludes some clinicians who see fewer Medicare patients and provide services to fewer beneficiaries than CMS requires.

There has been very little empirical research on HPSA bonuses. One study by Chan et al. (2004) used Medicare Part B claims data for 1998 to assess amounts paid under the 1991 10 percent bonus program and reached two important conclusions. First, amounts paid were small, which could be expected to limit incentive effects of the program. Second, many claims that could have been subject to the bonus had no bonus payments, and many bonus payments that should not have been paid were paid. Shugarman and Farley's (2003) study contributed additional evidence on the small size of the 1991 bonus program, documenting that bonus payments constituted about 1 percent of total Part B payments for services in rural, underserved areas. Given its small size, important effects on HPSA practitioner workforce could not be expected, and the same may be true of the Affordable Care Act bonus program. Given that the more recent bonus payments have only been available for about a year, it is too early to evaluate their effects on the primary care workforce. However, any temporary bonus can be expected to have a much lower effect on a clinician's location choice than a permanent bonus, because of the length of time often involved in making location decisions.

HPSA Surgical Incentive Payment (HSIP)

The Affordable Care Act of 2010, Section 5501 (b)(4) provides bonus payments for general surgeons in HPSAs. Effective 2011 through 2015, physicians serving in designated HPSAs will receive an additional 10 percent bonus for major surgical procedures within a 10- or 90-day global period (CMS, 2011b). This additional payment, referred to as the HPSA Surgical Incentive Payment (HSIP) will be combined with the original HPSA payment and will be paid on a quarterly basis.

HSIP is intended to provide incentives for general surgeons in medically underserved areas, as they make it possible for many of the nation's smallest and most remote hospitals to provide services (Hagopian et al., 2003). Many rural towns can lose non-hospital-employed physicians as well as those employed by hospitals after their hospitals close (Hart et al., 1994). Similar to the Affordable Care Act primary care bonus program, studies of the effects of the Affordable Care Act provision on the general surgery workforce are not yet available.

Methodological Questions About Provider Distribution

Current official measures of the distribution of physician personnel and by inference, geographic access to physicians' services, such as HPSAs, are based on county boundaries. County

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[2] The bonus provisions were described in the Affordable Care Act of 2010. See http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HPSAPSAPhysicianBonuses/index.html?redirect=/hpsapsaphysicianbonuses.

boundaries were established historically and are at best imprecisely related to medical market areas, because beneficiaries routinely cross county and other boundaries to obtain care.

Using data from 23 states with relatively low physician-to-population ratios compared to the other 27 states, and assuming that people seek care from nearby primary care physicians, Rosenthal et al. (2005) found that few persons would have relied on primary care physicians with caseloads in excess of federal guidelines for HPSAs in 1999 (i.e., caseloads exceeding 3,500 patients per physician). In particular, only 11 percent of individuals residing in rural counties adjacent to metropolitan areas would have obtained care from primary care physicians with caseloads exceeding this threshold.

For residents of rural counties not adjacent to metropolitan areas, Rosenthal et al. (2005) estimated that 7 percent saw primary care physicians with caseloads above the threshold represented in the federal HPSA guidelines. The authors took the position that many individuals in counties adjacent to metropolitan areas obtain care from providers in the metropolitan areas and hence should not be attributed to providers in their counties of residence. For this reason, the caseload burden in such counties is actually lower than their calculations imply.

Thus, using an alternative assumption about individuals' travel to care, meaning they travel further than was assumed in the baseline calculations, reduces variation in caseloads by area, which implies less of a geographic maldistribution of providers. In other words, because so many individuals are willing to travel to see practitioners in both urban and rural locations, it is very difficult to estimate whether or not there is a maldistribution of clinicians on the basis of provider location alone.

Other results in the Rosenthal et al. (2005) study also raise issues about the strength of the relationship between provider location and availability of care. For one, residents of very rural counties had to travel 5 miles on average to the nearest general or family practitioner. The nearest specialist in internal medicine was slightly over three times further away, and physicians in specialties with fewer practitioners (e.g., ophthalmology and neurology) were even further away. Primary care physicians locate their practices in communities of all sizes, so a close link would be expected between primary care availability, especially general and family practitioners, and access to primary care services. By contrast, the geographic locations of physicians in smaller fields such as subspecialty care tend to be limited to communities with larger population sizes.

Availability of care depends on many factors, including work hours—total and scheduled hours, staff size and variety of personnel, willingness to accept new patients, including Medicare beneficiaries, and many others. As Rosenthal et al. (2005) pointed out, there are some limitations to their study. First, as they acknowledge, the American Medical Association Masterfile, which the authors used for data on the location and specialty of physicians, is a headcount. Second, they made assumptions about travel patterns for care but did not observe actual patterns. Any measure of central tendency, such as mean distance between a place of residence to the nearest physician, obscures important variation. For example, although it is important to know that a mean travel distance is 5 miles, travel is going to be much longer for those who live in isolated rural communities. Finally, workforce policies of the U.S. government may reduce differences in ratios of health professional personnel relative to population. By excluding federal physicians and other federal clinicians from their analysis, Rosenthal et al. (2005) may actually have overstated geographic variation in these ratios.

The Rosenthal et al. (2005) study makes an important contribution in raising questions about the degree of geographic maldistribution of physicians and in emphasizing the limitations of using counties as units for calculating shortages. As a matter of policy and practice, however,

additional studies will be needed to fully understand the range of influences on individual willingness to travel to see providers, and policy makers will need to conduct further studies and consider setting national distribution targets for the workforce in order to determine the extent of shortages.

CURRENT PROGRAMS TO IMPROVE QUALITY

As discussed in Chapter 3, HHS uses a core set of evidence-based quality measures to make standardized comparisons of the quality of care for different groups and regions (AHRQ, 2010). Quality measures include process measures, which are derived from administrative or claims and clinical data and measure the delivery of care; and outcome measures, which are often disease specific and include clinical outcomes as well as patient experience and satisfaction with the care team and the care setting. Hospital reporting on quality measures has been under way for several years, while primary care quality reporting is in earlier stages. However, several policies tie payment to performance on quality measures.

Hospital Inpatient Quality Reporting Program

For the past 6 years, CMS has been administering the Hospital Inpatient Quality Reporting Program,[3] which is designed to incentivize IPPS hospitals, through Medicare Part A payments, to report their quality of care measures to CMS (CMS, 2009). In 2010, participating hospitals were required to report 42 quality measures, including 30-day mortality and 30-day risk-standardized readmissions on three specific medical conditions,[4] patient safety indicators and hospital-acquired conditions, and patient satisfaction data (CMS, 2011c).[5]

Hospital patient satisfaction data are collected from each hospital by administering the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. Developed by CMS and AHRQ, the HCAHPS is a national standardized survey that asks discharged patients 27 questions about their recent hospital stay (HCAHPS, 2012). Since 2008, each hospital has been responsible for administering the survey to a random sample of adult patients (18 years of age and older) between 48 hours and 6 weeks after discharge.

Participating hospitals that fail to report the 47 quality measures and the HCAHPS patient satisfaction data receive a 2 percent reduction in their annual market-based update in Medicare payment. In FY 2011, only 47 IPPS hospitals (or less than 5 percent of all IPPS hospitals) chose not to participate in the quality reporting program and therefore received a 2 percent reduction in their annual market-based update in Medicare payment (CMS, 2011d).

Hospital Readmissions Reduction Program

New Medicare payment policies are targeting payments to help reduce overall Medicare spending while maintaining or improving the quality of care. Based on evidence from pilot programs, demonstration projects, and expert consensus, these policies reflect a combina-

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[3] As mandated by mandated by Section 501(b) of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003.

[4] The three conditions are heart attacks, heart failure, and pneumonia—the three most common medical conditions of hospital-admitted Medicare beneficiaries.

[5] Starting in 2013, each quality measure specified by the Secretary of HHS must be endorsed by a contracted consensus entity (currently the National Quality Forum) (P.L. 111-148).

tion of financial incentives for desired performance and penalties for poor performance or nonparticipation.

The first efforts at quality reporting and monitoring began with hospital services, which represent a relatively large share of Medicare outlays. In 2008, spending on hospital inpatient care came to $129.1 billion, or 29 percent of total Medicare payments that year. Despite such high spending, the quality of care was deemed not adequate for beneficiaries who had multiple chronic conditions and see multiple practitioners. Readmission rates varied substantially across the country, even after controlling for the severity of illness (Jencks et al., 2009). For example, Illinois, Louisiana, and New Jersey readmission rates approach 22 percent, while Idaho, Oregon, and Utah were between 13 and 16 percent (CRS, 2010).

Between 2003 and 2004, 19 percent of Medicare beneficiaries who were admitted to a hospital were readmitted within 30 days (Hansen et al., 2011; Jencks et al., 2009). The total cost of all rehospitalizations within 30 days has been estimated at $44 billion (Jencks, 2010), and MedPAC (2007) has estimated that 75 percent of these hospitalizations may be avoidable; preventing them could save Medicare $12 billion a year. Factors contributing to preventable hospital readmissions include poor coordination between different care settings (e.g., hospitals, skilled nursing facilities, outpatient clinics), such as a lack of follow-up appointments after discharge (Jencks et al., 2009), as well as lack of assistance and support for frail beneficiaries at home as they recover.

As part of a major national policy initiative, CMS made 30-day readmission rates publicly available on its Hospital Compare website in 2010 to try to bring increased attention to this measure of quality of care, which reflects not only the quality of inpatient care but the ability of the care system to coordinate postacute care as patients transition across settings, such as from hospital to nursing home to home.

Readmission rates have been found to vary by hospital and by geographic area, even for the same level of severity for the same disease. This variation suggests that some readmissions could be prevented if there were better care management, particularly at discharge as beneficiaries transition to other care settings, such as their homes, skilled nursing facilities, or other postacute care (CRS, 2010). Beginning in 2013, CMS will reduce Medicare Part A payments for hospitals with higher than expected risk-adjusted readmission rates for three conditions: heart attack, heart failure, and pneumonia (CMS, 2011h). Medicare payments will be reduced by an adjustment factor based on the ratio of aggregate payments for excess readmissions (determined as a function of spending) to aggregate payments for all discharges.

Over time, Medicare plans to expand this program to include other common diagnoses, which will be good for beneficiaries and for Medicare. However, there are no economic incentives for hospitals to reduce Medicare readmissions, and the financial penalties may not be strong enough to make a business case for improving quality. It remains to be seen whether other models such as bundled payments and "single-episode prices" may be more effective in improving efficiency and patient experience while lowering costs (Berenson et al., 2012).

Of further concern, African American and Hispanic beneficiaries are more likely to be rehospitalized for preventable conditions than are white beneficiaries. An analysis of hospital discharge data from 10 states found that African American and Hispanic patients were at greater risk of rehospitalization, even after adjusting for patient differences in health care needs, socioeconomic status, insurance coverage, and the availability of primary care (Gaskin and Hoffman, 2000). In a comparison of predictors for rehospitalization after coronary artery bypass surgery, African Americans had higher rates of readmission (Hannan et al., 2003).

The specific reasons for readmissions are likely to vary by individual and care setting, but cultural differences in care seeking as well as racial and ethnic differences in how clinicians and health care organizations care for patients may have an influence on the readmission rates in different areas of the country. CMS has drawn attention to the problem of hospital readmissions by including a risk-adjusted 30-day readmission rate for heart failure patients as one measure of the quality of care (CRS, 2010). However, the rates are not always reported by race and ethnicity, and documenting and addressing potential disparities will require further attention.

Payment Policies and Quality Measures for Physicians and Other Providers

Since 2006, CMS has been collecting quality data measures from physicians and other eligible practitioners[6] paid under the Physician Fee Schedule under the Physician Quality Reporting System (PQRS). Similar to the Hospital Quality Reporting Program, the PQRS provides financial incentives to eligible Medicare practitioners who successfully submit the required quality measures to CMS. In CY 2011, eligible practitioners who satisfactorily reported data on 175 individual quality measures and 13 quality measure groups received a 1 percent incentive payment of their total estimated allowed charges (CMS, 2011j). For 2012 through 2014, eligible professionals may earn an incentive payment of 0.5 percent of their total estimated allowed charges (CMS, 2011j).

The PQRS began as a voluntary program, but beginning in 2012, practitioners who do not report quality data will have their annual Medicare payment update reduced by 2.5 percent (CMS, 2011j). Beginning in 2014, clinical quality reporting will be required. Also beginning in 2012, the secretary of HHS will be required to provide clinician feedback reports that compare each clinician's resource use to the resource use of other participants in the fee-for-service system (P.L. 111-148). The feedback reports are a mechanism to provide transparent and comprehensible performance results, and to encourage clinicians to provide more efficient and higher-quality care (CMS, 2011e).

CMS also will be making the quality data for physicians and other health professionals available to the public through the Physician Compare website,[7] analogous to Hospital Compare. The site currently allows anyone to search for a physician or other health care professional by specialty, type of professional, and location. To meet requirements of the Medicare Improvements for Patients and Providers Act, a list of professionals who satisfactorily reported PQRI measures for 2009 is also available on the site. CMS is required to implement a plan for making the performance data available to the public by January 2013.

National Quality Strategy

As documented in the most recent National Healthcare Quality Report (AHRQ, 2010), improvements in the quality of care have been disappointingly slow and have not yielded significant across-the-board changes in provider performance. For example, the widely studied Premier hospital demonstration, initiated in 2003, has not resulted in changes in mortality and

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[6] Eligible providers include doctors of medicine, osteopathy, podiatry, optometry, oral surgery, dental medicine and chiropractic medicine, physician assistants, nurse practitioners, clinical nurse specialists, certified registered nurse anesthetists, anesthesiologist assistants, certified nurse midwives, clinical social workers, clinical psychologists, registered dieticians, nutrition professionals, audiologists, physical therapists, occupational therapists, and qualified speech-language therapists.

[7] See http://www.medicare.gov/find-a-doctor/provider-search.aspx.

has called into question the value of using financial incentives in hospital pay-for-performance programs (see Box 4-1).

In March 2011, HHS (2011a) released the *National Strategy for Quality Improvement in Health Care* (*National Quality Strategy*), a congressionally mandated report with the first set of national aims and priorities to guide efforts to improve national, state, and local efforts and help reduce their administrative and quality reporting burdens. Building on the national strategy, CMS (2012a) released *National Impact Assessment of Medicare Quality Measures*, a congressionally mandated report on quality and efficiency measures that marks a shift for Medicare toward playing a more active role as a value-based purchaser. A technical expert panel will be convened to identify critical measures and areas for future such reports and will include a mix of measure types, including structural, process, outcome, patient experience of care, efficiency, care transitions, and system integration measures (CMS, 2012a). Taken together, these coordinated national efforts may begin to yield better results in terms of patient outcomes and also reduce the burden of reporting, which currently involves data collection from claims, assessment instruments, medical charts, and registries.

Another influence on quality reporting will be the increasing use of electronic health

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BOX 4-1
Do Quality Incentive Payments Work?:
Results from the Premier Hospital Quality Incentive Program

In theory, performance-based payment is believed to improve quality and efficiency of care, but studies of the Premier Hospital Quality Incentive Program have yielded mixed results on the level of improvement. Three studies found improvements in quality of care (Grossbart, 2006; Lindenauer et al., 2007; Werner et al., 2011), but two studies concluded that the incentive payments were not associated with significant improvements in quality of care (Glickman et al., 2007; Ryan, 2009). The mixed findings may be related to methodological difficulties in defining measures and in measuring clinical outcomes, but the payment model also changed in 2006 to add incentives both for quality improvement and good performance across a broader range of quality measures (Ryan et al., 2012). Even with these design changes, however, the degree of quality improvement has been generally disappointing.

Initiated in 2003, the Premier Hospital Quality Incentive Program is a CMS demonstration project that recognizes and provides financial incentives to participating Inpatient Prospective Payment System hospitals that demonstrate high-quality performance. Hospitals are ranked based on quality measures for the following medical conditions: heart attacks, heart failure, pneumonia, coronary artery bypass graft, and hip and knee replacements. In 2007, 225 hospitals voluntarily participated in the demonstration project. Hospitals that attained or exceeded the median performance level received 40 percent of the total quality incentive payment. The top 20 percent of hospitals in each clinical area received an additional incentive payment. Low-scoring hospitals receive a 2 percent reduction in their Medicare payment in the clinical area being measured.

A comparison of participating and control hospitals found no difference in 30-day mortality rates (Jha et al., 2012), and the study's authors caution that expectations of improved outcomes for programs modeled after Premier should remain modest.

SOURCE: Premier, Inc. See https://www.premierinc.com/quality-safety/tools-.services/p4p/hqi/index.jsp.

records to collect and report quality measures. Authorized by provisions of the HITECH Act,[8] CMS provides Medicare and Medicaid incentive payments for health providers who demonstrate "meaningful use" of certified electronic health record systems for such purposes as e-prescribing, exchange of clinical information at the point of care, and quality reporting (CMS, 2012b). Electronic reporting of performance data as a routine part of clinical care is expected to reduce administrative burdens, provide more accurate and timely data, and help to improve the quality of care.

As described in Chapter 3, some geographic variations in quality are known to occur, but extensive variation also occurs across settings even within the same geographies. There is no evidence to support using geographic adjustment to try to affect the quality of care, and the committee does not view geographic adjustment as an appropriate means to do so. Therefore, while the committee views quality reporting and accountability as essential to health care transformation, no recommendations in this report will address health care quality.

CURRENT PROGRAMS TO IMPROVE WORKFORCE SUPPLY AND ACCESS

This section examines evidence on the extent to which various programs and policies have influenced the ability of U.S. communities to attain adequate access to services appropriate to meet their health care needs. It begins with a brief conceptual section that identifies potential barriers to access and types of policy solutions designed to trigger workforce supply responses. It then reviews the evidence on the extent to which such programs and policies have been successful in improving access, and it discusses the ways in which Medicare payment policies may have also affected practitioner location and access to care.

Policies to Increase the Workforce Supply

Locations and practitioners differ in many important ways. Areas differ, for example, in the costs of inputs required to establish a practice and provide health care services, such as remodeling an office, hiring staff, and building a patient clientele. As the committee's Phase I report indicated, it is very important to measure input cost variations accurately and incorporate them appropriately in setting fee-for-service payments to Medicare's providers.

Practitioners also show variation in the importance they place on both financial and nonfinancial characteristics of their practice locations. On the financial side, income per professional in areas that are generally attractive may be lower than in those areas that are relatively unattractive, because salaries and/or bonuses may be higher to attract health professionals.

As following sections will discuss, financial incentives and considerations of rate of return on the medical school investment are an important part of the decision-making process for specialty and location choices for physicians (Nicholson, 2008), but they are not the only factors involved in these decisions (Phillips et al., 2009). For NPs and PAs, as discussed in Chapter 3, rural practice sites are more likely choices, but those are not reported in the literature on the impact of federal loan repayment programs.

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[8] Health Information Technology for Economic and Clinical Health, part of the federal economic stimulus program authorized under the American Recovery and Reinvestment Act of 2009.

Physicians' Location Decisions

In a standard economic framework employing several underlying assumptions about market pressures—such as no meaningful differences among geographic areas in the desirability of locations to those who are making a location decision or in per capita demand for care—increases in the supply of physicians in the United States as a whole should lead physicians to locate in smaller geographic markets, meaning rural areas (Newhouse et al., 1982). In other words, the geographic diffusion of physicians would be expected to respond to market forces (Ricketts and Randolph, 2007).

In fact, Rosenthal et al. (2005) demonstrated that diffusion to smaller areas occurred between 1979 and 1999 following a substantial increase in U.S. physician supply. They grouped physician specialties into four groups depending on the number of physicians in the field. In both years, the vast majority of communities with population sizes of 2,500 to 5,000 had at least one physician in group 1, general or family practice (86 percent in 1979 and 91 percent in 1999). However, in their group 2, less than half of the communities of this population size had at least one physician in general or family practice (23 percent in 1979 and 41 percent in 1999 for internal medicine, for example). The percentage of such communities having group 3 and 4 specialties was minuscule (e.g., 4 percent and 3 percent in ophthalmology, a group 3 field, and 1 percent in each year for neurology, a group 4 field). More generally, group 3 and 4 specialty physicians were located in larger versus less populated communities.

Using American Medical Association Masterfile data to study physician diffusion between 1981 and 2001, Ricketts and Randolph (2007) also found a small net flow from urban to rural areas, which they attributed to workforce programs that are intended to counter the normal market pressures for health professionals to locate in urban areas. One-third of the physicians they studied remained in the same urban or rural practice for most of their careers, and approximately one-quarter moved across county boundaries in any given 5-year period.

There are few studies on the role of financial incentives on physician location decisions. In a study of location decisions of psychiatrists, Frank (1985) obtained estimates of the elasticity of the short-run response to a fee change of 0.13 and 0.23, which are similar to the elasticity estimates reported for specialty choice in Box 4-2, and long-run response estimates of 0.96. However, it would take a long time for the long-run response to be realized.

In the short term, most physicians face the barrier of having to reinvest in practice building in a new location among other barriers to relocating, and hence are likely to stay where they are. The fraction of physicians who are willing to consider making a locational choice are largely limited to the pool of recent medical school graduates. At any point in time, this pool is small relative to total physician supply. If fee differences persist over time, there will be more graduating classes of physicians making location decisions and some less recent graduates may be willing to relocate as well.

An increasing number of medical school graduates are choosing to become salaried employees rather than establish their own independent practices, and it is not clear how much this trend will impact physician diffusion. Two studies have examined the effect of health maintenance organization (HMO) market penetration on physician location (Escarce et al., 1998; Polsky et al., 2000). Although not a direct measure of physician earnings, HMOs presumably have a negative effect on such earnings, both by negotiating lower fees and by reducing demand for care. The bottom line from these studies is that HMO penetration has a larger effect on location of younger physicians than it does on physician location decisions overall. This evidence is consistent with the view that the primary location changers are younger physicians.

BOX 4-2
Expected Earnings and Physician Specialty Choices

There is an important relationship between specialty choice and the geographic distribution of health personnel. As described in Chapter 3, primary care physicians, nurse practitioners, and physician assistants are more likely to locate in communities with smaller populations. There is evidence of substantial differences in physicians' earnings by specialty, with earnings in primary care specialties being appreciably lower than earnings in other specialties on average.

Few studies have assessed the impact of expected best predictor of specialty choices was subjective income expectations, and that a $10,000 increase in expected income increased the probability of entering a non-primary care specialty.

Nicholson (2008) analyzed the relationship between earnings expectations by specialty and specialties that medical students preferred to enter. The responsiveness of preferred specialties to anticipated earnings by specialty was quite high. The elasticity was 1.42, about 10 times higher than the elasticities in the Sloan (1970), Bazzoli (1985), and Gagne and Leger (2005) studies. The reason for the difference is that entry into residency programs is limited. Students may desire to enter a program but cannot be admitted because of entry restrictions. Studies of the effects of earnings differences on specialty choices should model demand for and supply of residency slots. For this reason, studies that conclude that earnings affect specialty choice based on the observation that the residency fill rate is higher in higher specialties with higher earnings (e.g., Ebell, 2008) should have taken account of the possibility that earnings affects demand for residency programs, but earnings may be high in part because of limitations on the number of places in residency programs; tighter limits lead to higher earnings. Particularly because of constraints in supply of places in residency programs, it is appropriate to conclude that anticipated earnings do not have much of an effect on specialty choice.

Practitioner Preferences

Three types of strategies deal with variation in location in attractiveness: personnel selection, educational policies that seek to demonstrate the positive features of areas with certain characteristics, and policies to increase the attractiveness of location. Selection policies recognize inherent heterogeneity in preferences among individuals (Wilson et al., 2009). Such policies seek to recruit persons into training who for reason of their backgrounds or stated career orientations are likely to be willing to practice in areas that the majority find unattractive for personal or professional reasons. Educational policies provide exposures that are likely to make placements in such areas more likely to succeed. In a sense, they seek to change preferences rather than to take them as given as in the selection policies.

The third approach improves the professional attractiveness of areas. There are essentially two dimensions to nonfinancial attractiveness: professional and personal. From a professional perspective, connectedness with developments in medicine (e.g., the ability to enhance connectedness to professional expertise using telemedicine for videoconferencing with colleagues in other locations, good colleagues and facilities, and clinical backup) are attractive features. In addition, personal factors include quality of schools for children, availability of employment opportunities for spouses, recreational opportunities, and connectedness to the community, such as prior experience with that type of community.

Thus, health workforce policy needs to account for variations both in the characteristics of geographic areas and variations in the preferences of practitioners. A limited amount of empirical evidence gives some indication of the effectiveness of alternative policies, and that will be presented in a subsequent section.

Barriers to Entry

As previously discussed, geographic areas may differ in the cost of establishing a practice, such as the costs of becoming licensed and credentialed in a location, remodeling an office building, and building a practice. Variation in entry costs may reflect differences in policies among areas, such as in certificate of need (e.g., for an ambulatory surgery facility), openness of hospital medical staffs, and enforcement of no-compete provisions of employment contracts. If entry cost in an area is sufficiently high, practitioners may be unwilling to locate there, and policy interventions such as bonus payment programs may be needed to ensure adequate access.

Analytically, there is a difference in the potential effect of a public policy such as a loan forgiveness program, which offsets entry cost, and a reoccurring bonus which takes the form of a fixed-dollar annual subsidy, a bonus per unit of service, or a combination of the two. A one-time subsidy, such as a loan forgiveness program, encourages entry but will not provide a financial disincentive for exit if ongoing conditions are not favorable for the provider. In contrast, a fixed-cost subsidy that reoccurs annually provides a slight entry incentive and a more powerful disincentive for exit.

Thus, it is important to understand areas' conditions of entry and disincentives to exit in order to devise effective strategies to enhance and maintain access. These are discussed further in the next section. In addition, Box 4-2 discusses the relationship between expected earnings, specialty choice, and practice location decisions.

EMPIRICAL EVIDENCE ON EFFECTS OF PUBLIC POLICIES TO IMPROVE GEOGRAPHIC DISTRIBUTION OF HEALTH CARE PRACTITIONERS

Limited evidence exists on the factors that determine location decisions, and it is almost entirely about physicians. In a comprehensive study of physician career choices by a research organization affiliated with the American Academy of Family Physicians, data surveying graduating medical students over a period of nearly 20 years were brought together to analyze student characteristics and training influences that might influence their choices of specialty and geographic practice location (Phillips et al., 2009). The specific outcomes studied were practicing in primary care (family medicine, general internal medicine, or general pediatrics), a rural community, a health center (either a Federally Qualified Health Center or rural health center), an underserved area, or ever having served in the National Health Service Corps (NHSC). Data sources included historical Title VII[9] training files, cross-sectional data about current specialties and practice locations, and a 5-year cross-section of service in Rural Referral Centers and Federally Qualified Health Centers.

In general, the study found that public and rural training programs produced a higher proportion of primary care, rural, and health center physicians than medical school programs that did not have a programmatic emphasis on underserved populations. Students in the study

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[9] Title VII of the Public Health Service Act provides for the National Health Service Corps and other programs to expand the geographic, racial, and ethnic distribution of the health care workforce.

who chose to accept debt obligations such as loan repayment were more likely to practice in primary care and rural and other underserved areas. Other predictors of choosing careers in primary care and rural and underserved areas were being born in a rural area, being interested in serving underserved or minority populations, or having had Title VII experience in medical school and training experiences in rural or inner-city areas. Title VII exposure during residency increased the likelihood of serving in the NHSC and in shortage areas, but not in primary care or rural practice. In addition, men were less likely to choose primary care, and women were less likely to choose rural practice.

Students with no debt and no scholarships (either NHSC or armed forces) were the least likely to later practice in primary care, a rural area, or a CHC. The authors concluded that addressing the income gap and its consequences will require changes in the way training is financed and the settings in which training is provided for physicians. There is no comparable study for other health professionals, but these choices may be unique to the physician labor market because of the generally higher incomes in the specialty and subspecialty categories. That may change as NPs and PAs increasingly begin to specialize because of the financial incentives associated with specialty care.

Further review of the empirical evidence in this report examines programs designed to reduce the cost of entry into underserved areas, direct public provision of services, and programs designed to encourage continued practice in underserved areas, including increased professional connectedness and targeted training. The committee looked for literature on the impact of Medicare's payment policies on health professionals' location decisions. Although payment policies may affect location and policy makers should consider the possibility that their decisions could affect health professionals' location decisions, the committee found no conclusive empirical evidence specifically linking payment policies to such choices.

Policies Affecting the Net Cost of Entry—Outcome Evaluations of National Health Service Corps

The NHSC was created by the Emergency Health Personnel Act of 1970 (P.L. 91-623).[10] This legislation authorized the U.S. Public Health Service to assign commissioned officers and federal civil service personnel to practice in shortage areas. In 1972, Congress passed the Emergency Health Personnel Amendments authorizing scholarships to support health professions education in return for a minimum of 2 years of service in shortage areas designated by the agency. During the 1980s, the NHSC implemented the Loan Repayment Program, which substantially increased the number of NHSC field personnel.

Much of the literature evaluating the performance of the NHSC has focused on retention of health professionals in NHSC-designated shortage areas, and not on factors related to their recruitment. Based on survey data collected from NHSC and non-NHSC physicians practicing in similar settings during mid-1979 through year-end 1981, Pathman et al. (1992) found substantially lower retention rates for NHSC than for non-NHSC physicians. When these physicians were resurveyed in 1990, 12 percent of NHSC physicians remained in the practice they were in during the previous survey or within 24 km of this practice versus 39 percent for non-NHSC physicians. Nearly one-third (29 percent) of the former and slightly more than half (52 percent)

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[10] The history of the NHSC is described in several sources. See, e.g., Politzer et al., 2000.

of the latter were in nonmetropolitan practices. The decline in retention was higher at the time the service obligation was completed, but the rate of drop off slowed thereafter.

Subsequently, Pathman et al. (1994a) analyzed data on cohorts of NHSC and a comparison group of non-NHSC physicians over the period 1987–1990, finding that retention rates[11] were about the same for NHSC as for the comparison group immediately after the NHSC obligation was satisfied, but beginning at 3 years postobligation, the NHSC physicians were less likely to remain at their practice sites. Some NHSC physicians reported negative experiences with their placements, which was one reason for low retention. Also, NHSC physicians were less likely to have been raised in rural areas than were physicians in the non-NHSC comparison group. Pathman et al. (2006a) focused on an underrepresented minority cohort of NHSC physicians, finding that the 1-year retention rate of these physicians was not statistically different than for other NHSC physicians.

Rosenblatt et al. (1996) argued that the concept of retention in the earlier studies was too narrow. They defined five retention measures: (1) physician remained at same rural site; (2) physician remained in same county; (3) physician practiced in remote rural county; (4) physician practiced in other rural county; and (5) physician now practiced in urban site (CK). They reported that three-fifths of physicians had left their original site (categories 2–5). Using a broader definition of retention similar to Rosenblatt and colleagues, Porterfield et al. (2003) found three factors were significantly associated with a higher probability of retention: older; higher initial desire to serve the underserved on an index ranging from 1 to 5; and final salary in the NHSC. The result for salary was that each $10,000 increase in final salary raised the probability of retention by 11 percent.

Data collected during the past 2 decades documented increases in NHSC retention rates (Politzer et al., 2000). In FY 2009, the retention rate was 76 percent, and this rose to 82 percent in 2011 (HRSA, 2012b). This may be due in part to changes implemented by the NHSC program, but it also could reflect changes in how retention is measured. HRSA is working on a retention strategy, and close to 60 percent of NHSC sites report that they have recruitment and retention plans (HRSA, 2012b). It is difficult to know whether the results of these evaluations are determined by the underlying physician selection process or whether there is something about the NHSC experience that promotes or deters retention. The result on salary, for example, might represent an effect of increased salary on retention decisions or simply the fact that more productive NHSC physicians are more likely to continue to work in shortage areas, or some combination of the two.

Another issue relates to whether or not the presence of NHSC physicians in an area reduces the number of non-NHSC physicians. A decrease might be expected since income per physician may fall with entry of new physicians, whether such physicians are NHSC or not affiliated with the NHSC. In investigating this issue, Pathman et al. (2006a) held other factors constant and found that more NHSC physicians led to *higher* growth in non-NHSC physicians in the area. A third unmeasured factor may account for both NHSC physician supply and the growth of non-NHSC supply.

Pathman et al. (2006b) compared growth in primary care physicians per 10,000 population during 1981–2001 in areas with an NHSC presence compared to those without NHSC clinicians. The physician-to-population ratio grew at more than twice the rate in the NHSC areas as opposed to the non-NHSC areas, which suggests that NHSC presence may make a positive

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[11] Defined as still working in rural practice at a 9-year follow-up.

contribution to the workforce in those areas. The impact of NHSC on NP and PA decisions to stay in underserved areas is unknown, because no data were found on these groups of practitioners.

Process Evaluations of the NHSC

Pathman et al. (1994a) surveyed physicians in the NHSC and a comparison group of physicians to learn about the quality of their experiences. They found that NHSC physicians often were motivated to practice in areas characterized as "underserved," a result consistent with evidence from other studies (see, e.g., Phillips et al., 2009; Probst et al., 2003). Yet, Pathman and coauthors suggested that the NHSC could have done more to accommodate the preferences of NHSC personnel and their families, and this has been an issue in NHSC retention. The Office of Inspector General of HHS (OIG, 1994) conducted an evaluation of NHSC processes. A deficiency documented by the Office of Inspector General was the inadequacy of the matching process. Furthermore, prospective NHSC physicians lacked information on what was involved in practicing in underserved areas. Two GAO studies (1995, 2001) concluded that there was an imbalance of placements with some sites receiving excess numbers of placements and others receiving none. In recent years, NHSC has been making priority placements of personnel to ensure that assignments are made to areas with the greatest need (Salinsky, 2010), but funding shortfalls mean that large number of unfilled vacancies remain.

Other Programs That Reduce Net Entry Cost: State Scholarship, Loan Forgiveness, and Related Programs

Pathman et al. (2000) surveyed state programs in 1996 that satisfied the following criteria: (1) provided financial assistance to medical students, physicians, physician assistants, and advanced practice nurses; (2) conditional on providing service in a designated medically underserved area ("service for support programs"); (3) relied on public and/or private philanthropic financial support paid to an individual, educational, or financial entity; and (4) were statewide rather than in a particular locality within a state. They identified programs in 41 states consisting of scholarships (n=29), loans (n=11), resident support (n=5), loan repayment (n=29), and direct financial incentive programs (n=8). Scholarship programs have an expectation that students will provide service upon graduation with substantial financial penalties for those who do not. Loan programs have service requirements but offer the option of repaying the loans in lieu of service at market interest rates. Direct financial incentive programs offer incentives at about the time the health professional is to enter practice but provide unrestricted funds. Resident support programs provide financial assistance to residents with 1- to 2-year service requirements at the end of the residency.

The aggregate number of health professionals receiving subsidies was small; an estimated 1,215 practitioners signed initial contracts and 1,676 (of whom four-fifths were physicians) were working to fulfill their service obligations. For physicians, financial support ranged from $3,000 to $38,000 per annum with service obligations from 1 to 60 months. The authors did not perform an evaluation of program outcomes.

More recently, Pathman et al. (2004) conducted an evaluation of selected state program outcomes based on surveys sent to state-obligated physicians and a comparison group of physicians in 1998–1999. The loan programs had the lowest mean service completion rate (44.7 percent, followed by the scholarship programs at 66.5 percent). The remaining types, which

in contrast to the loan and scholarship programs incentivized physicians much nearer to the time they first entered practice, had service completion rates of over 90 percent. Physicians in the obligated group were more likely to be practicing in areas with greater underservice than were physicians in the comparison group. Physicians in the former group were more frequently satisfied with their work and practices than were those in the latter group. Over 90 percent of those in the obligated group said that they would be likely to enroll in the program again. That is, they had no regrets. Retention was higher among the obligated than the nonobligated group, although the difference diminished as the length of the follow-up period increased. By year 8 following placement, retention rates were 55 percent for the obligated versus 52 percent for the nonobligated group.[12] In evaluation of similar programs in a single state (West Virginia), retention rates were slightly over 50 percent at 10 years for the obligated and between 60 and 70 percent for the nonobligated comparison group.

J-1 Visa Waiver Program

The proportion of physicians practicing in the United States who graduated from medical schools outside of the United States and Canada, termed international medical graduates (IMGs), has grown appreciably in the last 5 decades and now represents approximately one out of four practicing U.S. physicians (AMA, 2006). This growth is attributable to a variety of factors, including changes in U.S. immigration policies as they apply in general and to health professionals in particular and expanded capacity in U.S. residency programs that exceeds the level that can be filled by U.S. medical school graduates. The J-1 Visa Waiver Program allows non–U.S. citizen IMGs to enter the United States for educational purposes under the "alien physician program." Upon completing their postgraduate residency programs, physicians holding a J-1 visa must return to their countries of origin for 2 years before becoming eligible to return to the United States. However, if they agree to work in a designated position in an HPSA, they can apply for a waiver of this requirement provided that they work in a HPSA for 3 years. Thereafter, they are free to practice in nonshortage areas.

Current sources of J-1 visas are the HHS and the Conrad-30 (or State 30 waiver) Programs (CK). Under the latter, each state is allowed 30 visa waiver slots annually to administer through its state health department. An alternative to a J-1 is an H-1B visa. The J-1 is for training while the H-1B is for "temporary specialized workers." The latter is more flexible in that there is no requirement of return to the home country after training. On the other hand, it imposes a requirement that the spouse not work and takes more time to process than the J-1 does.

In late 1999, over 2,000 IMGs with J-1 visa waivers were practicing in shortage areas compared to 1,356 physicians in the NHSC (GAO, 2001). According to data from the Educational Commission for Foreign Medical Graduates, the number of IMGs with J-1 visas in 2006–2007 declined by more than 5,000 individuals compared with the numbers from 1996–1997 (Boulet et al., 2006; Croasdale, 2008).

Conceptually, the J-1 Visa Waiver Program reduces the entry cost on IMGs for practicing in the United States. Assessments of the effect of IMGs in general and the J-1 Visa Waiver Program in particular have been very limited. A public policy issue of general concern is whether entry of IMGs has contributed on balance to a reduction in rates of underservice in the United States.

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[12] In multivariate analysis, which controlled for demographic characteristics and physician specialty, difference in retention rates was below conventional statistical significance levels (p=0.08).

Mick et al. (2000) investigated this issue empirically and found that IMGs are more likely than U.S. medical graduates to practice in underserved areas. This finding was supported by Mertz et al. (2007) but not by Fink et al. (2003), reflecting differences in study methods.

In Wisconsin, a survey of physicians with J-1 visas indicated general satisfaction with the medical community and with the care provided (Crouse and Munson, 2006). However, physician lack of integration into the community was perceived as a problem. J-1 Visa Waiver Program participants who did not integrate into the community were significantly less likely than those without J-1 waivers to stay in the community 3–4 years after initial location. Among the reasons cited for lack of integration were unmet cultural and religious needs (Crouse and Munson, 2006).

Multivariate analysis in a study of J-1 Visa Waiver Program participants conducted in the state of Washington (Kahn et al., 2010) revealed no statistically significant predictors of retention. However, from open-ended questions about how the program could be improved, nearly two-fifths of physician respondents said that they felt employers could have shown more respect (such as treating them the same as they did nonwaiver employees), could have offered more support (such as with legal help with visa applications), and could have offered more competitive compensation (at market rates).

Targeted Training

There are large differences among medical school graduates in the propensity to practice in rural areas (Rosenblatt, 2010). While these differences plausibly reflect self-selection as well as effects of exposure to rural practice during the course of medical education, evidence seems clearest for selection. In a qualitative study based on 22 in-depth interviews with rural- and urban-raised physicians in northeastern California and northwestern Nevada, Hancock et al. (2009) identified types of exposures, most outside of the medical education process, that led physicians to choose to practice in rural areas. Another important influence on rural practice recruitment is having been brought up in a rural area (Blue et al., 2004; Hancock et al., 2009; Phillips et al., 2009).

As for the role of medical education, several points in a health professional's decision-making process are relevant to the ultimate goal of improving availability of health professionals in underserved areas. These include choice of specialty (e.g., Quinn et al., 2011, Rabinowitz et al., 1993), initial location decision after training—the recruitment dimension, and decision to remain in an underserved area after practice obligations are satisfied—the retention dimension. Subspecialists are less likely to locate in a rural area or even an inner city because the market size is insufficient to support the practice (e.g., Ricketts and Randolph, 2007; Rosenthal et al., 2005).

Factors influencing recruitment are distinct from those affecting retention in a geographic area underserved by health professional personnel. Recruitment reflects such factors as exposures during childhood and adolescence, among other factors. By contrast, retention is from a self-selected minority of personnel who have been willing to practice in such areas at all. For example, self-reported preparedness for rural practice and small-town living was positively associated with recruitment but not retention in one study (Pathman et al., 1992).

Pathman et al. (1994b) inquired whether retention in rural practice is of longer duration for public medical school than for private medical school graduates, for those who participated in community hospital-based residencies, and for physicians who had participated in rural rotations as medical students and residents. In 1980 to 1982, the authors identified 464 rural practices

in the United States that received some kind of external subsidy, such as from the NHSC, CHC funds, and state and local governments. In 1990, they conducted a follow-up study of 412 physicians identified at baseline in primary care fields. Respondents were asked about rural training experiences as well as more general questions about their medical education. They found that among non-NHSC physicians practicing in subsidized rural practices at follow-up, retention duration could not be predicted by ownership of medical school, training in community hospital-based residencies, or participation in rural training experiences as medical students or residents. Among NHSC physicians in such practices at follow-up, graduates of private medical schools remained in these practices longer than their counterparts from public medical schools did. The authors explained that a physician's rural upbringing is a predictor of recruitment to rural areas (Pathman et al., 1992), but it is not a predictor of retention.

A study for the Josiah Macy Foundation (Phillips et al., 2009) analyzed career decisions using almost 20 years of survey data from graduating medical students related to student factors (e.g., demographics, values), curriculum factors (medical school training), debt, and institutional factors (public or private). While rural birth and training, attending a public medical school, and attitudes about assuming debt were important predictors for rural primary care careers, interest in underserved populations nearly tripled the likelihood of practicing in an FQHC and made service in the NHSC eight times more likely.

These findings suggest that recruitment and retention efforts should give more weight to personal interests in working with the medically underserved, beginning with acceptance to medical school and continuing through mentoring programs, internships, and residencies. Clearly, the relationships between personal background, personal interests, training experiences, exposures, and career decisions are more complex than is commonly believed and need to be better aligned.

Medicare Implications of Findings

Various federal and state workforce policies have been implemented over the past decades with the intent of increasing production of health professionals determined to be in short supply, to support clinical training—especially in locations serving underserved populations—and to encourage professionals to practice in underserved areas. The availability of evidence to determine the effectiveness of these programs varies greatly by program, from none to numerous studies.

While residents of underserved communities probably have benefited from the public programs on balance, it might be said that the programs have not been implemented on a sufficient scale to have had meaningful effects or to have had meaningful effects in some areas but not all. For example, the funding levels for the NHSC have never been adequate to support the number of clinicians who would be required to fill all of the vacancies (Salinsky, 2010). There are many such programs with a relatively small investment per program, especially relative to the size of the U.S. health care sector overall and public programs such as Medicare and Medicaid in particular.

There has been little theoretical and empirical analysis of geographic markets for health professionals, and there is a paucity of relevant studies in the peer-reviewed literature. In part, this reflects the lack of availability of general grant support for research on health care supply, organization, and financing. Moreover, there is no consensus about the endpoints that should be used in program evaluation. For example, much of the research on effectiveness of loan

forgiveness programs has been on physician retention following fulfillment of the service obliga-tion, using different numbers of years of continuing service to indicate success. However, the effect of physician turnover on patient care is unknown. In general, while a variety of programs attempt to enhance recruitment, retention, or both, we know very little about which types of policies are most successful in improving access in underserved areas.

CMS and HRSA are both HHS agencies, but policies to enhance access to primary care services have not been jointly developed.[13] Indeed, Medicare payment policies that promote specialization and a large income gap between primary care practitioners and specialists have likely worked at cross-purposes with the objectives of Public Health Service programs to improve access in underserved areas. As Medicare is the single largest insurance program in the world, the incentives produced by its payment policies may well dominate many decisions made by health care providers throughout the United States.

DELIVERY SYSTEM REFORM INITIATIVES TO PROMOTE ACCESS AND QUALITY OF CARE

The growing costs of health care, the demographics of the aging population, and the chal-lenges of managing the care of older adults with multiple chronic health conditions are driving system reform and innovations in health services delivery. Among these are changes intended to improve access to primary care services and to improve the coordination of care as mechanisms for improving access and health care outcomes.

There are many emerging conceptual models of coordinated care, including accountable care organizations, transitional care, medical homes, and others (CMS, 2011g; CRS, 2010; Friedberg et al., 2010; Naylor and Kurtzman, 2010; Pohl et al., 2010). What these models have in common are (1) the essential role of primary care services in ensuring that the care is coordinated and provided in the appropriate setting and level of care, including the type of clinician who provides services, and (2) the need for payment reform to support the policy goal of improved care coordination.

Over time, many types and models of care may be shown to improve clinical outcomes and population health. Because Medicare is the largest payer, many of the new models are intended to move Medicare payments away from fee-for-service payment by providing financial incentives for shared risk through bundled payment options. It is hoped that these models will not only improve efficiency but also provide better integration and more coordinated care for benefi-ciaries (Guterman et al., 2009). The committee expects that these models may have workforce implications, by increasing the demand for primary care services provided by NPs and PAs.

Accountable Care Organizations (ACOs)

ACOs are defined by CMS as "groups of physicians, hospitals, and other health care pro-viders who come together voluntarily to give high-quality coordinated care to the Medicare patients they serve" (CMS, 2012c). The goal of ACOs is to improve quality of care for Medicare beneficiaries by coordinating care among practice settings (e.g., hospitals, physician groups, and skilled nursing facilities), which helps ensure that patients get the appropriate level of care and that unnecessary duplication of services, medical errors, and hospital readmissions are

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[13] Jurisdiction over Public Health Service programs and Medicare is also exercised by different committees in the U.S. Congress.

reduced (CMS, 2012c). CMS has established two ACO payment programs to provide financial incentives for Medicare-enrolled providers who come together to form an ACO: the Medicare Shared Savings Program and the Advance Payment Model.

Medicare Shared Savings Program

Shared savings is an approach to improving the value of health care by promoting accountability, requiring coordinated care, and encouraging infrastructure investments such as electronic health records and broadband to enable the secure exchange of clinical information across settings in real time (CMS, 2012d). Other investments may include hiring new nurse care managers and other personnel to provide better continuity of care across clinical settings. Participants agree to lower the cost of health care while meeting identified performance standards by sharing resources and care in a coordinated manner.

CMS is implementing two shared savings models: one-sided and two-sided shared savings models. Under the one-sided model, providers only share the savings; in the two-sided model, providers share the savings and the losses if there is a growth in costs (CMS, 2012d). CMS will develop a target level of spending for each participating ACO. Depending on the quality of their performance, those under the one-sided model will receive up to 50 percent in savings and those under the two-sided model will receive up to 60 percent in savings (CMS, 2012d).

According to the ACA, NPs are authorized to be ACO professionals but are excluded from assignment of patients for this program; that is, patients must be assigned to and cared for by primary care physicians. Therefore, patients cannot choose a NP for their primary care provider under the current ACA. While this does not prevent nurse practitioners from joining an ACO, it does prevent their patients from being assigned to them directly. At this early stage, it is not clear how third-party payers will respond to this.

Pioneer ACO Model

The pioneer ACO model is designed to support organizations that already have experience operating as ACOs or in similar arrangements providing coordinated care to Medicare beneficiaries at a lower cost to Medicare. It is designed to allow them to move more rapidly from a shared savings payment model to a population-based payment model and to work in coordination with private payers to provide better care for beneficiaries (CMS, 2012e).

The first 32 pioneer ACO organizations were announced in December 2011 after a lengthy and competitive process (CMS, 2012f) and collectively provide care for about 860,000 beneficiaries. They include primarily physician-led organizations and include health systems in urban and rural areas in 18 states and various geographic regions of the country. The pioneer initiative is operated by the CMS Innovation Center and tests a shared savings and shared losses payment arrangement with higher levels of reward and risk than the rest of the Shared Savings Program.

Advance Payment Model

The advance payment ACO model is open only to two types of organizations participating in the Shared Savings Program: (1) ACOs that do not include any inpatient facilities *and* have less than $50 million in total annual revenue; and (2) ACOs in which the only inpatient facilities are critical access hospitals and/or Medicare low-volume rural hospitals *and* have less than $80 million in total annual revenue (CMS, 2012g).

The advance payment model is designed to provide financial support to organizations by improving their access to capital, including rural and physician-owned organizations. The first five awardees were announced in April 2012, and additional organizations were announced in July 2012 (CMS, 2012g).

Future Success of ACOs

The first 27 ACOs were selected in April 2012, including the five that are participating in the advance payment model, and they will be coordinating care for nearly 375,000 beneficiaries (CMS, 2012h). Of the 27 organizations, 21 are physician-led, even in those ACOs that involve hospitals (Fiegl, 2012). While the goal of all ACOs is to improve quality at lower costs, it is not yet clear how many new employment opportunities for NPs and PAs will emerge. Regional differences in staffing may be observed based on the current number of NPs and PAs already practicing in local markets.

ACOs will have many operational challenges, including the need to change beneficiaries' expectations about how they receive their care, beneficiaries' potential unwillingness to share their personal health information with other providers within the ACO network, and difficulties establishing secure health information exchanges to support the exchange of that information (Gold, 2012).

As hospitals and physician groups are consolidating to form ACO networks, there is concern that mergers and provider consolidation could increase market share enough to provide more leverage in negotiations with private insurers, thus driving up health care costs—having the opposite effect from the one intended. There is also concern that providers may take on more financial risk than they can handle, that the quality standards are too rigorous, that the expense of quality reporting through chart reviews or surveys for those who do not have electronic reporting will be overly burdensome, and that the potential savings will be too low in relation to the upfront investments needed (Ginsburg, 2011).

From a workforce perspective, one of the more controversial aspects of ACOs is that beneficiaries are attributed to ACOs on the basis of which primary care physician provided a plurality of their primary care services. It will not be clear for some time how nurses, NPs, and PAs will contribute to care coordination across organizations and settings, one of the main goals of the ACO program.

Value-Based Purchasing

CMS will begin the hospital value-based purchasing program in FY 2013, requiring that a certain percentage of Medicare hospital payments be based on hospital performance.[14] The goal of the value-based purchasing program is not only to incentivize hospitals to improve the quality of care they provide, but also to reward hospitals based on the extent of their quality improvement.

The hospital performance standards for the value-based purchasing program are based on 12 clinical process measures and 8 patient experience measures and were announced in 2011

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[14] CMS will use a linear exchange function to compute the percentage of value-based incentive payment earned by each hospital. CMS will notify each hospital of the exact amount of its value-based incentive payment by November 1, 2012 (CMS, 2011b).

(CMS, 2011i). Each hospital will be scored based on achievement and improvement ranges for each of the 20 quality measures (CMS, 2011i). Achievement scores are to be based on how much a hospital's current score differs from all other hospitals' baseline period performance. Hospitals will be awarded achievement points if they fall within the range of the 50th percentile of hospital scores or higher (CMS, 2011a). Improvement scores will be based on how much a hospital's current performance changes from its own baseline period performance, and hospitals that meet or exceed the performance standards will receive a value-based incentive payment. Future measures for consideration are posted on the CMS Hospital Compare website (CMS, 2012i).

Incentive Payments for Coordination of Care

New bonus payments for primary care practitioners are funded under the Affordable Care Act to improve coordination of care. Beginning in the summer of 2012, a Medicare pilot project, referred to as the Comprehensive Primary Care Initiative, will pay primary care practitioners in five to seven markets a bonus of $20 per month per patient for helping patients to coordinate care with specialists, develop personalized care plans, and deliver preventive care and health education (HHS, 2011b). This initiative is based on evidence from previous pilot projects and other studies that show primary care services help to prevent and reduce the use of more complex and more expensive settings, often with better patient experiences and outcomes (e.g., Friedberg et al., 2010).

Among the most vulnerable times for patients—especially those with chronic conditions—are the times when they are transitioning from one clinical setting to another, such as returning home after a hospitalization or nursing home stay. The movement of patients from hospitals and nursing homes to their homes and back to clinical settings has been estimated to cost Medicare approximately $15 billion per year. Studies have shown that up to 34 percent of beneficiaries experience adverse events and/or are rehospitalized at those transition times, which are also known as "handoffs" (Naylor et al., 2011). New approaches to improve care integration across episodes and settings of care are referred to as transitional care. These practices are distinct from care coordination in that they focus on critical transition periods, are time limited, designed to avoid preventable hospitalizations, and supported by a robust body of evidence that confirms their benefits (Coleman et al., 2006; Naylor et al., 2011).

POLICY CONSIDERATIONS AFFECTING WORKFORCE DISTRIBUTION

In 2009, nearly 1 million health professionals were participating in fee-for-service Medicare (MedPAC, 2011), but there are no agreed-upon national targets for the supply of practitioners by type. A major source of concern among policy experts involves questions about whether the balance and coordination of primary care services and specialty care are meeting the needs of beneficiaries for chronic care management and other primary care services (Goodman and Grumbach, 2008; Naylor and Kurtzman, 2010).

Variation in Payment Policies for Medicare Providers

In addition to payment for physician services, Medicare also pays for NP or PA services. These payments are paid at the same rate paid to physicians only if the services are deemed to be "incident to" physician services. This means that the service cannot be billed to Medicare

by the NP unless a physician has seen the patient previously for the particular diagnosis being addressed at the visit (i.e., so the NP service is considered to be "incident to" the physician's management). In practice, this means an NP may not see a new patient or an existing patient with a new diagnosis if billing "incident to" a physician. In settings where these practitioners are salaried employees paid by the supervising physicians, the payment benefits accrue to the physicians as employers, and in settings where NPs are paid by hospitals, any payment benefits accrue to hospitals.

To help expand access to primary care services, an incentive payment of 10 percent of the amount is paid quarterly under the Physician Fee Schedule for primary care services provided by primary care physicians (defined as those trained and practicing in family medicine, internal medicine, pediatrics, and geriatrics), NPs, clinical nurse specialists, and PAs (CMS, 2011b,f).

Along with differences related to the degree of practitioner autonomy and the legal right to practice independently, payment differentials between primary care and nonprimary care physicians and between physicians and other health professionals are controversial. While physician organizations often maintain that their longer and more extensive medical training makes them more qualified than NPs or PAs to diagnose and treat patients and that their payment should be commensurate with their experience, others focus on the need to expand primary care services through (1) the use of the "full primary care workforce" (Fairman et al., 2011; IOM, 2010; Pohl et al., 2010) and (2) consideration of the outcomes of care from all health care professionals (Newhouse et al., 2011).

National Workforce Policy and Data Gaps

As discussed previously in Chapter 3 and in this chapter, the committee's review has been made more difficult by serious data gaps, including a lack of consistent methodologies for workforce studies, conflicting findings, and lack of research attention to many members of the health care workforce who provide care for Medicare beneficiaries. For example, as mentioned in Chapter 3, there is no single source of accurate, up-to-date information on the current numbers of practicing health professionals for all of the major professions, and many of the sources of data have biases or other flaws in their data collection methods or reporting. Another problem the committee encountered is the lack of current evaluation research on training programs, due to several years of underfunding for evaluations specifically and workforce programs generally.

As a result of the lack of clear, consistent data for many areas in its charge, the committee sought to draw conclusions from the limited evidence using a consensus process. Here too lay challenges, in that there were differences of opinion about how to distinguish between a shortage (supply) and a distribution problem, or how to describe the workforce implications for care coordination—a significant problem for beneficiaries in terms of access and quality of care, but not an area in which clear guidelines or practice patterns can be identified. The committee concluded that many of the complexities and contentiousness of workforce policies and programs are influenced by market-based factors such as competition for patients in local areas, as well as by professional levels and types of training and differing views about scope of practice.

Early in their deliberations, the committee members recognized the complexity of these issues and discussed the importance of creating and funding a new, independent body with representatives of different viewpoints that would help to prioritize workforce policy choices at a national level. They reviewed the authorizing language for a Health Care Workforce Com-

mission in the Affordable Care Act and agreed that that commission or an entity similar to it is called for. No single agency within HHS currently has the authority or the resources needed to provide a comprehensive, objective view of the nation's workforce needs, and an independent body would be best suited to advise on ways to improve coordination across federal agencies.

FINDINGS

The committee members sought to identify the best available evidence to help them determine what policies and programs have been most effective in improving access to hospital and clinical services, improving quality of care, and helping to increase the supply of practitioners as well as influence their distribution across the country. The evidence review was hampered by the lack of evaluation, mixed results, and methodological challenges in finding studies that included geographic comparisons.

In developing their findings and recommendations, committee members developed a consensus on what the evidence base suggests. They also identified some promising new areas of policy and program development where changes in payment policies have the potential to expand beneficiaries' access to care.

1. Medicare policies intended to preserve beneficiary access to hospital care may not be efficiently targeted.
2. The effectiveness of bonus payments to improve Health Professional Shortage Areas (HPSAs) has not been adequately evaluated, and it will take time before there is enough information and experience to evaluate other recently introduced bonus payments.
3. Medicare's payment policies related to quality of care are important, but there is no evidence that geographic adjustment is related to quality of care.
4. Current information on public programs related to workforce is inadequate to assess whether current needs are being met. Consistent national data on workforce distribution and independent evaluations of public programs pertaining to distribution are lacking, and there are no nationally accepted distribution targets.
5. Evidence suggests some success of federal loan repayments in placing practitioners in underserved areas. Retention rates appear to be comparable to retention of other practitioners in similar areas without special programs, but more studies with consistent definitions of retention are needed for comparison.
6. New payment models are being introduced to encourage providers to improve care coordination through team-based approaches, but the extent to which an increased emphasis on care coordination will provide new opportunities for nurse practitioners and physician assistants to practice to the full extent of their educational preparation is unclear.

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Observations on the Larger Policy Context

This report assessed the potential impact of changes in provider payment on access to health care and quality of care that would result from implementing the committee's proposed revisions of Medicare geographic adjustment factors. The relevant existing literature is based on research conducted primarily in a fee-for-service Medicare payment environment where provider revenue depends on price per unit of service combined with volume of services delivered. In this environment, the concern is that any change in price per unit, such as could be experienced by a change in Medicare's geographic adjustment factor, could change provider behavior.

In particular, in areas where implementation of the proposed changes in geographic adjustments would result in lower per-unit prices, there have been concerns that providers would accept fewer Medicare patients or move to geographic areas where payment adjustments are more favorable, creating access problems for Medicare beneficiaries, or that they could reduce quality to maintain incomes in the face of lower payments.

The committee did not find any evidence, either from its review of the literature, its payment simulations, or its analysis of beneficiary survey data, that changes in geographic adjustment could have an impact on quality of care. The committee also did not find that any specific type of hospital would be disproportionately advantaged or disadvantaged by using the technically more accurate index it recommended, with the exception of the hospitals operating under policy adjustments such as market reclassifications and floors.

However, the payment simulations did show that implementation of the recommended changes to payment areas for physicians would result in payment redistribution from nonmetropolitan to metropolitan areas, although there was wide variation in the estimated payment changes. While the committee noted that many of the rural practitioners in Health Professional Shortage Areas (HPSAs) would be eligible for primary care bonuses through Medicare, which might partially offset the proposed reductions, the committee was concerned about the impact of its recommendations on practitioners and beneficiaries in HPSAs. This impact will need to

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be further evaluated in the future and addressed through another policy mechanism, but not through geographic adjustment.

This chapter briefly addresses two overarching policy issues that arose many times during the committee's deliberations—the overall effect that certain Medicare payment policies may have on the geographic distribution of the health care workforce, and the clear evidence of disparities in the care provided in different geographic areas, which in turn may be reflected in the health of the population in different areas.

Because of its sheer size and influence on providers and other payers, Medicare tends to be seen as a policy driver in discussions of health care delivery reform. The committee discussed two features of Medicare's fee-for-service payment systems—the manner in which fees for services are established and the subsidization of graduate medical education (GME).

Disparities are especially important to consider in the context of analysis that uses averages to compare and contrast different areas. This is so because averages have a tendency to obscure potentially important differences in the well-being of racially and ethnically distinct populations in local communities.

While the committee does not offer recommendations on disparities and these features of Medicare payment policies, it believes that serious debate over geographic access to care, including workforce policy, needs to take them into account.

UNINTENDED EFFECTS OF MEDICARE PAYMENT POLICIES

During its Phase I deliberations, when the committee was focused on Medicare geographic adjustments to fee-for-service provider payments, several committee members observed that there were other important features of Medicare payment that affect the distribution of Medicare dollars among Medicare providers and geographic areas. The committee eventually decided that the fee-for-service geographic adjustments should be used only to adjust payments for underlying geographic differences in the costs of providing services, and several recommendations were offered that would improve the current system in achieving that objective (IOM, 2011).

However, during Phase II, the committee discussed other aspects of Medicare payment that could be appropriate targets for payment reform to improve geographic access to high-quality health care. These discussions centered on the Medicare fee schedule for physicians and other individual practitioners and on the supplemental payments to hospitals to subsidize the costs of GME.

Fee-for-Service Payment

In Chapter 2 of this report, the committee examined statistical simulations of its recommended changes to geographic adjustments to Medicare payments to clinical practitioners and considered how the changes might affect Medicare beneficiary access to health care. Known individually as the geographic practice cost indexes (GPCIs) and collectively as the geographic adjustment factor, the physician fee schedule adjustments are applied to the fees that Medicare pays physicians and other practitioners who are authorized to bill for services under Medicare (IOM, 2011). Over the course of its deliberations, the committee came to realize that the ways that Medicare sets its national fees, before geographic adjustments are applied, may have consequences for beneficiary access to health services through their influence on professional income and medical specialty choice.

Practitioners are currently paid under the Resource-based Relative Value Scale (RBRVS) system. Medicare established the RBRVS in 1992 to replace the Customary-Prevailing-Reasonable method of setting fees. The RBRVS comprises approximately 7,000 services, each of which is assigned a number of relative value units (RVUs) that determine the amount any given service is paid compared to any other service. For example, a service that is assigned 20 RVUs is paid twice as much as a service that is assigned 10 RVUs. Once a dollar conversion factor is determined, a national fee schedule in dollar terms is established. Both the conversion factor and the RVUs, including adding RVUs for newly covered services, typically are updated once per year.

The committee observed that an unintended consequence of the way Medicare sets its national fees may be leading to shortages of both primary care and specialists in rural and other underserved areas. The 10 percent primary care bonus that is in effect from January 1, 2011, to December 31, 2015, may not be sufficient to address the inherent limitations of the RBRVS system for primary care. Although it is beyond the scope of this study to analyze the RBRVS and how the RVUs are determined and updated, several researchers and studies have concluded that the RBRVS tends to undervalue primary care services and overvalue specialty services in relative terms (e.g., Berenson et al., 2010; MedPAC, 2010, 2011). That is, evaluation and management services tend to yield far less Medicare income than procedures and tests, which in turn has contributed to a substantial income gap between primary care practitioners and specialists (Bodenheimer et al., 2007).

As discussed in Chapter 4, differences in earnings for primary and specialty care may have consequences for access to care because of their influence on specialty and practice location choices, in that specialists tend to locate their practices in areas with larger populations. Figure 5-1 illustrates the differences in primary care billings for metropolitan and nonmetropolitan areas. More than 60 percent of all RVUs billed in nonmetropolitan areas are from primary care services. In contrast, primary care services account for about 20 percent of all RVUs billed in metropolitan areas.

In 2006, the American Medical Association RVU Update Committee established a workgroup to identify potentially misvalued services using objective mechanisms for reevaluation (AMA, 2012), and many services, such as low-value/high-volume procedure codes, have been reviewed. Approximately $1 billion was redistributed in 2011 related to the physician work and practice expense RVUs (AMA, 2012), although some observers regarded that amount as far short of what might have been done. More recently, the Affordable Care Act requires the secretary of HHS to periodically review and identify potentially misvalued codes and make appropriate adjustments to the relative value of services, as well as to establish a formal process to validate RVUs under the physician fee schedule.

The committee therefore agreed that a reevaluation of the accuracy of the RVUs, as has been proposed by the Medicare Payment Advisory Commission (MedPAC), seems desirable in view of geographic variations in practice locations and their implications for access to care.

Financing GME

Medicare is the single largest source of funding for GME, spending $9.5 billion in 2009 (MedPAC, 2010). By contrast, in FY 2010, the Health Resources and Services Administration (HRSA) spent a combined amount of $532 million to fund the National Health Service Corps and more than 40 health professions education programs authorized under Title VII and Title VIII of the Public Health Service Act (GAO, 2006; Salinsky, 2010).

RVUs Billed by Primary Care Practitioners
as Percent Total RVUs Billed

Category	Percent
Metro. Pop. >1M	22.4
Metro. Pop. 250K–1M	23.0
Metro. Pop. <250K	24.1
Nonmetro. Adj. u_pop >20K	30.7
Nonmetro. Not Adj. u_pop >20K	26.6
Nonmetro. Adj. u_pop 2.5–20K	44.1
Nonmetro. Not Adj. u_pop 2.5–20K	39.4
Nonmetro. Adj. u_pop ≤2.5K	62.8
Nonmetro. Not Adj. u_pop ≤2.5K	63.5

Percent
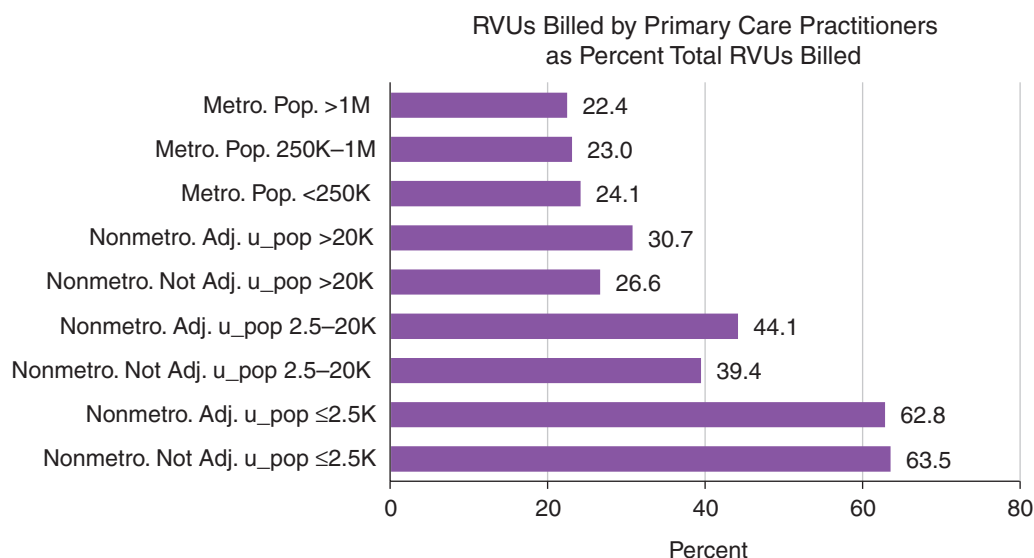
FIGURE 5-1 Primary care billings reflect a higher proportion of total RVUs in nonmetropolitan areas.
NOTE: The figure is based on the share of national total Part B RVUs billed in 2010 by physicians identified as internists, geriatricians, family practitioners, and pediatricians, plus RVUs billed by nurse practitioners and physician assistants. RVU = relative value unit.
SOURCE: County totals of RVUs billed by primary care and non–primary care practitioners in 2010 were provided to RTI by the CMS contractor, Acumen, LLC.

The current structure of GME has been essentially intact since an explicit subsidy was designed in 1983 with the introduction of the Medicare Prospective Payment System (Rich et al., 2002). Less than half the amount spent by Medicare on GME reflects direct costs of GME. The larger share is spent to cover indirect clinical cost of such education. Recipients of these funds, which in the vast majority of cases are individual teaching hospitals and the organizations that sponsor residency programs, are able to determine the mix of residency programs with minimal direction from Medicare and other public programs that subsidize GME (MedPAC, 2010).

In a 2003 study of future roles of academic health centers, an Institute of Medicine (IOM) committee observed that the financing of GME in the United States through the Medicare program is focused on inpatient hospital care and specialty services most often delivered in urban settings. That committee recommended reprogramming many of these expenditures to support more interdisciplinary, team-based, nonhospital training focused on improving the health of patients and populations (IOM, 2003a).

In 2010, the MedPAC concluded that "the specialty mix of physicians coming through the GME pipeline is not well matched to the needs of an efficient, high-quality, high-value delivery system." MedPAC further concluded that "there is insufficient socioeconomic diversity among physicians entering the pipeline, and too few are drawn from rural areas and inner cities, which may mean a reduced propensity to practice in these often underserved areas" (MedPAC, 2010). MedPAC did not propose specific criteria for determining the mix of residency positions by specialty, geographic area, and characteristics of the residents enrolled in such programs. However, it did call for studies to be conducted on these issues followed by a report on strategies that are likely to be most effective in achieving health care system priorities.

The IOM recently initiated a study that will provide a comprehensive review of policy options concerning Medicare's approach to governance and financing of GME. The study will be completed in 2013.

DISPARITIES IN ACCESS TO CARE

Within the context of the U.S. health care marketplace, one of the specific tasks of the committee was to evaluate and consider the effects of the geographic adjustment factors on population health and quality of care. Arguably, one of the most pervasive affronts to population health is the persistence of racial and ethnic health disparities. Racial and ethnic minorities and low-income individuals face more barriers when trying to access care and also receive a lower quality of care (IOM, 2003b).

The committee's primary focus was on investigating geographic differences in Medicare beneficiaries' ability to access health care and the quality of that care. While the differences between metropolitan and nonmetropolitan regions were generally found to be small in aggregate, geographic differences in access to care were noted in Chapter 3, with some communities and areas of the country experiencing greater access problems than others. Moreover, the committee's impact analyses showed that payment to practitioners in HPSAs, which are disproportionately populated by racial and ethnic minorities, would be adversely affected by the Phase I recommendations.

As described throughout the report, the committee found substantial literature documenting problems both of access and of quality of care for racial and ethnic minority and low-income populations. Racial and ethnic minorities consistently face more barriers when trying to access care (AHRQ, 2010), but individual-level factors such as health status, personal preferences, and insurance status are not the only determinants of access to health care (Gaskin et al., 2011). Systematic differences in the characteristics of the health care system and availability of services, including the distribution of services within neighborhoods, also contribute to lower levels of access by racial and ethnic minorities (IOM, 2003b).

For example, a recent study explored geographic barriers to care by examining the association between residential segregation and geographic access to primary care physicians in metropolitan statistical areas (Gaskin et al., 2011). Researchers combined ZIP code data on primary care physicians from the 2006 American Medical Association Masterfile and used logistic regression to predict the odds of a ZIP code being a primary care physician shortage area. They found the odds were 67 percent higher for ZIP codes with a majority African American population.

Residents of predominantly African American, Hispanic, and integrated ZIP codes have also been found to be less likely to use services provided by nurse practitioners and physician assistants (Gaskin et al., 2011). This finding contrasts with previous studies indicating greater trust and higher levels of satisfaction with care provided by nurses and nurse practitioners among low-income African Americans (Benkert et al., 2008). The lower utilization could be caused by lack of familiarity with these clinicians, or lack of supply within minority neighborhoods, and suggests that there are many opportunities to increase access to primary care services by increasing the number of qualified practitioners who are able to practice to the full extent of their educational preparation, as the committee recommends in Chapter 6.

The Department of Health and Human Services (HHS) has developed a long-term strategic framework to address disparities at three levels (see Box 5-1): the level of the individual, including factors such as health knowledge, beliefs, and behaviors; at the environmental and com-

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BOX 5-1
Key Disparity Measures from Department of Health and Human Services Action Plan to Reduce Racial and Ethnic Health Disparities

I. Transform Health Care

1. Percentage of the U.S. nonelderly population with health coverage
2. Percentage of people who have a specific source of ongoing medical care
3. Percentage of people who did not receive or delayed getting medical care due to cost in the past 12 months
4. Percentage of people who report difficulty seeing a specialist
5. Percentage of people who reported that they experienced good communication with their health care provider
6. Rate of hospitalization for ambulatory-sensitive conditions
7. Percentage of adults who receive colorectal cancer screening as appropriate

II. Strengthen the Nation's Health and Human Services Infrastructure and Workforce

1. Percentage of clinicians receiving National Health Service Corps scholarships and loan repayment services
2. Percentage of degrees awarded in the health professionals, allied, and associated health professionals fields
3. Percentage of practicing physicians, nurses, and dentists

III. Advance the Health, Safety, and Well-Being of the American People

1. Percentage of infants born at low birth weight
2. Percentage of people receiving seasonal influenza vaccination in the last 12 months
3. Percentage of adults and adolescents who smoke cigarettes
4. Percentage of adults and children with healthy weight

SOURCE: HHS, 2011.

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munity level, including the physical, social, and economic environment, as well as assets and values in the community; and at the systems level, including health planning, resource targeting and infrastructure development, and information sharing to apply research and evaluation results that are adopted for continuous improvement (HHS, 2011). At the National Institutes of Health (NIH), the National Institute for Minority Health and Health Disparities will seek to reduce disparities by strengthening the basic, clinical, social, and behavioral research base and developing an integrated trans-NIH research agenda. Taken together, these national initiatives may provide the attention needed to address these long-standing, systemic problems.

GEOGRAPHIC ADJUSTMENT AND PAYMENT REFORM

Geographic adjustment to Medicare payment makes up an important but small part of the overall multipayer fee-for-service payment system. It has a limited ability to influence many of the factors the committee was asked to evaluate and consider, including access, health care qual-

ity, efficiency, workforce supply and distribution, and population health. However, geographic adjustment also is embedded in the larger payment system and subject to larger policy issues that affect the health care delivery system and the health care workforce.

Currently, Medicare is experimenting with alternative provider reimbursement methods with the potential to replace or modify payment per unit of service. Collectively, these different approaches (pay for performance, bundled payments, accountable care organizations, or ACOs) have been referred to as "value-based" reimbursement. In each case, payment is based to varying degrees on achieving quality benchmarks. Under pay-for-performance models, providers receive a portion of their fees based on their performance on a prespecified set of quality of care measures. In contrast, under ACO models, providers must meet quality performance standards in order to be eligible for participation in "shared savings" resulting from delivering care that is less costly than predicted by Medicare for a defined group of patients. Under value-based payment arrangements, instead of asking how changes in payment will affect quality of care, one might ask how changes in quality will affect payment levels.

Under value-based payment will there continue to be a role for geographic adjustment of prices assigned to units of service? Clearly, under a pay-for-performance program the basis for payment continues to be the per-unit price, and the logic of adjusting this price for geographic differences in the cost of providing care remains unchanged. However, geographic adjustment also will be an important factor in determining provider payments under shared gain payment models. In these models, actual provider costs are compared to benchmark cost estimates to determine if there are "gains" to be shared by providers who meet quality goals. The benchmark for a given provider will be determined by estimating costs under fee-for-service in the past for patients assigned to a provider (or, possibly, for Medicare beneficiaries in the region where the provider is located) and trending these costs forward. The geographic adjustment factor will affect this estimate because geographic adjustment was incorporated in previous payments to providers. It appears that the actual costs incurred by providers will be determined by weighting services provided to Medicare beneficiaries by ACOs using the Medicare fee schedule, which incorporates in it a geographic adjustment factor. Thus, geographic adjustment is likely to have an impact on both the benchmark used to determine savings as well as the estimate of the costs of services delivered to ACO patients.

For this reason, one would expect to see providers and other stakeholders raise issues regarding what constitutes accurate and appropriate geographic adjustment under a value-based reimbursement model, similar to issues they have raised in the past regarding geographic adjustment under traditional fee-for-service payment. In fact, there is early evidence of this. Some providers under ACO contracts who have traditionally delivered care to Medicare beneficiaries at a relatively low cost are now arguing that basing their estimate of savings on historical performance penalizes them for past efficiencies, such as early adoption of electronic health records, e-prescribing, and other information technologies that streamline and improve the flow of clinical information.

However, another reason their overall costs may have been low is that their cost of inputs was relatively low, as reflected in their geographic adjustment factor, in addition to their being efficient providers of services. Some are lobbying for a benchmark constructed using national data, a parallel argument used by providers in lower input cost regions who want geographic adjustment factors to be calculated based on relatively large geographic areas that include areas with higher input costs. The committee's observations about geographic adjustment in

this report thus might prove useful in future deliberations about payment and delivery system reform.

CONCLUSION

A commitment to improving the accuracy of geographic adjustments to fee-for-service Medicare payments shaped the committee's deliberations and development of its recommendations. However, the committee also noted that payment policies of the larger delivery system and certain demographic factors potentially had more influence on access, efficiency, and quality of care than did geographic adjustment.

In conducting the statistical simulations of the impact of its Phase I recommendations on clinical practitioners, the committee found a disproportionate impact on certain geographic areas, such as rural and frontier areas, and on racial and ethnic minorities in underserved communities. In keeping with its principles from Phase I, the committee found that other adjustments such as bonus payments were more appropriate to address payment differences than geographic adjustment.

Given its charge to evaluate and consider the impact of geographic adjustment on the workforce, the committee also reviewed and discussed some of the current policy, payment, and program changes that are aimed at strengthening the nation's primary care infrastructure and promoting beneficiaries' access to care that is appropriate and well-coordinated across different clinical settings. Attainment of both of those goals will affect the workforce by providing incentives to deliver care in teams with physicians, nurse practitioners, physician assistants, and other clinical and support personnel who work together across clinical settings to improve patient outcomes and experiences. These workforce shifts will not only affect Medicare, but all payers.

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6

Recommendations

I n its Phase I report, the committee set forth a number of recommendations designed to make Medicare's geographic adjustments to payments to hospitals, other institutional providers, physicians, and other practitioners more accurately reflect the underlying differences in costs of providing care across different areas of the nation. The committee recognized the importance of inter-area differences among labor markets for health care services, and many of its recommendations would improve not only the definitions of, but also the data pertaining to, such markets in reformulation of the geographic adjustments. The committee concluded that, if its recommendations were adopted, the geographic adjustments would not only be more accurate but would render unnecessary the many exceptions that had been implemented to make the current adjustments more conducive to promoting beneficiary access to high-quality health services.

In its Phase II report, the committee was charged both with an assessment of the extent to which its recommendations, if followed, would affect payments to Medicare's providers and, more generally, an assessment of to what extent geographic payment adjustments affect the quality of, and access to, the care provided. Analogous to its approach in Phase I of focusing on labor markets, the committee recognized the importance of the health care workforce in its analyses of geographic variations in quality and access to care. Consequently, while the impact analysis in Chapter 2 and Appendix A is extensive, the committee determined that redistribution of payments among Health Professional Shortage Areas (HPSAs) deserves special attention.

Inevitably, a change in the way Medicare's geographic payment adjustments are calculated would cause some providers' payments to increase and some to decrease, and Chapter 2 provides examples of how the adjustments in both directions could affect different groups and geographic areas. While it is natural to focus attention on the decreases, it is equally valid to be concerned about the inaccurately low past and current reimbursement to providers whose payments would increase under the committee's recommended changes. Nevertheless, the committee chose to concentrate on areas of underservice whose payments would decrease, and where the potential impact on beneficiaries would be of particular concern.

The changes in hospital payments based on the committee's recommendations would not result in significant redistribution except for those providers that have benefited from special exceptions. The change in practitioner payments, however, would tend to redistribute payments to metropolitan areas from nonmetropolitan areas, including some that historically have been underserved.

The literature reviews and analyses reported in Chapter 3 concluded that there are wide discrepancies in access to and quality of care across geographic areas, but they do not appear to be strongly related to differences in, or potential changes to, fee-for-service payment adjustments. This finding was supported both by literature review and by original analysis of Medicare beneficiary survey data from the Consumer Assessments of Healthcare Providers and Systems (CAHPS) survey. Thus, geographic payment adjustments are an appropriate tool for addressing geographic differences in costs of doing business, such as inter-area variations in labor market wages, but they are a blunt instrument for addressing variation in health care quality and access. Reasons for such discrepancies are varied and sensitive to area type, such as inner-city neighborhoods or remote rural areas. Accordingly, typical geographic designations, such as metropolitan statistical areas and nonmetropolitan "rest-of-state" areas, are not well suited to applying adjustments to encourage practice in underserved areas.

The committee advocates more targeted policies and programs both within and outside the Medicare program focusing on the size, composition, and distribution of the health care workforce. In particular, the committee determined that the geographic availability of a workforce constituted to provide its population with robust primary care services is a key factor in achieving geographic access and quality objectives. This finding is especially significant with respect to racial and ethnic minority populations.

In Chapter 4, the committee reviewed numerous programs, many of them organized within the Public Health Service, designed to encourage practitioners to locate in underserved areas. Federal as well as state programs have been funded at modest levels and rarely subject to systematic rigorous evaluation. The committee concluded that there is some evidence of effectiveness of many programs but that the evidence falls short of providing a reliable guide for policy makers. The chapter also discussed the changing roles of different health professionals as Medicare's payment incentives increasingly move toward care coordination and different care delivery models, such as accountable care organizations.

Throughout its deliberations, the committee discussed policies within the Medicare program that may also have an impact on the geographic composition and distribution of services to Medicare beneficiaries. The committee observed that the sheer size of the program, accompanied by the incentives that its payment policies exert on practitioner decisions, such as the method of subsidizing the costs of training physicians, may act as an impediment to the achievement of some access objectives. For example, the National Health Service Corps and other programs appear to have improved access, but the magnitude of spending on such programs is very small relative to the size of our health care system and the financial incentives that tend to exacerbate imbalances in access to primary care services. On the other hand, Medicare may be inadvertently contributing to these imbalances through the unaccountable ways in which health professional education is financed and health services are reimbursed.

Thus, the picture that emerges from the committee's review of the evidence is multidimensional. Yet, the committee was tasked with determining how its recommendations about the accuracy of geographic adjustment would affect access and quality of health care and the supply and distribution of the health care workforce. With regard to access to care, the committee

learned from the payment simulations that payments to physicians and other practitioners in shortage areas, which are disproportionately populated by racial and ethnic minorities, would be adversely affected by the Phase I recommendations. Because the committee's recommended approach to geographic adjustment appeared to place some providers in shortage areas at an added disadvantage, the committee included an evaluation of the potential impact of its Phase I recommendations on high-risk and vulnerable populations as part of its charge. Although not explicitly mentioned in the statement of task, the committee sought to develop recommendations to help strengthen access and improve efficiency, particularly for high-risk and vulnerable populations, in order to address the adverse impact of the proposed adjustment.

With regard to quality of care and the workforce supply and distribution, the committee did not find evidence that its recommendations about accuracy of geographic adjustment would have a significant impact. In sum, geographic adjustment plays an important, specific, but very limited role in the larger, multipayer health care system.

The committee offers six recommendations below. Each recommendation is followed by a rationale statement that links back to the findings in previous chapters.

RECOMMENDATION 1: The Medicare program should develop and apply policies that promote access to primary care services in geographic areas where Medicare beneficiaries experience persistent access problems.

A focus on primary care is an important part of any effort to build a system of care that will provide efficient, high-value care for all Medicare beneficiaries, including those who require care from multiple specialists because of multiple chronic conditions and those who live in medically underserved areas where there are shortages of health professionals.

In determining the impact of its Phase I recommendations on vulnerable populations, the committee used HPSAs with shortages of primary care physicians and other practitioners as the generally accepted standard for representation of geographic areas in which beneficiaries may experience access problems due to the undersupply of clinical practitioners. Based on an analysis of data from the CAHPS survey, the committee did not find any evidence that the proposed revisions in the geographic adjustment factors were related to consumer-reported access and quality of care. The payment simulations for shortage areas, however, did find that physician payments to metropolitan shortage areas would increase by 0.7 percent and payments would be reduced by 3 to 4 percent in most of the nonmetropolitan primary care shortage areas that are currently eligible for Medicare primary care bonus payments.

After considering these analyses and the review of evidence about access and quality of care, the committee concluded that geographic adjustment is not an appropriate tool for achieving policy goals such as expanding the pool of providers available to see Medicare beneficiaries. However, Medicare payment policy already provides bonus payments to primary care practitioners and general surgeons who practice in HPSAs. The committee supports these targeted bonus payments and encourages the Centers for Medicare & Medicaid Services (CMS) to support other policy adjustments to offset potential payment reductions in shortage areas and encourage the provision of care in those areas.

RECOMMENDATION 2: The Medicare program should pay for services that improve access to primary and specialty care for beneficiaries in medically underserved urban and rural areas, particularly telehealth technologies.

One very promising and rapidly developing strategy to improve access to care for beneficiaries is to provide practicing clinicians with new resources and technology that enable them to reach more patients. Increasingly, the term *telemedicine* is being replaced by a newer term, *telehealth*, that refers to the use of technology-enabled delivery of services to facilitate the monitoring, diagnosis, treatment, management, care, and education of patients who are at a distance from the providers. These services can not only reduce the travel burden for beneficiaries but also improve efficiency by increasing the availability of real-time information on clinical status.

Nearly 50 recognized subspecialties now use telehealth services, ranging from teleradiology to teledermatology, teleophthalmology, telecardiology, and telemental health. More than half of all Medicare beneficiaries have chronic medical conditions such as diabetes, arthritis, and kidney disease for which regular monitoring is becoming part of the standard of care. Remote patient monitoring, in which electronic devices are used to remotely collect and send real-time clinical data to a clinician's office or a monitoring service, is increasingly being used to replace office or clinic visits or to supplement the use of visiting nurses. As of October 2011, 13 states support telehealth technology to improve parity between health care services delivered in person and via telehealth.

While the lack of technology infrastructure was previously cited as a barrier to adopting telehealth services, recent public investments are helping to steadily expand the availability of broadband access in rural communities. A significant barrier to broader expansion and use of telehealth services is limitations in payment. Currently, Medicare pays for telehealth services when provided by qualified providers to beneficiaries in rural areas, but individuals and facilities in medically underserved urban areas are not eligible for Medicare payment for telehealth services. Therefore, the committee calls for changes in CMS payment policy to support services that improve access for all beneficiaries, and particularly for those in underserved urban and rural areas.

RECOMMENDATION 3: To promote access to appropriate and efficient primary care services, the Medicare program should support policies that would allow all qualified practitioners to practice to the full extent of their educational preparation.

The committee reviewed multiple sources of workforce data and found clear documentation of the need for primary care providers and clinicians in general, and specifically in rural areas. There is evidence that primary care nurse practitioners choose to practice in rural areas more frequently than their physician counterparts, and there is also a trend that nurse practitioners are more likely to locate in rural areas in states with more progressive, less restrictive regulations.

The scope of practice of various health professions is not only an area of disagreement over professional autonomy between physicians and other health professionals, but it also has a major impact on regulatory and payment policies. As of March 2012, 16 states and the District of Columbia have passed laws that remove nurse practitioner practice barriers, enabling them to practice to the full extent of their education and within their scope of preparation, bearing responsibility for the care they deliver under their own license. Although some of these 16 states have large rural areas (e.g., Alaska, Hawaii, Iowa, North Dakota, Oregon, and Washington), other more restrictive states such as Georgia and Alabama also have significant rural areas as well as provider shortages that could be alleviated by full use of the available workforce.

In the Institute of Medicine (IOM) report *The Future of Nursing*, the first recommendation was to "Remove scope of practice barriers," that is, "APRNs should be able to practice to the

full extent of their education and training." This committee concludes that—given the shortage of primary care providers in the United States and specifically in rural areas—it would be reasonable to remove barriers in Medicare language and address inconsistencies in state laws so all qualified practitioners are able to practice to the full extent of their educational preparation.

RECOMMENDATION 4: The Medicare program should reexamine its policies that provide location-based adjustments for specific groups of hospitals, and modify or discontinue them based on their effectiveness in ensuring adequate access to appropriate care.

Several groups of hospitals currently receive special treatment in determining Medicare payment, on the basis that extra payment is necessary to preserve beneficiaries' access to appropriate care in the areas they serve: critical access hospitals, sole community hospitals, Medicare-dependent hospitals, low-volume hospitals, and rural referral centers. The criteria for qualifying for special treatment are generally not consistently stated or applied, nor have access benefits for beneficiaries been consistently demonstrated.

Just as the critical access hospital provision was created in the Balanced Budget Act of 1997 by merging two separate programs that had been established for the same purpose, so all the existing provisions that currently provide additional payment to specified groups of hospitals should be reexamined for their effectiveness in protecting adequate access to appropriate care for the Medicare beneficiaries in the areas they serve. Such policies should be subject to periodic reevaluation to ensure that Medicare payments are targeted most effectively.

It may be advisable over time to combine existing programs—or establish new ones—to best protect access to appropriate high-quality care for Medicare beneficiaries in different areas across the country. The rural referral center provision, in particular, should be reexamined, given the changes in the Medicare Inpatient Prospective Payment System since its implementation—some of which may obviate the need for such special treatment. That provision, and all special provisions established to accomplish specific policy objectives, should continuously be evaluated as to their effectiveness in light of an evolving Medicare program and the environment in which it functions.

RECOMMENDATION 5: Congress should fund an independent ongoing entity, such as the National Health Care Workforce Commission, to support data collection, research, evaluations, and strategy development, and make actionable recommendations about workforce distribution, supply, and scope of practice.

The committee was tasked with assessing "the effect of the adjustment factors on the level and distribution of the health care workforce and resources including: recruitment and retention taking into account mobility between urban and rural areas." That task was made difficult by the lack of objective, longitudinal research on the workforce. While there is an overall acceptance of the existence of specialty and geographic imbalances in the health care workforce, there is little in the way of systematic tracking and ongoing assessment of the status and distribution of those professionals. This is due, in part, to the lack of clear and consistent data collected in a uniform manner over time.

At the same time, most of the research and analysis being carried out is sponsored by and focused on the needs of a particular specialty group. Rarely are there to be found cross-

disciplinary studies or assessments of the interactive effects of workforce policies that consider more than one profession or discipline. This situation is largely caused by the lack of coordination and unified guidance for policy analysis and research as well as a lack of credible evaluations of the many programs that are intended to improve supply and geographic distribution of practitioners. This latter situation may be due in part to stakeholder influence on the programs that oversee these initiatives under Title VII and VIII.

Recognizing these problems and constraints, the committee's recommendation will promote the collection of more useful data as well as the coordination of evaluation and assessment projects, the consideration of cross-cutting policy options, and the funding of an independent body that can focus policy questions and serve to combine viewpoints and prioritize policy choices among different constituencies.

The committee was further tasked with assessing "the ability of hospitals and other facilities to maintain an adequate and skilled workforce; and patient access to providers and needed medical technologies." The committee did not closely assess the effects of payment policy on workforce retention, other than to note certain trends that have not yet been fully researched. These included the growing number of physicians and physician groups that are being folded into hospital systems either under formal direct employment or some other arrangement that links them more closely to these institutions. Also noted were the relationships of rural hospitals to the local supply of physicians and other health care professionals, and the tendency for rural towns to lose physicians after hospitals close.

RECOMMENDATION 6: Federal support should facilitate independent external evaluations of ongoing workforce programs intended to provide access to adequate health services for underserved populations and Medicare beneficiaries. These programs include the National Health Service Corps, Title VII and VIII programs under the Public Health Service Act, and related programs intended to achieve those goals.

The committee conducted a comprehensive literature review of public programs designed to improve the geographic distribution of health care professionals. Important social objectives motivated the establishment of these programs with the goal of providing access to health care services for underserved populations, including Medicare beneficiaries, but they have been funded at very low levels for several years and funding for evaluations of the programs has been quite minimal. Thus, the empirical evidence about program impact is quite limited.

Publications were located by using the Web of Science with keywords for specific public programs. This literature search was supplemented with research known to committee members. The literature on physician practice decisions published in the last three decades or so is quite limited, and there is even less information on nurse practitioners and physician assistants. Since growth in the number of nurse practitioners and physician assistants has been relatively recent, virtually all of the research reviewed by the committee dealt with physicians.

Evaluations of public programs designed to improve the geographic distribution of health practitioners are also extremely limited. For example, as noted in Chapter 4, there is some literature evaluating the performance of the National Health Service Corps (NHSC) in terms of retention of health professionals. But much less is known about effects that lack of retention has had on populations in underserved areas, measured in terms of access and quality of care received, or whether or not the existence of the NHSC has increased the number of health

professionals who would have located in these underserved areas if the NHSC programs did not exist. The research base, at least that part in the public domain, is insufficiently detailed to inform recommendations as to how NHSC effectiveness could be improved. The majority of studies have focused on the retention of physicians, and not on the numbers recruited to underserved areas or the mix of different types of clinicians.

In addition, states have implemented training programs to improve the geographic distribution of physicians. These programs generally have not been the subject of independent evaluations at all. Another problem is that the endpoints used in the studies are not comparable to allow comparisons of the effectiveness of the various public programs.

Although the committee would have liked to have reviewed a more comprehensive research base available in the public domain, many of the research findings reach positive or neutral conclusions as to program effectiveness. Therefore, the committee anticipates continued support of the programs at current levels, but also asks for much more rigorous independent evaluation of these programs in the future. These evaluations should not only focus on decision making of physicians, but be broadened to include all participating health professionals. They also should also assess impacts on populations that live in underserved areas. It is important to do much more to learn how the programs work and which program components and strategies work best to improve retention, clinical effectiveness, and population health.

CONCLUSION

Through its recommendations presented in its Phase I and II reports, the committee has fulfilled its charge to recommend improvements in the way Medicare's fee-for-service geographic payment adjustments are calculated. It is important to recognize the limitations of reliance on fee-for-service payment in encouraging health care delivery system innovations that emphasize improved population health outcomes rather than increased volume of services.

Nevertheless, even as our delivery system evolves toward such reforms, fee-for-service payment levels represent a baseline against which future payments will be compared, including geographic differences in payments. Therefore, it is essential to make fee-for-service payments as accurate as possible even as we rely less on such payments over time.

Changes in fee-for-service payments that encourage greater coordination of care may be helpful in promoting outcome-based delivery system changes. The committee's Phase I recommendations to harmonize hospital and practitioner labor market areas and data sources are examples of ways that payment changes may encourage delivery system improvements. Consistent with this harmonization is the recognition in Phase II of the vital importance of the health care workforce in achieving access and quality goals.

Appendix A-1

Technical Approach to Payment Simulations: IOM Committee Recommendations for Hospital Wage Index and Physician Geographic Adjustment Factors

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Contents

List of Exhibits

1 COMMITTEE CHANGES INCLUDED IN THE PAYMENT SIMULATIONS

Recommendations from the committee's Phase I report that have been incorporated into payment simulations are presented in Exhibit A-1 below, grouped as changes in source data, changes in labor markets used for payment areas, and changes in exceptions or adjustments. Not all recommendations could be simulated accurately. For example, the recommendation for new data on geographic variation in commercial rents (a component of the practice expense [PE] geographic practice cost index [GPCI]) could not be included in the simulations because we do not have the recommended data and could not identify a reasonable proxy. The recom-

EXHIBIT A-1 Recommended Changes in Index Construction Incorporated into Payment Simulations

Type of Recommendation	Regarding the Geographic Practice Cost Indexes	Regarding the Hospital Wage Index
Changes in Data **[Year 1 Recommendations 2-2 and 3-3]** (*Note: recommendations 5-4 and 5-7 were incorporated by CMS into 2012 rates and therefore did not need to be simulated*)	• Use health care worker wages instead of all-employer wages • Use BLS-constructed indexes from public and nonpublic data for all occupations reported for physician offices surveys • Incorporate separate benefits index (from cost reports)	• Replace hospital reported average wages with BLS-based index health care worker wages for hospital occupations • Incorporate separate benefits index (from cost reports)
Changes in Payment Areas (Market Definitions) **[Year 1 Recommendations 2-1 and 4-1]**	• Replace the 89 payment localities (88 excluding territories not included in this analysis) with CBSA-based markets for metropolitan counties and single rest-of-state areas for nonmetropolitan counties • Apply county-based smoothing based on commuting patterns across markets (practice expense and physician work GPCIs only)	• Apply county-based smoothing based on commuting patterns across markets
Changes in Exceptions and Adjustments **[Year 1 Recommendation 4-2]**	• Apply county-based smoothing based on commuting patterns across markets (practice expense and physician work GPCIs only) • Eliminate frontier floors and work GPCI floors from the index	• Eliminate frontier floors (selective replacement with other types of payment adjustments where needed) • Eliminate rural floors for metropolitan areas • Eliminate geographic reclassifications (all)

NOTES: BLS = Bureau of Labor Statistics; CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index.

mendation to incorporate geographic variation in health care worker benefits into the Bureau of Labor Statistics (BLS)-based index also cannot be implemented as envisioned without more detailed data collection; in this case, however, market-level variation in hospital worker benefits is available through Medicare cost reports, and is used as reasonable proxy.

2 TECHNICAL APPROACH

2.1 Use of BLS Data

2.1.1 New BLS-Constructed Indexes

BLS base wage indexes for the hospital wage index (HWI) and the nonphysician wage component of the PE-GPCI were computed by BLS staff at RTI's request, in order to make use of data in small markets that were suppressed from the public use files due to privacy rules. Note that this is different from current policy, in which the Centers for Medicare & Medicaid Services (CMS) computes the GPCIs directly from wages in published data.

- Both GPCI and HWI used wages reported across all health care employers, defined as North American Industry Classification System (NAICS) code 62. Indexes were constructed from the mean wage statistic. Note that this is different from current policy, in which CMS uses the published median wage statistic.[1]
- BLS computed index values using fixed employment weights for physician offices (NAICS code 621100) in the nonphysician wage component of the PE-GPCI, and for general hospitals (NAICS code 622100) in the hospital index.
- For both indexes, weights for all occupations that were reported in their respective NAICS group were used in the computations.
- Missing values for any given occupation within any given BLS area were handled by renormalizing the weights for nonmissing occupations within the affected market such that the nonmissing weights for that market would sum to 1.00. Note that this is different from current policy, where CMS replaces missing data with the national median wage.

2.1.2 Mapping BLS Areas to CBSA Markets

In most parts of the country, the BLS survey data are analyzed by geographic areas that correspond to metropolitan core-based statistical areas (CBSAs) plus multiple nonmetropolitan areas within each state composed of nonmetropolitan counties grouped at the recommendations of that state. The exception is in New England, where BLS data are analyzed by New England City and Town Areas (NECTAs). Unlike CBSAs, which are composed of whole counties, NECTAs can cross multiple counties.[2] This causes problems in mapping BLS data to individual counties, both for CMS when it computes current GPCIs and for the IOM's recommended indexes. For consistency with current CMS practice, RTI used a mapping provided to us by the CMS contractor for physician payments (Acumen LLC) to assign BLS wage values to individual counties.

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[1] Mean wages were used after it was noted that the median wages by market were more frequently suppressed in the publicly available data series; if the indexes are computed by BLS from nonpublic data, however, then median wages would be preferable in order to avoid distortion from occasional extreme values that might reflect data reporting errors.

[2] See http://www.census.gov/geo/www/2010census/gtc/gtc_cbsa.html for further definitions and discussion.

Twenty-nine counties are affected by this problem; 15 map to two NECTAs, seven map to anywhere from three to nine NECTAs, and seven map to 10 or more NECTAs. Where this occurs, an employment-weighted average of the relative wages for all NECTAs associated with a given county was computed and assigned to that county. Counties were then remapped to their payment locality, and the relative wage for the locality was computed as an RVU-weighted average of county relative wages. We note, however, that RTI's averaging may not be identical to the averages computed for CMS, and that some of the payment differences we have identified in New England areas may be due to this. It is worth emphasizing this is an area where further review might be helpful; the averaging method is a convenient, but not necessarily optimal, way to handle the problem.

Exhibit A-2 provides the number of geographic areas used for index construction in the original BLS data and the number for the final recomputed indexes for this report. GPCIs and simulations of physician payments included data from Puerto Rico but did not include data from other territories. The recomputed HWI and simulations of hospital payments did not include data from Puerto Rico, because the Inpatient Prospective Payment System (IPPS) base rates and wage index are handled somewhat differently in this territory as compared to the 50 states.

2.1.3 Adjusted Average Relative Wages vs. a Fixed-Weight Index

The most significant data change recommended by the Institute of Medicine (IOM) is the move in the HWI from a relative average hourly wage to a fixed-weight index. Addition of the benefits index to the BLS-based wage index (see Section 2.2, below) makes the BLS data more comparable to the IPPS average hourly wage data, but major differences remain due to (a) substituting BLS's average wages from all health care employers for wages paid by IPPS hospitals, and (b) substituting a fixed-weight construction with a national average hospital occupation mix as weights, for average hourly wages reflecting each individual hospital's occupation mix with only a partial adjustment to standardize for national average mix of nursing personnel. RTI found that the percent differences between the CMS occupation-mix adjusted hospital index and benefits-adjusted BLS-based index are relatively small in large markets where several hospitals contribute to the CMS hospital index, but the differences become quite large (whether

EXHIBIT A-2 Labor Markets in Source Data and Final Index Construction

	BLS-Based Wage Areas	IOM Proposed GPCI Labor Markets	IOM and CMS HWI Labor Markets
Nonmetropolitan	60	48	48
Metropolitan, CBSA-based	368	384	384
Metropolitan, NECTA-based	29	0	0
Subtotal Excluding Territories	457	432	432
Puerto Rico, Metropolitan*	8	8	0
Puerto Rico, Nonmetropolitan*	1	1	0
Total	466	441	432

NOTES: BLS = Bureau of Labor Statistics; CBSA = core-based statistical area; CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index; HWI = hospital wage index; IOM = Institute of Medicine; NECTA = New England City and Town Area.
*Payment areas in Puerto Rico are included in the HWI but are adjusted separately due to special exceptions in the computation of the standardized rates for this area. All HWI analyses for the IOM Committee exclude these areas. Payment areas in other territories are excluded from both HWI and GPCI analyses.
SOURCES: RTI Analysis of CMS Wage Index Files; Communication from Acumen LLC, received November 6, 2011.
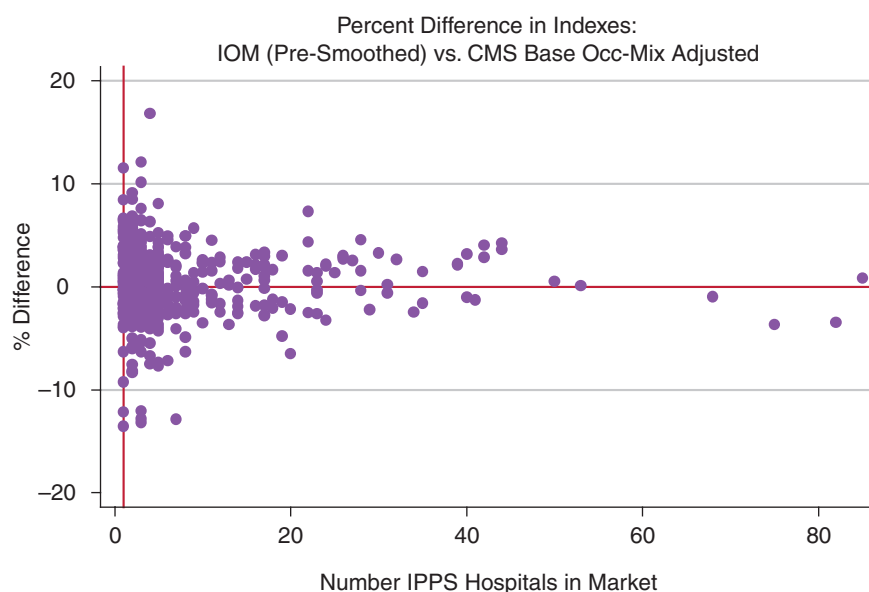
EXHIBIT A-3 Percent difference in HWI values due to data change alone, plotted against number of hospitals in labor market.

NOTE: Both indexes adjusted for budget neutrality.
SOURCE: RTI simulations.

positive or negative) as the number of hospitals contributing to the CMS hospital index declines. This is easily illustrated in a scatter plot of the percent difference against the number of IPPS hospitals per market (Exhibit A-3).

The shape of this plot suggests strongly that hospital wages could be a reasonable proxy for health care wages but only in markets where there is an adequate sample of hospitals; where there are too few hospitals, the IPPS average hourly wage, even after the partial occupation mix adjustment, is too heavily influenced by the hiring patterns of the specific hospitals in that market. The smaller the market, the less accurate the IPPS hospital index is as a measure of local variation of the exogenous price of health care labor. This is a particularly important finding in light of CMS's use of the IPPS hospital index as geographic price adjusters for other institutional settings, and one that lends strong support to the BLS data recommendation.

2.2 Addition of Benefits Index

For lack of better data at this time, the source for the independent benefits index applied to both the HWI and the work and practice expense GPCIs is the IPPS hospital cost report wage survey.[3] Data from 2009, 2010, and 2011 were combined to provide additional stability to the index. Compensation-related benefits (including payroll taxes, insurance, and pension costs)

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[3] Worksheet S-3 Parts 2 and 3, as edited and adjusted for inflation by CMS, and published in the wage index public use files. File can be found at http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY-2012-IPPS-Final-Rule-Home-Page.html.

are identified separately on these surveys, and can be used to compute an aggregate market-level average benefit cost per paid hour. This series was then converted to a national index by dividing the market-level hourly benefits figures by the national average hourly benefits figure. Budget neutrality between the base wage and benefits indexes was implemented by normalizing each to a payment-weighted average of 1.00. For each market, the two index values were then combined using the national weights for the ratio of benefits (exclusive of paid time off) to base wages, as published in the IPPS market basket and the MCI, respectively.

Exhibit A-4 shows the effects of adjusting base BLS wages for independent variation in benefits. It summarizes the distribution and regional mean values for the base wage index, the benefits index, and the resulting total compensation index, as computed for the revised HWI and for the new CBSA-based practice expense GPCI.

Accounting for variation in benefits tends to raise index values in high-wage markets and lower them in low-wage markets, widening the gap slightly between the lowest and highest index values. Puerto Rico is the only area where addition of the benefits resulted in a substantial reduction in the PE-GPCI, although a review of the data indicated that this could be due to

EXHIBIT A-4 Effects of Adjusting for Independent Area Variation in Benefits

	Hospital Wage Index			Practice Expense GPCI		
	Budget-Neutral BLS-Based Hospital Wage Index	Budget-Neutral Benefits Index	Resulting Budget-Neutral Compensation Index	BLS-Based Wage Component Index (IOM Version)	Budget-Neutral Benefits Index	Resulting Budget-Neutral Compensation Index
N (Markets)	431	431	431	441	441	441
Mean (Unweighted)	0.955	0.963	0.959	0.944	0.954	0.946
Standard Deviation	.11025	.2222	.1231	.1180	.2411	.1340
Index Values						
Minimum	0.746	0.550	0.728	0.462	0.227	0.430
5th percentile	0.821	0.696	0.809	0.815	0.676	0.793
25th percentile	0.876	0.814	0.875	0.877	0.811	0.872
50th percentile	0.931	0.933	0.931	0.940	0.933	0.932
75th percentile	1.007	1.049	1.021	1.007	1.050	1.018
95th percentile	1.160	1.392	1.177	1.152	1.382	1.156
Maximum	1.487	1.973	1.591	1.373	1.984	1.501
Average Values, by Region and Rural/Urban Status						
Northeast–metro.	1.107	1.149	1.121	1.109	1.188	1.127
–Nonmetro.	0.921	0.955	0.932	0.92	0.959	0.929
Midwest–metro.	0.975	0.997	0.985	0.982	0.996	0.986
–Nonmetro.	0.87	0.911	0.883	0.867	0.916	0.879
South–metro.	0.962	0.846	0.942	0.956	0.853	0.936
–Nonmetro.	0.865	0.759	0.847	0.848	0.767	0.832
West–metro.	1.134	1.176	1.148	1.088	1.181	1.109
–Nonmetro.	0.98	1.026	0.994	0.947	1.019	0.963
Puerto Rico–metro.	—	—	—	0.567	0.339	0.521
–Nonmetro.	—	—	—	0.873	0.858	0.871

NOTES: BLS = Bureau of Labor Statistics; GPCI = geographic practice cost index; IOM = Institute of Medicine.
SOURCES: RTI Simulations; Wage Index Public Use Files published for FY 2010 through FY 2012.

underreporting of benefits on the Medicare Hospital Cost Report. Nevertheless there are still significant regional differences in relative benefit levels, indicating that it is important to incorporate benefits into wage index.

2.3 Redefined GPCI Payment Areas

Payment areas for the GPCIs were reconfigured as CBSA markets by reaggregating county-level data to CBSA and statewide nonmetropolitan areas, using total county relative value unit (RVU) to weight each county index within the revised market (see Section 2.5.2). Redefining the payment areas into separate metropolitan and nonmetropolitan markets has a systematically negative effect in the index values for nearly all rural counties, but it also has a surprisingly large impact in many metropolitan areas. This is due to the fact that for the 34 current payment localities that are *not* statewide, the division into urban and rest-of-state areas does not always conform to metropolitan and nonmetropolitan CBSA designations, and consequently the effect of regrouping counties based on CBSA metropolitan areas is less predictable. Among metropolitan counties, converting to CBSA markets reduces the GPCIs for roughly half and increases them for roughly half. In contrast, converting to CBSA markets reduces the GPCIs for 99 percent of nonmetropolitan counties. Exhibit A-5 provides additional detail on the county-level impact of redefining the GPCI payment areas, broken down by region and by the type of current payment locality.

2.4 Smoothing

The approach recommended by the committee for commuter-based smoothing adjustments is described in detail in the Phase I report, where it was illustrated using the 2000 "long form" census data that is used by CMS to implement the "Section 505" outmigration adjustments. For these simulations, the IOM obtained special tabulations of data from the most recent 5-year summary "Journey to Work" section of the American Community Survey (ACS).[4]

Commuter-pattern based smoothing is predicated on the assumption that economic integration across CBSAs or other county-based markets can represent inaccuracies in the labor markets as defined. This is seen most clearly when the wage indexes of adjoining markets are substantially different and employers compete for workers across the county-drawn boundaries. To reduce the number of arbitrary "cliffs" in the wage index—where index values differ sharply at market boundaries but economic integration (as demonstrated by the commuting) is evident at the geographic edges of these markets, the committee recommended computing county-level adjustments based on commuter-weighted averages of the index values in neighboring markets. Where workers commute in or out of counties that are part of the same labor market, no change in the index occurs; where workers commute in or out of markets with relatively little difference in their wage indexes, only small changes result. Where workers commute in or out of markets with large differences (the "cliffs"), large changes occur. Chapter 3 of the IOM's Phase I report provides detailed examples of how these adjustments are calculated for the HWI.

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[4] Discussion of this survey can be found in Chapter 5 of the first report, *Geographic Adjustment in Medicare Payment: Phase I: Improving Accuracy* (Washington, DC: The National Academies Press). Unlike the 2000 census "long form" data, the ACS data are from community samples. Complete national county-level data are available only from the 5-year summary files due to sample size issues. Special tabulations were provided to the IOM that were run for the county commuting patterns of all health care workers.

EXHIBIT A-5 County Assignments by Region, Type of Payment Locality, and CBSA Market

Region and Type of CBSA-Based Market	Statewide Payment Localities		Non-Statewide Payment Localities				All Payment Localities	
			Urban		Rest-of-State			
	Number of Counties	Percent Total RVUs	Number of Counties	Percent Total RVUs	Number of Counties	Percent Total RVUs	Number of Counties	Percent Total RVUs
Northeast								
Metropolitan markets	17	5.6%	34	31.4%	72	19.5%	123	18.6
State nonmetro. counties	20	0.9%	4	0.2%	70	3.0%	94	1.4%
Midwest								
Metropolitan markets	185	25.6%	24	18.4%	76	8.2%	285	17.6%
State nonmetro. counties	477	5.5%	3	0.04%	197	3.4%	677	3.0%
South								
Metropolitan markets	240	33.5%	48	32.3%	270	43.5%	558	36.1%
State nonmetro. counties	480	11.7%	1	0.1%	390	6.0%	871	5.9%
West								
Metropolitan markets	75	15.1%	15	17.7%	50	15.0%	140	15.8%
State nonmetro. counties	331	3.0%	0		68	1.3%	399	1.4%
Puerto Rico								
Metropolitan markets	68	1.0%	0	0	0	0	68	0.3%
State nonmetro. counties	10	<0.05%	0	0	0	0	10	<0.05%
National								
Metropolitan markets	585	79.3%	121	99.7%	468	86.2%	1,174	88.3%
State nonmetro. counties	**1,318**	**20.7%**	**8**	**0.3%**	**725**	**13.8%**	**2.051**	**11.7%**
All Counties	1,804	100.0%	129	100.0%	1,193	100.0%	3,225	100.0%

NOTES: CBSA = core-based statistical area; RVU = relative value unit.
SOURCE: RTI Analysis of CMS GPCI County Data File for 2012.

For the simulations in the year 2 report, smoothing adjustments have been computed for the revised HWI, for the CBSA wage component of the practice expense GPCI and work GPCI, and for the payment locality-based GPCIs. Exhibit A-6 shows the distribution of smoothing factors applied to the new HWI and the CBSA GPCIs. For most counties, smoothing adjustments are very small.

    RTI found find that smoothing behaves exactly as was expected: commuters tend to move from lower-wage areas to higher-wage areas (making positive adjustments more common

EXHIBIT A-6 County Smoothing Adjustments, by Type of Index

	For Hospital Wage Index	For GPCIs		
		PE, Wage Component	PE, Service Component	Physician 25% Work PE
Number of Counties Affected	1,573	3,220	3,220	3,220
Value of Smoothing Factors				
Mean	1.0050	1.0055	1.0028	1.0009
Standard Deviation	0.0133	0.01710	0.0099	0.0037
Minimum	0.9720	0.8983	0.9280	0.9682
1st Percentile	0.9860	0.9770	0.9801	0.9908
10th Percentile	0.9960	0.9960	0.9977	0.9990
50th Percentile	1	1	1	1
90th Percentile	1.0190	1.0233	1.0129	1.0045
99th Percentile	1.0670	1.0747	1.0382	1.0128
Maximum	1.1240	1.1984	1.1393	1.0563

NOTES: Smoothing adjustments computed for CBSA markets. GPCI = geographic practice cost index; PE = practice expense.
SOURCES: RTI simulations; American Community Survey 5-Year Journey-to-Work data.

than negative ones), commuting across market boundaries is more common in counties that are adjacent to other markets, and the largest smoothing adjustments are computed for rural counties adjacent to metropolitan areas. Exhibit A-7 confirms this in a graph of the average smoothing factors by USDA Rural–Urban Continuum Code.

The committee considers the smoothing adjustment to be a type of refinement to the labor markets, one that reduces inaccuracies caused by the inherent limitation of representing economic markets by fixed political boundaries. The IOM committee's version of smoothing adjustment is similar in many ways to the outmigration adjustment that CMS now computes for hospitals that are not reclassified, but the CMS adjustments are only positive; commuting patterns from a higher to a lower-index market are not included in the computations. Exhibit A-8 compares the size of commuter-based smoothing adjustments to the size of CMS' outmigration adjustments as well as reclassifications.

2.5 County Indicators for Health Professional Shortage Areas

2.5.1 Background

The Health Resource Services Administration (HRSA) identifies Health Professional Shortage Areas geographically (by census tract) and by specific institution (Federally Qualified Health Centers or other safety net providers).[5] HRSA also maps these designated areas or populations to counties, and provides a three-level county shortage area indicator that is published annually in the Area Resource File (ARF). In the ARF variable, counties are identified only as "not a shortage county," a "full shortage county," and a "partial shortage county." Many counties are identified as "partial," particularly in metropolitan areas, and "partial" status gives no indication

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[5] See http://bhpr.hrsa.gov/shortage.

For Hospital Wage Index
(Unit of Observation Is Hospital)

Plots exclude extreme values.
Shaded areas incorporate 25th to 75th percentile.

For PE-GPCI (Wage Component)
(Unit of Observation Is County)

Plots exclude extreme values.
Shaded areas incorporate 25th to 75th percentile.
RUCC categories not available for Puerto Rico.
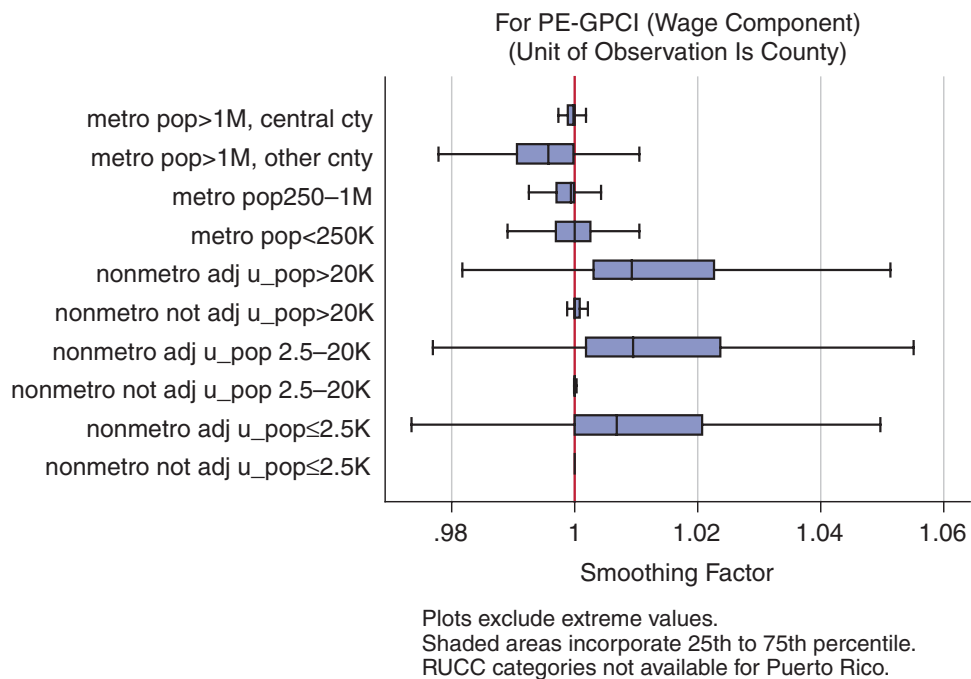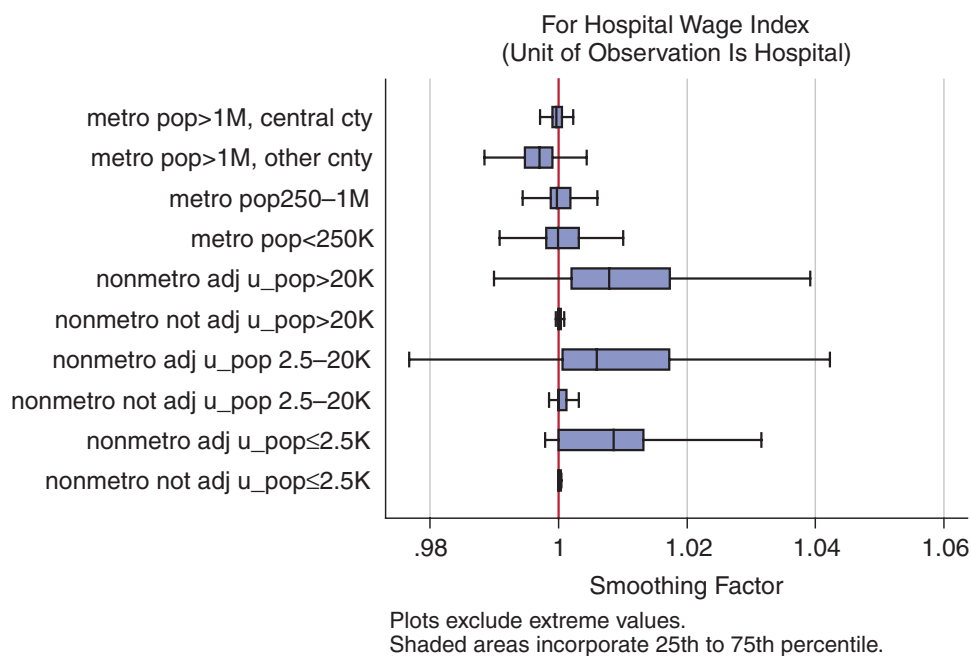
EXHIBIT A-7 Commuter-based smoothing adjustments by Rural–Urban Continuum Code.
NOTES: Smoothing adjustments computed for CBSA markets. Adjustments have been made budget-neutral to offset the effect of a larger number of positive than negative adjustments.
SOURCE: RTI simulations; American Community Survey 5-Year Journey-to-Work data.

EXHIBIT A-8 IOM Committee's Recommended Smoothing Adjustments Compared to Current Outmigration Adjustments Under "Section 505" and Related Reclassifications

	IOM Committee Proposed Smoothing Adjustments	Current Section 505 Outmigration Adjustments	Current Reclassification Adjustments
N (Hospitals with Non-Zero Adjustment)	**3,142**	**270**	**913***
Positive adjustments	1,533	270	913
Negative adjustment	1,609	N/A	N/A
	Proportional Adjustment to Index		
Mean	1.003	1.018	1.065
Standard Deviation	0.0110	0.01922	0.0614
Minimum	0.972	1.0001	1.0001
5th Percentile	0.994	1.0005	1.002
25th Percentile	0.999	1.003	1.016
50th Percentile	0.99996	1.011	1.048
75th Percentile	1.004	1.029	1.095
99th Percentile	1.024	1.053	1.186
Maximum	1.124	1.095	1.365

NOTES: CBSA = core-based statistical area; IOM = Institute of Medicine.
*Additional hospitals were identified in the 2012 payment impact file as having reclassified wage index values that were lower than the non-reclassified values for their geographic labor market, which could be due to anomalies in the timing of provider requests. We have only counted reclassified hospitals where the post-reclassified index is higher than the geographic index. Smoothing adjustments are computed for CBSA markets.
SOURCES: RTI simulations; 2012 IOPPS Impact File; American Community Survey 5-Year Journey-to-Work data.

whether the portion of a county's population that is located in shortage areas is 5 percent or 95 percent.

HRSA also provides data to CMS that identifies primary care shortage areas by ZIP code, using the data from the geographic shortage areas (i.e., census tracts).[6] There are more than 7,000 ZIP codes identified by CMS as eligible for the primary care bonus area. Bonuses are paid based on the location of services delivered, rather than residence of the beneficiary.

Because the committee felt that the ARF indicator does not provide a strong enough basis to evaluate the impact of the committee's recommendations on actual shortage area populations, RTI developed a revised county indicator based on the estimated portion of a county's population that lives within the ZIP codes identified as eligible for the primary care shortage area bonus payments.[7] Eligible ZIP codes were mapped to counties using a purchased file that tracks the portions of ZIP codes that overlap county boundaries, and that also provides a weight to use in developing a proxy measure for how much of any one county's population is covered by the eligible ZIP codes.

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[6] The source file for ZIP codes is publicly available at http://www.cms.hhs.gov/Medicare/Medicare-Fee-for-Service-Payment/HPSAPSAPhysicianBonuses/index.html?redirect=/hpsapsaphysicianbonuses.
[7] The source file for mapping ZIP codes to counties was purchased from CD Light, LLC, and downloaded from http://www.zipinfo.com/index.htm.

2.5.2 Computation

ZIP codes do not lend themselves easily to being mapped back to individual counties, since roughly one in five overlaps county boundaries. The file purchased by RTI has a record for every ZIP code–county pair as of January 1, 2012. The file does not have population estimates or land area for each record, but it does publish the number of addresses associated with each record, which can be adjusted for use as a proxy for population weights. Adjustments are made to back out address counts for specialized ZIP codes including those for the military and ZIP codes that are used for individual office buildings or large corporations; addresses were not counted for these two types of codes. This reduces, though cannot eliminate, overcounting from business addresses being added to residential. The number of addresses will always be larger than the number of residents, but if the overstatement is proportionally similar across all counties then the distribution of the adjusted address count would still be an unbiased estimate of the distribution of the population. Since this assumption is unlikely, we tested the correlation of the adjusted address counts aggregated to the county level with total county population and also with total Medicare Part B fee-for-service enrollees, by rural and regional location.[8] As shown in Exhibit A-9, the results indicate that with the exception of nonmetropolitan counties in the Northeast, the address statistic correlates very well with population, indicating that this approach to redefining counties by level of primary care shortage areas is acceptable for purposes of assessing the impact of the IOM committee's recommended changes on populations living in shortage areas.

For each county we then computed the proportion of total population (as estimated by the adjusted address counts) located in bonus-eligible ZIP codes to the total for that county. The distribution of this statistic across counties is extremely bimodal (Exhibit A-10).

Given the shape of this distribution, we constructed a five-level categorical variable assigned to each county using cut points at 0 percent, greater than 0 and up to or equal to 20 percent, greater than 20 percent and up to or equal to 80 percent, greater than 80 percent and up to but not including 100 percent, and 100 percent. Exhibit A-11 identifies the number of metropolitan and nonmetropolitan counties in each of these five categories, as well as the share of Part B fee-for-service enrollees and Part B RVUs billed by primary care providers.

2.6 Payment Simulations

2.6.1 Hospital Computations

Hospital payment estimates were made at the IPPS provider level, taking into account all current payment factors as identified in the most recent IPPS Impact Files and payment tables and published for IPPS final rules for FY 2012.[9] Source documents needed to do this include the following:

- *CMS IPPS Impact Files for FY 2012*, for data on providers' geographic market; number of transfer-adjusted discharges; transfer-adjusted case-mix index (CMI); indirect medical

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[8] We used fee-for-service enrollees because these are the beneficiaries that would be affected by any change in the geographic adjusters. Because Medicare managed care enrollment varies sharply by location, this statistic does not necessarily correlate with related population statistics.

[9] All files can be found at http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY-2012-IPPS-Final-Rule-Home-Page.html.

EXHIBIT A-9 Correlation of Adjusted ZIP Code–to-County Address Counts to Population and Beneficiary Statistics

Pearson Correlation Coefficients

Census Region	Metropolitan Counties		Nonmetropolitan Counties	
	Adjusted Address Count to Total Population	Adjusted Address Count to Part B Fee-for-Service Beneficiaries	Adjusted Address Count to Total Population	Adjusted Address Count to Part B Fee-for-Service Beneficiaries
Northeast	0.917	0.848	0.537	0.516
Midwest	0.992	0.987	0.899	0.890
South	0.973	0.954	0.831	0.821
West	0.995	0.990	0.956	0.914
All Regions	0.978	0.957	0.823	0.823

SOURCES: RTI analysis of CMS primary care bonus ZIP codes (2012); CMS Part B enrollee file (2010); HRSA Area Resource File (2010).

education (IME) and disproportionate share (DSH) adjusters; outlier payments as percent of total; applicable cost-of-living adjuster (COLA); Section 505 outmigration adjustments; and final post-reclassification wage index. Data for Indian Health Service providers and providers in Puerto Rico and other territories are excluded from the computations.

Payments for rural hospitals subject to the "lower of" hospital-specific rates or IPPS rates. Sole community hospitals (SCHs) and Medicare-dependent hospitals (MDHs) were treated as traditional IPPS providers.

Distribution of Proportion of County Addresses Located in Shortage Area ZIP
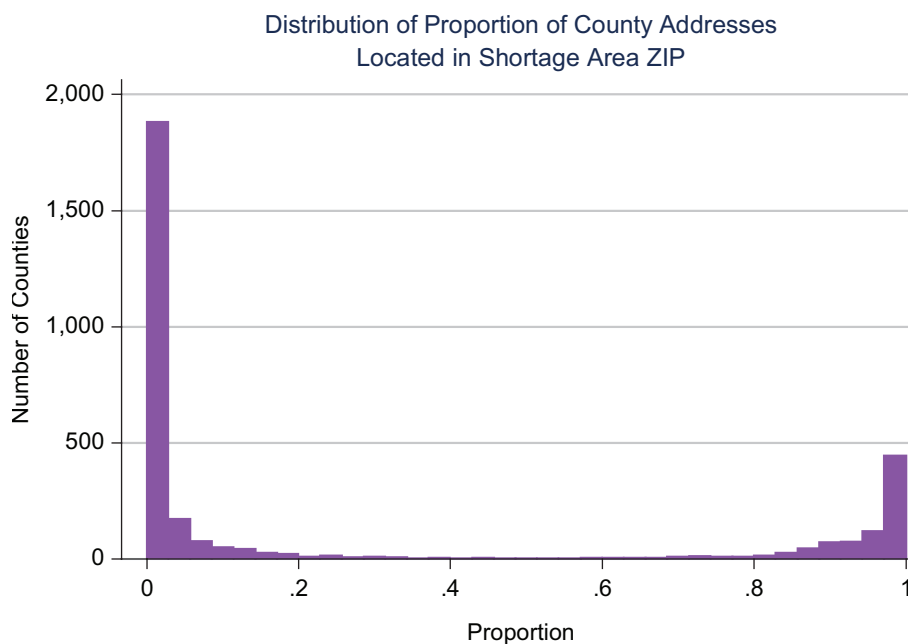
EXHIBIT A-10 Distribution of estimated proportion of county population in primary care shortage areas.

EXHIBIT A-11 Distribution of Counties, Part B Enrollees, and RVUs Billed by Primary Care Practitioners, by Revised HPSA County Status

HPSA County Status (by Estimated Share of County Population in CMS Primary Care Bonus Areas)	Metropolitan			Nonmetropolitan		
	Number of Counties	Share of Part B Fee-for-Service Enrollees	Share of Primary Care RVUs[a]	Number of Counties	Share of Part B Fee-for-Service Enrollees	Share of Primary Care RVUs[a]
Non HPSA: 0%	558	0.365	0.384	658	0.089	0.063
Partial: ≤20%	415	0.369	0.437	650	0.096	0.075
Partial: 20%–80%	51	0.011	0.008	89	0.010	0.005
Partial: 80%–<100%	119	0.012	0.005	430	0.032	0.013
Full HPSA: 100%	31	0.004	0.003	224	0.012	0.006
All Counties	1,174	0.761	0.836	2,051	0.239	0.164

NOTES: CMS = Centers for Medicare & Medicaid Services; HPSA = Health Professional Shortage Area; RVU = relative value unit.
[a]Defined as Part B RVUs billed in 2010 by physicians self-identified as family practitioners, internists, pediatricians or geriatricians, nurse practitioners, nurse midwives, and physician assistants.
SOURCES: RTI analysis of CMS primary care bonus ZIP codes (2012); CMS Part B enrollee file (2010); HRSA Area Resource File (2010).

- *CMS Table 1A and 1B for FY 2012*, to identify the standardized operating and capital payment amounts.
- *CMS Wage Index Public Use Files*, to identify pre- and post–occupation-mix-adjusted index values, pre- and post-reclassification index files; application of frontier floors; and application of Section 505 outmigration adjustments.

Smoothing adjustment factors were computed only after the revised BLS-based indexes were computed. This is because the size of the smoothing factor is a function of the proportion of health care workers commuting out of each county and the HWI of the county to which the worker is commuting, as described in Section 2.4. Smoothing adjustments were then also *applied* at the county level (i.e., to all IPPS hospitals in the applicable county), creating slight differences in HWIs within a given market.

Payments under the various index options were estimated as follows:

- All applicable CMS and BLS-based index values were merged into the provider-level file based on their labor market code (combined "CBSA X state" or "rest-of-state").
- All providers were assigned the standardized IPPS payment rate per discharge from CMS Tables 1A and 1B using the full update rather the reduced update. (A very small number of providers that do not submit quality data for the Hospital Compare web site are penalized by being given reduced standardized rates. They can be identified in the CMS Provider Specific Files [PSFs], but there are not enough of them to make a difference to these simulations.)
- Consistent with current policy, the labor-related share was set to 0.688 for providers located in labor markets with index values of 1.00 or higher, and it was set to 0.620 for providers located in labor markets with index values below 1.00.

- The provider's diagnosis-related group (DRG) payment rate is the sum of its operating rate and its capital rate.

  Whichever wage index is being tested, the provider's *operating rate* is computed as

$$[\text{labor share} \times \text{national operating rate} \times$$
$$(1 + \text{operating IME\%} + \text{operating DSH\%}) \times \text{HWI}]$$
$$+$$
$$[(1 - \text{labor share}) \times \text{national operating rate} \times$$
$$(1 + \text{operating IME\%} + \text{operating DSH\%}) \times \text{cola}]$$

  Whichever wage index is being tested, the provider's *capital rate* is computed as:

$$[(\text{national capital rate} \times \text{HWI}^{.6847}) \times$$
$$(1 + \text{capital IME\%} + \text{capital DSH\%})] \times \text{capital cola}$$

  Note that there is no labor related share for capital costs in the IPPS formula; instead, CMS computes the capital cost geographic adjustment factor (capital GAF) by raising the HWI to the power of 0.6847.[10]

- For each provider, an estimate of aggregate DRG payments *excluding outliers* is computed by multiplying the sum of the operating and capital rates times the transfer-adjusted discharge count and the transfer-adjusted case-mix index.[11]

$$(\text{operating rate} + \text{capital rate}) \times \text{transadj discharges} \times \text{transadj CMI}$$

  An estimate of aggregate DRG payments *including outlier payments* can be derived making use of the Impact File's published statistic of outlier payments as a percent of total prospective payment system (PPS) payments. The computation is

$$[(\text{operating rate} + \text{capital rate}) \times \text{transadj discharges} \times \text{transadj CMI}] \div (1 - \text{outlier\%})$$

Payments for any IPPS provider can be estimated in this manner, for any wage index that is being modeled. Separate smoothing factor calculations must be made, however, for each difference index that is modeled. Also see Section 2.7, below, for a discussion of how budget neutrality computations affect each of the indexes prior to final payment estimation.

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[10] The exponent 0.6847 is the coefficient derived from a regression of the natural log of average total costs per discharge on the natural log of the wage index using 1988 data, estimated at the time that capital PPS payment was first implemented. The computed capital GAF can be found in the wage index public use files each year. The coefficient represents a statistical estimate of the labor-related share of total (i.e., operating plus capital) costs per Medicare discharge.

[11] "Transfer-adjusted" means that the total number of Medicare discharges has been adjusted to account for cases with short-stay transfers to another hospital, or for certain Medicare severity diagnosis-related groups (MS-DRGs), postacute provider. Short-stay transfers are defined as transfers occurring before the geometric mean length of stay for the patient's assigned MS-DRG, less 1 day. For cases qualifying as a short-stay transfer, DRG payments are reduced proportionally based on the number of actual days. The "transfer adjustment" used in this formula is computed by CMS based on the specific reductions to the payments for the cases qualifying as transfers.

2.6.2 Physician Computations

Estimates for the effects on physician and other practitioner payments were made at the county level, using all of the component county indexes and RVU data provided as published for the final rules for CY 2012.[12] Each year CMS publishes a *GPCI County Data File*, containing component index values at the county level as well as total RVUs billed from each county. Much of the information in this file does not originate as county-level data (for example, the source data for both indexes computed from BLS data is CBSA based and the malpractice data is state based), but CMS maps the information back to the county level and provides the appropriate type of RVUs that allow us to compute RVU-weighted averages for different geographic aggregates, including the current CMS payment localities and CBSA markets. Source data used from this file for payment computations include

- three component indexes used to construct the PE-GPCI (nonphysician wages, purchased services, rent);
- the physician work index, equal to one-quarter of the index computed on BLS data for the XX proxy professions;
  - o the malpractice index;
  - o physician work, malpractice, and PE-RVUs; and
  - o county payment locality assignment.

RTI merged CBSA codes, and the IOM committee revised nonphysician wage index and the independent benefits index into this file. County-level PE-GPCIs were computed using CMS as well as recommended IOM committee data, using the following formula as published in the final rules:

$$\text{PE-GPCI} =$$
$$[(0.19153 \times \text{nonphysician wage index}) + (0.1023 \times \text{rent index}) + (0.08095 \times \text{service index}) + 0.09968] \div (0.019453 + 0.1023 + 0.08095 + 0.09968)$$

(Note that 9.968 percent of the PE-GPCI is left unadjusted for geographic variation.) PE-GPCIs were computed for the CMS data as published with frontier floors, for the CMS data without the frontier floors, for the recommended IOM committee wage data without benefits, and for the recommended IOM committee wage data with benefits but no smoothing. Additional physician work GPCIs were also computed using CMS data but excluding the current Alaska floor of 1.50, for a work GPCI that was not adjusted to one-quarter of the proxy professional index, and for a "0 percent" work GPCI (allowing us to compute payments under no physician work adjustment).

The resulting PE-GPCI, work GPCI, and malpractice GPCI were each then aggregated from county level to (a) CMS payment localities and (b) CBSA markets, using RVU-weighted averages. Although not used directly to compute payments, an aggregate average GPCI referred to as the geographic adjustment factor, or GAF, was computed for each variation on the data and for each payment area, based on the national average mix of RVUs, as follows:

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[12] Found at http://www.cms.hhs.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeeSched/PFS-Federal-Regulation-Notices-Items/CMS1253669.html.

$$GAF = (0.47439 \times \text{PE-GPCI}) + (0.48266 \times \text{work GPCI}) + (0.04295 \times \text{malpractice GPCI})$$

The GAF is used by CMS and policy analysts for convenience, as a shorthand way to express overall payment differences. Since no two payment areas (or counties) have exactly the same distribution of RVUs, however, the GAF provides only an approximation of actual geographic payment adjustments.

Smoothing adjustment factors were computed only after the first round of GPCI computations were made, at both the payment locality and CBSA market level. This is because the size of the smoothing factor is a function of the proportion of health care workers commuting out of each county and the area GPCI of the county to which the worker is commuting, as described in Section 2.3. Smoothing adjustments were then also *applied* at the county level, creating slight differences in GPCIs within a given market.

For each county, regardless of which GPCI is used or which payment area is used, aggregate physician payments are computed by multiplying each of the three types of RVUs by their respective GPCIs (after application of smoothing factors, if applicable), summing the three products, and multiplying this sum by the current conversion factor (CF). The computation is

$$\text{County\$} = [(\text{PEGPCI} \times \text{PE RVU}) + (\text{work GPCI} \times \text{work RVU}) + (\text{malpr GPCI} \times \text{malpr RVU})] \times CF$$

Payments for any county can be estimated in this manner, using any GPCI and any level of county aggregation for payment areas. Separate smoothing factor calculations must be made for each different index that is modeled. Also see Section 2.7, below, for a discussion of how budget neutrality computations affect each of the component indexes prior to final payment estimation.

2.6.3 Payment Impact Computations

For both HWI and GPCI simulations, payment impact was computed for three intermediate levels and for the net impact of all IOM committee recommendations combined. The three intermediate levels correspond to the three types of recommendations as outlined in Exhibit A-1. Payment impact is expressed as the difference between payments computed under one or more IOM committee recommendation(s) and payments computed without the recommendation(s), expressed as a percent relative to payments without the recommendation(s). Computations are as follows:

For hospital impact:
- *Difference due to data changes* isolates the effect of the move from the CMS hospital data to the BLS data as adjusted for benefits. Payments are computed using the benefits-adjusted BLS-based hospital index only, without market smoothing, and then compared to payments computed using CMS's occupation-mix–adjusted index, without frontiers, reclassification, or outmigration adjustment.
- *Difference due to market changes* isolates the effect of commuter-based smoothing adjustments only, as this is the only market-based change among the recommendations for the HWI. Payments are computed using the benefits-adjusted BLS-based hospital index after smoothing and then compared to payments computed using the benefits-adjusted BLS-based hospital index before smoothing.

- *Difference due to the elimination of policy adjustments* isolates the effect of eliminating reclassifications, Lugar counties, rural floors, frontier state floors, and outmigration adjustments.[13] None of these adjustments is included in the IOM committee recommendations, consequently the only way to isolate their impact is to simulate CMS payments in the absence of the adjustments (using a budget-neutrality–adjusted version of CMS's occupation-mix–adjusted wage index) and compare these to CMS payments under current policy.

For physician payment impact:
- *Difference due to data changes* isolates the effect of the move from publicly available BLS data to internally computed indexes, moving from wages reported by physician office employers to wages reported by all health care employers, and adding the independent benefits index. Payments are computed using the IOM committee's recommended benefits-adjusted BLS-based physician office wage index only (without market smoothing) and *retaining* the 88 payment localities, and then compared to payments computed using the CMS GPCIs without the frontier floors (also computed over the 88 payment areas).
- *Differences due to market changes* isolate the effect of the using CBSA markets rather than the 88 payment localities. Payments are computed using all of the IOM committee recommendations including the market change, and then payments are compared to payments computed using all of the IOM committee recommendations *except* the market change (that is, using an index that reflects the IOM committee data aggregated to the level of the 88 payment localities).
- *Difference due to elimination of policy adjustments* isolates the effect of removing the frontier floors from the PE-GPCI and the 1.50 floor from the physician work GPCI in Alaska. Payments are computed using CMS GPCIs and CMS payment areas but without floors, and compared to payments computed according to current CMS policy.

2.7 Budget Neutrality

The HWI and the physician geographic price indexes are required by statute to be budget-neutral, in the sense that the aggregate amount of payments after applying geographic adjustments must be the same as aggregate payments without any adjustment. A few special exceptions to the adjustments—including the frontier state floors and the outmigration adjustments for certain hospitals—have been explicitly exempted from this requirement. For purposes of these simulations, all of the indexes constructed to incorporate IOM committee recommendations have been made budget-neutral with respect to aggregate payments under current CMS policy, which includes any additional payments created by these special exempted exceptions.

Budget neutrality is a condition that is imposed on most special provisions of the PPS and the physician/practitioner payment system. Budget neutrality imposed on geographic price adjusters can be implemented with an across-the-board adjustment to the indexes themselves,

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[13] While outmigration adjustments can be thought of as a CMS version of the commuter-based smoothing, they are implemented only for hospitals that are not reclassified, and therefore are hard to separate from reclassifications (they are also implemented only as a positive adjustment, and therefore more of a policy adjustment than a market refinement). For this reason, we have grouped outmigration adjustments with other policy adjustments in the analyses.

EXHIBIT A-12 Budget Neutrality Factors Imposed on IOM Committee Indexes

Hospital Wage Index	
IOM committee proposed index made neutral to CMS final post-reclassification	1.0175011

GPCI Components, If Using Current Payment Localities for CMS and IOM Committee Indexes	
IOM committee PE smoothed wage component, made neutral to CMS wage component	1.004498
IOM committee PE smoothed service component, made neutral to CMS service component	0.999000
IOM committee smoothed work GPCI, made neutral to CMS work GPCI	0.999600

GPCI Components, If Using Current CBSA Markets for IOM Committee Index Only	
IOM committee PE smoothed wage component, made neutral to CMS wage component	1.004240
IOM committee PE smoothed service component, made neutral to CMS service component	0.998920
IOM committee smoothed work GPCI, made neutral to CMS work GPCI	0.999600

NOTES: CBSA = core-based statistical area; CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index; IOM = Institute of Medicine; PE = practice expense.
SOURCE: RTI Simulations.

or it can be implemented at the end of the rate-setting process by altering the underlying national standardized rate or conversion factor. In keeping with CMS's current approach, we have imposed budget neutrality to current CMS payments using across-the-board adjustments to the index values.

For the GPCIs, budget neutrality factors are computed by estimating aggregate payments under both the IOM committee recommendations and under CMS policy and dividing the IOM committee estimate by the CMS estimate. All index values constructed from IOM committee recommendations are then divided by this factor to achieve a budget-neutral index, and IOM committee payments are then reestimated using this adjusted index. This is computationally equivalent to saying that final payment-weighted averages of the two indexes being compared will be 1.00.

Adjusting the HWI for budget neutrality requires several more steps to account for (a) the labor related share that is applicable to operating costs and (b) a separate wage index adjustment that is applicable to capital costs. Specifically, the wage index is applied to either 62 or 68.8 percent of the operating rate, but it is applied to a variable proportion of the capital rate because it is based on an exponential function (as described in Section 2.6.1). For operating costs, the neutrality factor would have to be adjusted as follows:

$$\text{Neutrality Factor} = NF = \Sigma \, IOM_{pmts} \div \Sigma \, CMS_{pmts}$$
$$\text{HWI Neutrality Adjuster} = [(1 - NF) \times \text{labor share}] + 1$$

The neutrality adjustment for combined operating and capital payments is only *approximately* equal to this adjusted neutrality factor. While it is possible to compute separate HWI operating and capital neutrality factors, for ease of computation RTI simply iterated (starting at a value between 62 and 68.8 percent of the computed payment ratio) and recomputed payments until arriving at a value that resulted in equivalency between the two sets of payments.

Because there are several steps in the payment computations, and because RTI simulated payment impacts for subsets of the recommendations as well as for all of them combined,

multiple neutrality factors had to be computed.[14] The final neutrality adjustment factors for the HWI and each of the three GPCIs are presented in Exhibit A-12.

The HWI neutrality factor is larger than the GPCI neutrality factors because of the shift from hospital to BLS data. By construction, the employment-weighted average of the BLS-based index is always 1.00—or put another way, the index is normalized to a value 1.00 based on employment. In contrast, the CMS HWI is normalized to a value of 1.00 based on hospital hours paid (although CMS budget neutrality factors ultimately adjust this to a value of 1.00 based on payment dollars). The HWI neutrality adjustment effectively renormalizes the BLS-based index to a value of 1.00 based on payment dollars.

3 PAYMENT IMPACT EXHIBITS

Exhibits A-13 through A-30 are offered to provide additional detail on the payment simulation results. They are divided into Section 3.1 (related to impact on IPPS hospital payments) and Section 3.2 (related to impact on physician payments). They are presented without commentary, but are offered to supplement the analyses provided in Chapter 2 of the main report.

3.1 IPPS Hospital Estimates

3.2 Part B Physician and Other Practitioner Estimates

Combined Effects of All Recommendations
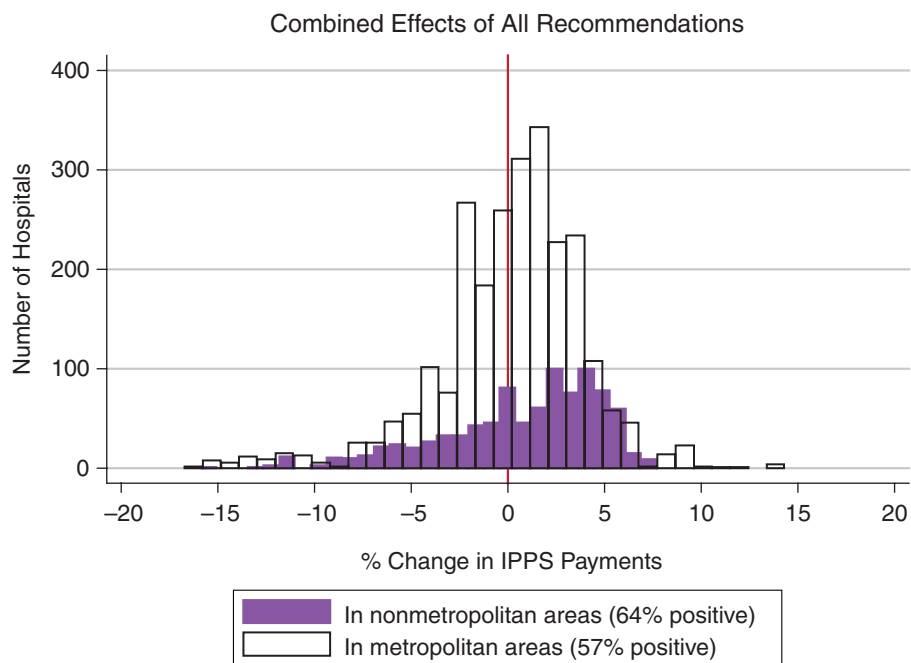
EXHIBIT A-13 Distribution of payment impact across all IPPS hospitals.
SOURCE: RTI simulations.

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[14] For example, before adding the independent benefits index to the base wage indexes, it was necessary to impose a budget neutrality adjustment on both such that the payment-weighted average of both would equal 1.00.

EXHIBIT A-14 Estimated Change in IPPS Payments, Isolated by Type of IOM Committee Recommendation

	Percent Difference in Estimated IPPS Payments (IOM Committee Relative to Current Policy)			
	Data (isolated effect of move to BLS-based wages)	**Market** (isolated effect of smoothing)	**Policy** (isolated effect of eliminating adjustments, reclassifications and floors)	**All** (combined effects of all IOM committee recommendations—payments under final IOM committee recommended HWI compared to payments under current CMS policy)
	Compares payments under benefits-adjusted BLS-based index with no other adjustments to payments under CMS's occupation-mix–adjusted index	*Compares payments under benefits-adjusted BLS-based index after smoothing to payments under benefits-adjusted BLS-based index before smoothing*	*Compares payments under CMS final post-reclassified index to payments under CMS's occupation-mix–adjusted index*	
Distribution Across Hospitals				
Minimum	–13.5%	–1.8%	–15.0%	–16.7%
5th percentile	–3.7%	–0.5%	–1.8%	–6.8%
25th percentile	–1.6%	–0.1%	–1.5%	–1.9%
50th percentile	0.5%	–0.1%	–1.4%	0.7%
75th percentile	2.4%	0.1%	0.4%	3.0%
95th percentile	4.5%	1.4%	8.2%	5.4%
Maximum	16.8%	7.7%	21.9%	14.3%
Average by Region and Metropolitan Status				
Northeast–metro.	–0.9%	0.05%	–1.9%	–2.7%
–Nonmetro.	1.8%	0.4%	–2.5%	–0.3%
Midwest–metro.	0.5%	–0.1%	0.9%	1.4%
–Nonmetro.	1.9%	0.3%	–2.6%	–0.5%
South–metro.	0.8%	–0.1%	1.1%	1.9%
–Nonmetro.	–0.9%	0.4%	–2.6%	0.2%
West–metro.	–2.5%	0.01%	0.5%	–2.1%
–Nonmetro.	2.0%	0.1%	–2.3%	–3.1%

NOTES: BLS = Bureau of Labor Statistics; CMS = Centers for Medicare & Medicaid Services; HWI = hospital wage index; IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System.
SOURCE: RTI Simulations.

EXHIBIT A-15 Impact of IOM Committee Recommendations on IPPS Payment, by USDA Rural–Urban Continuum Code

County Rural–Urban Continuum Code	Payments Under Current Policy (Billions)	Difference Under IOM Committee Recommendations			
		In Frontier States		In Other States	
		Number of Hospitals	% Difference	Number of Hospitals	% Difference
Metropolitan, population >1 million, central	$56.4	14	–0.9%	1236	–0.2%
Metropolitan, population >1 million, other	$2.7	0	—	162	1.4%
Metropolitan, population 250K–1 million	$24.5	4	1.3%	636	0.1%
Metropolitan, population <250K	$14.5	24	–5.8%	400	0.9%
Non-metro, urbanized pop >20K, adjacent	$4.3	1	–6.1%	267	–0.7%
Non-metro, urbanized pop >20K, not adjacent	$2.6	11	–9.7%	118	–1.4%
Non-metro, urbanized pop 2.5–20K, adjacent	$2.2	5	–7.3%	293	0.9%
Non-metro, urbanized pop 2.5–20K, not adj.	$1.7	12	–9.7%	180	1.1%
Non-metro, urbanized pop <2.5K, adjacent	$0.1	0	—	24	2.7%
Non-metro, urbanized pop <2.5K, not adjacent	$0.1	1	–11.5%	30	3.9%

NOTES: IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System; USDA = U.S. Department of Agriculture.
SOURCE: RTI Simulations.

EXHIBIT A-16 Impact of IOM Committee Recommendations on IPPS Payment, by Census Division and Metropolitan Status

Location	IPPS Payments Under Current Policy ($ Billions)	Difference Under IOM Committee Recommendations			
		In Metropolitan Areas		In Nonmetropolitan Areas	
		Number of Hospitals	% Difference	Number of Hospitals	% Difference
New England	$6.6	120	–9.4%	23	–1.6%
Middle Atlantic	$16.9	320	–0.6%	69	1.0%
East North Central	$18.1	401	2.6%	120	2.5%
West North Central	$7.4	169	1.1%	99	–5.1%
South Atlantic	$22.2	421	3.2%	170	0.9%
East South Central	$7.8	153	5.2%	170	2.6%
West South Central	$11.6	366	1.8%	183	–2.5%
Mountain	$5.1	159	–1.6%	66	–4.5%
Pacific	$13.4	380	–3.0%	29	–3.8%

NOTES: IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System.
SOURCE: RTI Simulations.

EXHIBIT A-17 Impact of IOM Committee Recommendations on IPPS Payment, by Hospital Reclassification Status

Hospital Reclassification or Adjustment Status	IPPS Payments Under Current Policy ($ Billions)	Difference Under IOM Committee Recommendations			
		In Frontier States		In Other States	
		Number Of Hospitals	% Difference	Number Of Hospitals	% Difference
Reclassifications (MGCRB)	$19.5	2	4.1%	606	−1.8%
"Lugar" Hospitals	$0.5	0	—	53	−1.4%
Section 505 Outmigration Adjustments	$4.6	2	−11.7%	268	−0.5%
Frontier Floors	$0.0	46	−7.4%	N/A	—
Metropolitan Area Rural Floors	$9.6	N/A	—	261	−3.1%
No Exceptions	$73.2	22	−0.5%	2158	1.0%

NOTES: IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System; MGCRB = Medicare Geographic Classification Review Board.
SOURCE: RTI Simulations.

EXHIBIT A-18 Impact of IOM Committee Recommendations on IPPS Payment, by Special Rural Status

Hospital Status	Payments Under Current Policy ($ Billions)	Difference Under IOM Committee Recommendations			
		In Frontier States		In Other States	
		Number of Hospitals	% Difference	Number of Hospitals	% Difference
Sole Community Hospital (All)	$5.9	32	−6.0%	410	−0.3%
Medicare-Dependent Hospitals (All)	$1.6	0	—	211	2.0%
Rural Referral Centers (Those Not SCH or MDH)	$5.5	2	−8.0%	174	−1.1%
All Other (Rural)	$1.7	4	−10.4%	219	1.3%
All Other (Nonrural)	$94.5	34	−3.3%	2332	0.1%

NOTES: IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System; MDH = Medicare-dependent hospital; SCH = sole community hospital.
SOURCE: RTI Simulations.

EXHIBIT A-19 Impact of IOM Committee Recommendations on IPPS Payment, by Teaching and DSH Status

Payment Status	IPPS Payments Under Current Policy ($ Billions)	Difference Under IOM Committee Recommendations			
		In Frontier States		In Other States	
		Number of Hospitals	% Difference	Number of Hospitals	% Difference
Teaching Only	$19.3	14	−4.1%	402	0.3%
Teaching and Disproportionate Share	$44.2	5	−4.2%	615	0.0%
Disproportionate Share Only	$35.2	25	−4.8%	1,767	−0.1%
All Other (Nonteaching, Non-DSH)	$10.2	28	−3.5%	562	0.4%

NOTES: DSH = disproportionate share hospital; IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System.
SOURCE: RTI Simulations.

EXHIBIT A-20 Impact of IOM Committee Recommendations on IPPS Payment, by Bed Size

Hospital Size	Payments Under Current Policy ($ Billions)	Difference Under IOM Committee Recommendations			
		In Frontier States		In Other States	
		Number of Hospitals	% Difference	Number of Hospitals	% Difference
≤50 beds	$2.3	21	−5.8%	654	0.6%
51–100 beds	$3.3	17	−7.2%	614	0.7%
101–300 beds	$42.4	25	−4.4%	1,419	−0.1%
301–500 beds	$30.6	6	−4.9%	444	0.8%
>500 beds	$27.4	3	0.1%	201	0.5%
Not available[a]	$0.03	—	—	14	−0.3%

NOTES: IOM = Institute of Medicine; IPPS = Inpatient Prospective Payment System.
[a]New hospitals; number of beds listed as "1" and data on bed days available are missing in 2012 impact file.
SOURCE: RTI Simulations; Final IPPS Payment Impact Files for FY 2012.
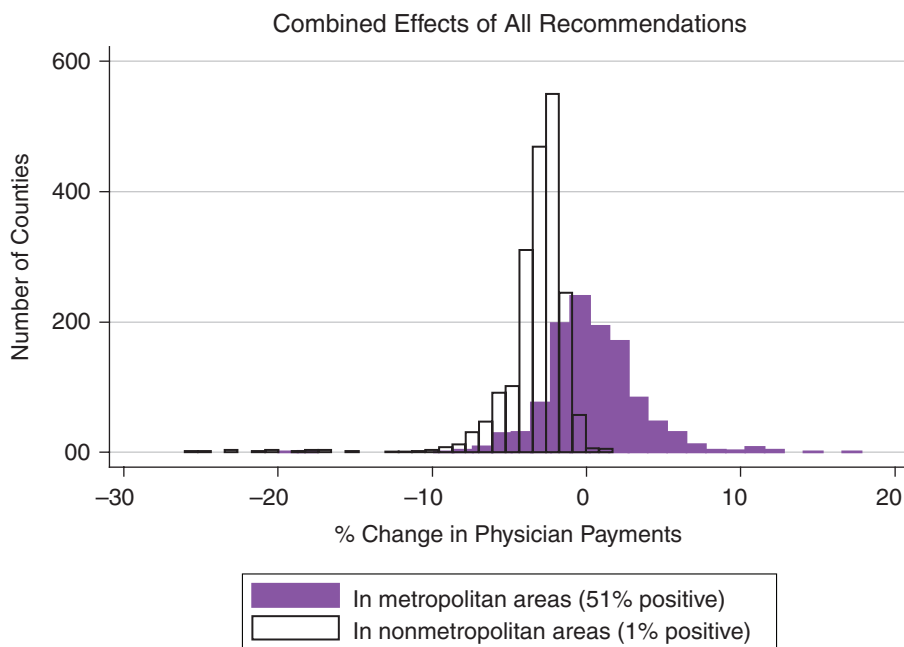
EXHIBIT A-21 Distribution of physician payment impact across all counties.

EXHIBIT A-22 Change in Aggregate Geographic Adjustment Factor, by Type of IOM Committee Recommendation

	Percent Difference in Payments			
	Data (isolated effect of adjusted BLS data)	**Market** (isolated effect of moving to CBSA markets)	**Policy** (isolated effect of removing index floors)	
	Compares payments using adjusted BLS data but keeping payment localities, to payments under CMS GPCIs but excluding frontier and Alaska floors	*Compares payments using all IOM committee recommended changes including CBSA markets, compared to payments using all IOM committee recommended changes <u>except</u> the CBSA markets*	*Compares payments under current CMS policy, including frontier and Alaska floors, compared to payments under CMS GPCIs but <u>excluding</u> all index floors*	**All (combined effects of all IOM committee recommendations— payments under final IOM committee recommended GPCIs compared to payments under current CMS policy)**
Distribution Across Counties				
Minimum	−3.5%	−10.5%	−26.2%	−26.1%
5th percentile	−0.8%	−4.5%	−4.1%	−6.0%
25th percentile	−0.4%	−2.8%	0.0%	−3.4%
50th percentile	0.0%	−2.0%	0.0%	−2.2%
75th percentile	0.3%	−0.4%	0.0%	−0.7%
95th percentile	1.0%	2.5%	0.0%	3.3%
Maximum	6.8%	12.0%	0.0%	17.9%
Average by Region and Metropolitan Status				
Northeast–metro.	0.4%	0.5%	0%	0.9%
–Nonmetro.	0.3%	−2.0%	0.0%	−1.7%
Midwest–metro.	0.3%	0.2%	−0.1%	0.3%
–Nonmetro.	0.6%	−2.9%	−0.2%	−3.1%
South–metro.	−0.2%	0.4%	0.0%	0.2%
–Nonmetro.	−0.4%	−2.7%	0.0%	−3.1%
West–metro.	0.2%	0.2%	−0.2%	0.3%
–Nonmetro.	0.7%	−2.3%	−0.8%	−3.0%
Puerto Rico–metro.	−1.6%	−0.2%	0.0%	−1.6%
–Nonmetro.	−0.2%	−0.6%	0.0%	−0.8%

NOTES: BLS = Bureau of Labor Statistics; CBSA = core-based statistical area; CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index; IOM = Institute of Medicine.

EXHIBIT A-23 County Analysis of the Isolated Payment Effects from Redefining the GPCI Payment Areas

	All IOM Committee Recommendations *Including* Market Redefinition	All IOM Committee Recommendations *Including* Market Redefinition	IOM Committee Recommendations *Excluding* Market Redefinition
	—compared to—	—compared to—	—compared to—
	IOM Recommendations *Excluding* Market Redefinition	CMS GPCIs Without Index Floors	CMS GPCIs Without Index Floors
All Counties			
Number of counties w/pmt reduction	2,464	2,467	1,658
Percent counties w/reduction	79%	79%	53%
Percent national RVUs	51%	54%	50%
Median % reduction	−2.3%	−2.4%	−0.4%
Aggregate average % reduction	−1.5%	−1.6%	−0.4%
Number of counties w/pmt increase	654	651	1,460
Percent counties w/increase	21%	21%	47%
Percent national RVUs	49%	46%	50%
Median % increase	+1.5%	+1.8%	+0.3%
Aggregate average % increase	+1.6%	+2.1%	+0.6%
Metropolitan Counties Only			
Number of counties w/pmt reduction	515	547	510
Percent metro. counties w/reduction	44%	48%	44%
Percent national RVUs	45%	48%	48%
Median % reduction	−1.2%	−1.3%	−0.3%
Aggregate average % reduction	−1.2%	−1.3%	−0.4%
Number of counties w/pmt increase	636	604	641
Percent metro. counties w/increase	66%	52%	56%
Percent national RVUs	55%	52%	52%
Median % increase	+1.6%	+2.0%	+0.5%
Aggregate average % increase	+1.6%	+2.1%	+0.6%
Nonmetropolitan Counties Only			
Number of counties w/pmt reduction	1,949	1,920	1,148
Percent counties w/reduction	99%	98%	58%
Percent national RVUs	99.9%	99%	63%
Median % reduction	−2.5%	−2.6%	−0.4%
Aggregate average % reduction	−2.7%	−0.2%	−0.4%
Number of counties w/pmt increase	18	48	819
Percent counties w/increase	1%	2%	42%
Percent national RVUs	0.01%	1%	37%
Median % increase	+0.2%	+0.6%	+0.2%
Aggregate average % increase	+0.8%	+0.5%	+0.3%

NOTES: CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index; IOM = Institute of Medicine; pmt = payment; RVU = relative value unit.

EXHIBIT A-24 Physician Payment Impact of IOM Committee Recommendations, by USDA Rural–Urban Continuum Code

Rural–Urban Continuum Code	Total Part B Practitioner Payments ($ Billions)	In Frontier States and Alaska		In All Other States	
		Proportion Billed RVUs	% Change in Payments	Proportion Billed RVUs	% Change in Payments
metro, pop>1M, CBSA central counties[a]	$38.9	0.005	2.0%	0.492	1.0%
metro, pop>1M, CBSA other counties[a]	$2.3	—	—	0.031	3.0%
metro, pop 250K–1M	$16.3	0.001	−2.0%	0.221	0.0%
metro, pop <250K	$9.1	0.006	−4.0%	0.120	−1.0%
adjacent nonmetro, urban pop >20K	$3.2	0.0002	−5.0%	0.045	−3.0%
not adjacent nonmetro, urban pop >20K	$1.7	0.001	−6.0%	0.022	−3.0%
adjacent nonmetro, urban pop 2.5–20K	$1.9	0.0004	−6.0%	0.026	−3.0%
not adjacent nonmetro, urban pop 2.5–20K	$1.4	0.001	−7.0%	0.019	−4.0%
adjacent nonmetro, urban pop <2.5K	$0.1	0.0001	−6.0%	0.002	−2.0%
not adjacent nonmetro, urban pop <2.5K	$0.2	0.0002	−6.0%	0.002	−3.0%
Puerto Rico (not coded)	$0.2	—	—	0.003	−2.0%
All counties	$75.4	0.016	−2.0%	0.984	0.0%

NOTES: CBSA = core-based statistical area; IOM = Institute of Medicine; RVU = relative value unit; USDA = U.S. Department of Agriculture.
[a]Designation as "central" and "other" derived from CBSA indicators for metropolitan counties, as published in Area Resource File 2009.
SOURCE: RTI simulations.

EXHIBIT A-25 Physician Payment Impact of IOM Committee Recommendations, by Revised Health Professional Shortage Area Indicator

County Shortage Indicator, as Defined by Estimated Population in Bonus Areas	Total Part B Practitioner Payments ($ Billions)	In Frontier States and Alaska		In All Other States	
		Proportion Billed RVUs	% Change in Payments	Proportion Billed RVUs	% Change in Payments
In Metropolitan Counties					
Non-HPSA (0%)	$31.4	0.001	−5.0%	0.410	1.0%
Partial HPSA (≤20%)	$34.7	0.012	−1.0%	0.448	0.0%
Partial HPSA (20% to 80%)	$0.5	0.00001	−6.0%	0.007	−1.0%
Partial HPSA (80% to <100%)	$0.2	0.0003	−5.0%	0.002	−1.0%
Full HPSA (100%)	$0.1			0.002	−1.0%
In Nonmetropolitan Counties					
Non-HPSA (0%)	$3.3	0.001	−6.0%	0.045	−3.0%
Partial HPSA (≤20%)	$4.0	0.002	−6.0%	0.055	−3.0%
Partial HPSA (20% to 80%)	$0.3	0.00003	−4.0%	0.004	−3.0%
Partial HPSA (80% to <100%)	$0.5	0.0003	−6.0%	0.007	−3.0%
Full HPSA (100%)	$0.3	0.0004	−6.0%	0.004	−4.0%
In All Counties	$75.3	0.016	−2.0%	0.984	0.0%

NOTES: HPSA = Health Professional Shortage Area; IOM = Institute of Medicine; RVU = relative value unit.
SOURCES: RTI simulations; CMS ZIP primary care bonus area file (2012).

EXHIBIT A-26 Physician Payment Impact of IOM Committee Recommendations, by County Ranking in Median Family Income

Counties Arrayed by Median Household Income	Total Part B Practitioner Payments ($ Billions)	In Frontier States and Alaska		In All Other States	
		Proportion Billed RVUs	% Change in Payments	Proportion Billed RVUs	% Change in Payments
Lowest quartile	$2.9	0.000	–7.8%	0.041	–2.4%
25th to 50th percentile	$8.7	0.000	–6.5%	0.121	–1.7%
50th to 75th percentile	$19.9	0.004	–5.4%	0.268	–0.5%
Top quartile	$43.9	0.011	–1.0%	0.555	0.7%
All counties	$75.4	0.016	–2.4%	0.984	0.0%

NOTES: IOM = Institute of Medicine; RVU = relative value unit.
SOURCES: RTI simulations; HRSA Area Resource File (2009).

EXHIBIT A-27 Physician Payment Impact of IOM Committee Recommendations, by County Ranking in Percent Non-White[a] Population

From Counties Arrayed by Percent Non-White Population	Total Part B Practitioner Payments ($ Billions)	In Frontier States and Alaska		In All Other States	
		Proportion Billed RVUs	% Change in Payments	Proportion Billed RVUs	% Change in Payments
Lowest quartile	$2.0	0.001	–5.4%	0.027	–2.1%
25th to 50th percentile	$7.7	0.005	–5.6%	0.102	–0.7%
50th to 75th percentile	$29.0	0.005	–3.7%	0.381	0.3%
Top quartile	$36.6	0.005	1.7%	0.473	0.0%
Total	$75.3	0.016	–2.5%	0.984	0.0%

[a]Computed as (1 – %white non-Hispanic).
NOTES: IOM = Institute of Medicine; RVU = relative value unit.
SOURCES: RTI simulations; HRSA Area Resource File (2009).

EXHIBIT A-28 Physician Payment Impact of IOM Committee Recommendations, by Rural County Population Density

Counties by Rural/Urban Status and Grouped by Persons per Square Mile	Total Part B Practitioner Payments ($ Billions)	In Frontier States and Alaska		In All Other States	
		Proportion Billed RVUs	% Change in Payments	Proportion Billed RVUs	% Change in Payments
Frontier Counties (≤6 persons/sq. mi.)	$0.2	0.0011	–5.6%	0.002	–4.0%
Other rural, below 50th percentile	$1.4	0.002	–5.6%	0.018	–3.0%
Other rural, above 50th percentile	$6.7	0.0006	–7.3%	0.094	–3.0%
For comparison: all urban	$67.0	0.013	–1.4%	0.870	0.0%
All counties	$75.3	0.016	–2.4%	0.984	0.0%

NOTES: IOM = Institute of Medicine; RVU = relative value unit.
SOURCES: RTI simulations; HRSA Area Resource File (2009).

EXHIBIT A-29 Physician Payment Impact of IOM Committee Recommendations, by Percent of Total RVUs Accounted for by Primary Care Practitioners

From Counties Arrayed by Primary Care Practitioner RVUs as Percent Total RVUs	Total Part B Practitioner Payments ($ Billions)	In Frontier States and Alaska		In All Other States	
		Proportion Billed RVUs	% Change in Payments	Proportion Billed RVUs	% Change in Payments
Lowest quartile	$47.5	0.007	−3.8%	0.618	0.2%
25th to 50th percentile	$23.9	0.008	−0.5%	0.311	0.0%
50th to 75th percentile	$3.2	0.0008	−6.8%	0.044	−1.3%
Top quartile	$0.7	0.0003	−6.6%	0.010	−2.1%
All counties	$75.3	0.016	0.0%	0.984	0.0%

NOTES: Primary Care practitioners include all those self-identified identified as internists, geriatricians, family practitioners and pediatricians, plus RVUs billed nurse practitioners and physician assistants. IOM = Institute of Medicine; RVU = relative value unit.
SOURCES: RTI simulations; 2010 RVU file provided to RTI by Acumen, LLC.

EXHIBIT A-30 Effect of Level of Physician Work GPCI on Estimated IOM Committee Payment Differences, for Counties Grouped by Revised Health Professional Shortage Area Indicators

Counties Grouped by Estimated Share of Their Population That Is Located in CMS Bonus Payment ZIP Codes	Percent Difference in Part B Payments by Level of Physician Work Adjustment[a]			Proportion Part B Enrollees[b]	Proportion Primary Care RVUs[c]
	Current Policy: 25% of Work GPCI	Range of Optional Policies			
		0% of Work GPCI	100% of Work GPCI		
Metropolitan Counties					
0%	0.7%	0.3%	1.8%	0.365	0.384
≤20%	0.1%	0.0%	0.5%	0.369	0.437
20% to 80%	−0.8%	−0.3%	−2.2%	0.011	0.008
80% to <100%	−1.3%	−0.4%	−4.0%	0.012	0.005
100%	−1.4%	0.0%	−5.6%	0.004	0.003
Subtotal	0.4%	0.1%	1.1%	0.761	0.836
Nonmetropolitan Counties					
0%	−2.8%	−1.0%	−8.1%	0.089	0.063
≤20%	−3.0%	−1.1%	−8.6%	0.096	0.075
20% to 80%	−2.5%	−1.2%	−6.3%	0.010	0.005
80% to <100%	−3.0%	−1.2%	−8.6%	0.032	0.013
100%	−3.7%	−2.0%	−9.0%	0.012	0.006
Subtotal	−2.9%	−1.1%	−8.4%	0.239	0.164
All Counties	0.0%	0.0%	0.0%	1.000	1.000

NOTES: CMS = Centers for Medicare & Medicaid Services; GPCI = geographic practice cost index; IOM = Institute of Medicine; RVU = relative value unit.
[a]For each choice of percent physician work adjustment, value is defined as difference between payments estimated with GPCIs computed using all of the IOM committee's recommendations, relative to payments estimated under current CMS policy including all floors.
[b]Share of Medicare beneficiaries enrolled in Part B fee-for-service program, from calendar 2009 (most recent county data available for download as of January 2012).
[c]Share of national total Part B RVUS billed in 2010 by physicians identified as internists, geriatricians, family practitioners and pediatricians, plus RVUs billed nurse practitioners and physician assistants.
SOURCES: RTI simulations; 2010 RVU file provided to RTI by Acumen, LLC.

Appendix A-2

Payment Simulations: Data Tables

The Payment Simulation Data Tables are available at
www.iom.edu/GeoAdjustPaymentSimulations.

Appendix B

Methods for the Analysis of Associations of Quality Measures with Payments in Chapter 3

DATA AND VARIABLES

The analyses reported in Chapter 3 used data from two sources to generate the 16 measures listed in Table 3-2 of the body of the report. Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS) data were drawn from the fee-for-service (traditional Medicare) arm of the 2010 Medicare CAHPS survey. The sample of 275,000 noninstitutionalized beneficiaries with at least 6 months of continuous enrollment in traditional Medicare was stratified by state. Sampled beneficiaries were sent a prenotice letter followed by a mail survey, and initial nonrespondents were followed up with a replacement survey and up to 20 telephone contact attempts, with a final response rate of 58 percent. The content, goals, and use of this survey have been described elsewhere (Goldstein et al., 2001).

CAHPS measures in our analyses included 10 individual items from this survey and one composite of four highly correlated items on doctor communication. These are listed in Table 3-2, ordered as access/timeliness measures, experiences with care, and clinical quality. All items are top-coded so the mean represents the fraction selecting the most favorable response option, when there are more than two options (for all items, in the composite), with the exception of "seen within 15 minutes," which combines the top two categories owing to its lower distribution. Results are presented in terms of percentages. Most of these items are among those used in public reporting of CAHPS data. The number of usable responses varies across items due to the use of screeners and skip patterns to ensure that only beneficiaries who had relevant experience during the 6-month reference period of the survey answered each item; access items were screened by items asking whether a service was ever needed during that period, and quality items by screeners for having used the service in question.

In addition to these measures, seven CAHPS items were used as adjusters for individual characteristics that are typically associated with measures, consistent with models used in comparative public reporting of CAHPS data (Zaslavsky et al., 2001). These were self-reported education, general and mental health status, and assistance by a proxy in completing the questionnaire,

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as well as age, Medicaid dual eligibility, and low-income supplement eligibility from Centers for Medicare & Medicaid Services (CMS) databases. These categorical variables contributed 22 dichotomous variables to the models.

Five additional measures assessed provision of guideline-recommended clinical care, following specifications of the Health Plan Employer Data and Information System (HEDIS). These were constructed from a 20 percent sample of fee-for-service Medicare claims for 2009, and included breast cancer screening and recommended testing for cardiac patients and diabetics. These measures were adjusted only for the patient's sex.

The key predictors of interest were defined at the county level. Rurality was represented by the 2003 version of the Rural–Urban Continuum Code (RUCC) with levels from 0 (central cities of largest metropolitan areas) to 9 (least densely populated rural areas), with odd numbers representing areas not adjacent to a more urban area.[1] The Health Professional Shortage Area (HPSA) designation is used to adjust Medicare physician fees at the ZIP code level.[2] For this analysis, the committee coded this information by ZIP code into a five-category county-level variable that captures the percentage of the county's population in HPSA ZIP codes: none (0 percent); between 0 and 20 percent; from 20 to 80 percent; over 80 but not 100 percent; or 100 percent (full-county HPSA). Both the physician practice geographical adjustment factor (GAF) and the physician work geographical practice cost index (GPCI) were used in separate models. The GAF drives geographical variation in total payments to practices for a given service mix, while the work GPCI is the component of the GAF specifically addressing the cost of physician labor; thus the two measures encompass the role of physicians both as operators of businesses and as workers. In most models including GAF or GPCI, the current CMS value for 2010 (excluding frontier floors) is used, on the assumption that this is best related (among current measures) to the historical experience of geographical adjustments potentially affecting the counties. The proposed Institute of Medicine (IOM) factors are used only in calculating the differences representing the potential effects on payment of shifting to the IOM committee's method.

MODEL SPECIFICATION

For each of 16 measures, 13 models were fitted. A baseline model included only the individual-level adjuster variables as regressors. Four models each added a single county-level variable (RUCC, HPSA, GAF, or GPCI) to the model, to assess their distinct associations with the measures. Four additional models combined a descriptive geographical variable (RUCC or HPSA) with a payment factor (GAF or GPCI) to assess whether one acted as a mediator for the other. Finally, four models entered the difference between proposed IOM and current CMS factors (either GAF or GPCI, with or without additional control for RUCC) to assess the relative impact of the change in method on payment in higher- and lower-performing areas.

All models were specified as multilevel random-effects linear models, reflecting geographical clustering of quality variations. We compared models with a single level of clustering (county) and two levels (county nested within state). For most models there was significant evidence (deviance >3.84) in favor of the latter model, which accounts for clustering at larger as well as smaller scales. We therefore used this specification for all models. Significance of fixed effects was assessed with Wald tests using the robust Huber variance estimator. Across all 143 CAHPS models (13 model specifications for 11 measures), case-mix effects for the two health variables

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[1] See http://www.ers.usda.gov/briefing/rurality/ruralurbcon/priordescription.htm.
[2] Also see discussion in Appendix A regarding translation of ZIP codes to county-level data.

were significant in every model, and effects of age, education, proxy response were significant in between 104 and 130 models (*F* test, $P < .05$).

Univariate Models

Adjusted associations of the GAF with all of the CAHPS measures were negative (although only two were significant), as were 8 out of 11 associations of GPCI with CAHPS measures, all significant (Table B-5, models PFC, PIC). Associations of both GAF and GPCI with cholesterol screening for both cardiac patients and diabetics were positive, although significant only for GAF. These coefficients should be interpreted in relation to the range of these adjustment factors. Multiplying the largest estimated coefficient (39.75 for wait <15 minutes) by the interquartile range (IQR) of county GPCI yields a predicted difference of $39.75 \times (1.017 - 0.973) = 1.75$ percentage points; similarly, multiplying the largest GAF coefficient (32.98, also for wait <15 minutes) by the IQR yields a predicted difference of $32.98 \times (1.032 - 0.938) = 3.10$ percentage points. Effects extrapolated over the full range of the payment factors would be about four times as large. Thus, higher payment indices were generally associated with worse scores for patient-reported measures, but with better cholesterol screening.

Global *F* tests of single geographic variables, relative to the base model, were significant ($P < .05$) for five measures for HPSA status (have a personal doctor, wait <15 minutes, both immunization measures, breast cancer screening) (Table B-1). The most consistent HPSA effects were for comparison of the 80–100 percent HPSA counties to the (baseline) 0–20 percent HPSA counties, with a mean 1 percentage point lower score for the former group, while non-HPSA (0 percent) counties had slightly higher scores than the non-HPSA group.

Patterns for RUCC were more variable and complex given the greater number of categories. Significant variation across the 10 categories was indicated by the *F* test for 12 out of 16 measures (Table B-2), including the five measures with significant variation by HPSA category and also specialist appointment, rating of care, doctor communication composite, and the remaining HEDIS items. We used a linear regression of coefficients for each measure, and the mean across measures, on the RUCC (for RUCC 1 to 9) as an ad hoc summary of the trend in beneficiary-reported quality from the most urbanized to the most rural areas. This summary for the mean suggested a weak trend toward lower quality in the more rural areas (Table B-4, first column). The trend in the mean, however, conceals opposite trends in ratings of care and doctor, timely routine care, and doctor communication, which are slightly higher in the more rural areas, and in the other measures, most notably getting needed care and immunizations, which trend lower in more rural counties.

ASSESSING THE MEDIATING ROLE OF PAYMENT RATES

We assessed mediation by adding controls for GPCI or GAF to models for RUCC or HPSA effects. If quality differences among areas along the urbanicity/rurality dimension were due to the effects of differences in the corresponding payment factors, we would expect that controlling for payment factors would reduce the variations across the corresponding categories; a similar argument could be made for HPSA categories.

HPSA coefficients without payment factor controls are compared to those with either GAF or GPCI controls in Table B-3, which shows the standard deviation of coefficients (representing adjusted differences). This measure increases and decreases with GAF or GPCI control for

approximately equal numbers of measures, but on the average is almost the same after GPCI control for either of the adjustment factor variables; this is opposite to the effect that might be expected under the hypothesis that adjustment factors mediated HPSA effects.

RUCC coefficients without payment factor controls are compared to those with either GAF or GPCI controls in Table B-4. The left-hand columns compare the slopes across RUCC categories in the three models, to examine ordered trends. These do not show a reduction in trends relating measures to rurality; on the contrary, the results are quite mixed, but the magnitude of the changes is generally small. The right-hand columns quantify the variation among RUCC categories, without regard to order, by the standard deviation of the 10 RUCC coefficients. The magnitude of variation increases for the majority of measures when the GAF or GPCI variable is added to the model. As with the HPSA comparisons, these are opposite the effects that might be predicted under a mediation hypothesis.

Looking at mediation from the opposite perspective, we considered whether RUCC or HPSA is a mediator of the paradoxical GAF and GPCI effects. As shown in Table B-5, controlling for RUCC or HPSA status does not remove the negative associations of GAF or GPCI with quality reports. Indeed, more often than not it strengthened the associations, especially for GPCI. After control for RUCC, GPCI was significantly and negatively associated with 14 of our 16 measures. Effect sizes for a one-IQR difference in GPCI, relative to total county variation, exceeded one-half for three measures (ratings of doctor and care, and pneumonia immunization). Like our previous results for HPSA and RUCC coefficients, this was opposite to predictions that might be expected under a mediation hypothesis.

ASSSOCIATIONS OF QUALITY MEASURES WITH PROPOSED CHANGES IN GAF OR GPCI

We supplemented our impact analysis by examining associations of the proposed changes in payment factors with beneficiary-reported quality assessments. As shown in Table B-6, these coefficients are mixed in sign and mostly not significant. Indeed, for the clinical measures (immunizations and HEDIS), the coefficients are mostly opposite in sign for GAF (all positive) and GPCI (mostly negative). After controlling for RUCC, only four coefficients for GAF and none for GPCI remain significant. Furthermore, the IQR of the GAF or GPCI *changes* is only about one-third that of current *levels*, further attenuating estimates of the differences in current quality associated with projected changes in the cost index.

Thus, this analysis provides little evidence to suggest that the committee's proposed revisions would systematically favor areas now experiencing either superior or inferior performance.

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Zaslavsky, A. M., L. B. Zaborski, L. Ding, J. A. Shaul, M. J. Cioffi, and P. D. Cleary. 2001. Adjusting performance measures to ensure equitable plan comparisons. *Health Care Financing Review* 22(3):109-126.

TABLE B-1 Coefficients of HPSA Category Dummies

Measure	County Percent HPSA				
	0%	20% to 80%	80% to <100%	100%	F-test P-value
Have personal doctor	0.09	−1.87*	−1.84+	−1.88	0.1235+
Timely routine care	1.11*	−0.02	−0.25	−1.86	0.1165
Timely care in illness	1.40	4.06*	1.93	0.45	0.0245
Wait <15 minutes	0.78	0.17	−0.91	−5.76+	0.8929*
Easy specialist appointment	0.22	−1.37	−0.07	−0.30	0.1097
Rating of care overall	0.00	1.39	−2.15*	1.91	0.6379
Rating of doctor	0.32	1.25	−1.10	2.58	0.5376
Doctor communication	0.78	0.44	1.03	3.02	0.3147
Get needed care	−1.07	1.04	−1.00	1.08	0.0004
Influenza immunization	0.15	−2.51*	−3.56+	−1.60	0.0110#
Pneumovax immunization	−0.07	−4.03+	−2.12	−1.84	0.0000*
Breast cancer screening	−0.26	−0.85	−3.06#	−2.72*	0.1864#
Cholesterol screening (cardiac)	0.50*	−0.15	−0.20	−0.72	0.8783
Cholesterol screening (diabetic)	0.21	0.23	−0.20	−0.85	0.4139
Hemoglobin A1c test (diabetic)	−0.16	−0.33	−0.56	−1.57	0.0936
Retinal exam (diabetic)	−0.12	−1.48+	−0.84	−0.19	0.2715
Mean of all items	0.24	−0.25	−0.93	−0.64	0.1235

NOTES: Coefficients are in percentage point units and are relative to baseline category, HPSA coverage >0 percent but <20 percent. Model PH includes only casemix adjusters and HPSA dummies. Significance indications: * = $p < .05$; + = $p < .01$; # = $p < .001$. HPSA = Health Professional Shortage Area.

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TABLE B-2 Coefficients of RUCC Category Dummies

Measure	Rural–Urban Continuum Code									F-test P-value
	RUCC1	RUCC2	RUCC3	RUCC4	RUCC5	RUCC6	RUCC7	RUCC8	RUCC9	
Have personal doctor	0.76	0.41	0.03	-0.69	0.09	-1.21*	-1.89*	-3.07*	-4.00+	0.0003#
Timely routine care	-1.66	-0.79	-1.49	-3.12+	-1.42	-0.69	-2.66*	-3.15	0.05	0.1527
Timely care in illness	1.83	1.51	1.28	-1.42	1.39	2.97	-0.80	-1.58	4.62	0.6027
Wait <15 minutes	1.03	3.96+	2.96	-0.33	3.92	2.35	0.29	0.50	1.01	0.0006#
Easy specialist appointment	2.01	-1.89*	-0.56	-0.14	-0.06	0.67	-1.48	-3.96	-0.74	0.0222*
Rating of care overall	-2.09	0.75	0.74	-0.61	0.66	1.40	-1.49	-4.04	4.34*	0.0002#
Rating of doctor	-1.64	-1.52	-0.53	-2.52*	-2.47	-0.28	-0.72	-2.15	1.28	0.2304
Doctor communication	0.95	-0.70	-0.23	-0.69	1.55	2.26*	1.86	-2.64	6.63+	0.0042+
Get needed care	3.24+	0.98	2.03	1.55	0.73	2.79+	1.29	-2.13	-0.67	0.1577
Influenza immunization	-0.30	0.62	0.40	-2.05	-1.11	-3.36#	-2.61*	-5.19+	-1.54	0.0006#
Pneumovax immunization	2.08	2.24*	1.87*	-0.24	1.18	-2.32	-1.12	-3.17	-1.76	0.0001#
Breast cancer screening	-0.82	0.54	1.45*	-0.02	0.04	-1.95+	-1.36	-2.24*	0.03	0.0000#
Cholesterol screening (cardiac)	0.26	-0.86	-1.17+	-0.58	-2.53#	-1.41+	-2.39#	-1.56*	-2.48*	0.0006#
Cholesterol screening (diabetic)	0.69	-0.45	-.18+	-1.52+	-2.71+	-1.73#	-2.39#	-1.38*	-2.15+	0.0000#
Hemoglobin A1c test (diabetic)	0.23	-0.12	0.14	-0.75	-0.48	-0.70	-0.69	-0.35	0.02	0.0057+
Retinal exam (diabetic)	-1.17*	0.96	0.63	-0.08	-0.70	-1.37+	-0.80	1.23	1.04	0.0000#
Mean of all items	0.34	0.35	0.40	-0.83	-0.12	-0.16	-1.06	-2.18	0.35	0.0736

NOTES: Coefficients are in percentage point units and are relative to baseline category, HPSA coverage >0 percent but <20 percent. Model PR includes only case-mix adjusters and RUCC dummies. Significance indications: * = $p < .05$; + = $p < .01$; # = $p < .001$. RUCC = Rural–Urban Continuum Code.

TABLE B-3 Comparison of Variation Among HPSA Category Coefficients Without and With Control for GAF or GPCI

	Standard Deviation of Coefficients		
Measure	PH (HPSA only)	PIH (& GPCI)	PFR (& GAF)
Have personal doctor	1.047	1.072	1.101
Timely routine care	1.067	1.039	1.075
Timely care in illness	1.587	1.565	1.569
Wait <15 minutes	2.649	2.853	2.725
Easy specialist appointment	0.626	0.688	0.659
Rating of care overall	1.576	1.603	1.612
Rating of doctor	1.382	1.369	1.382
Doctor communication	1.164	1.101	1.143
Get needed care	1.049	0.967	0.999
Influenza immunization	1.600	1.602	1.747
Pneumovax immunization	1.669	1.808	1.856
Breast cancer screening	1.420	1.403	1.431
Cholesterol screening (cardiac)	0.439	0.254	0.385
Cholesterol screening (diabetic)	0.442	0.341	0.434
Hemoglobin A1c test (diabetic)	0.620	0.594	0.626
Retinal exam (diabetic)	0.624	0.631	0.618
Mean of all items	1.185	1.181	1.210

NOTES: Entries summarize the variation among HPSA categories by the standard deviation of category coefficients, in percentage point units. GAF = geographic adjustment factor; GPCI = geographic practice cost index; HPSA = Health Professional Shortage Area.

TABLE B-4 Comparison of Variation Among RUCC Category Coefficients Without and With Control for GAF or GPCI

	Slope from RUCC=1 to RUCC=9			Standard Deviation of Coefficients		
Measure	PR (RUCC only)	PIR (& GPCI)	PFR (& GAF)	PR (RUCC only)	PIR (& GPCI)	PFR (& GAF)
Have personal doctor	−0.352	−0.383	−0.338	1.581	1.885	1.638
Timely routine care	0.089	0.068	0.097	1.181	1.318	1.252
Timely care in illness	−0.034	−0.036	−0.035	1.972	1.970	1.977
Wait <15 minutes	−0.254	−0.298	−0.211	1.608	1.659	1.525
Easy specialist appointment	−0.184	−0.232	−0.180	1.600	1.960	1.685
Rating of care overall	0.110	0.080	0.112	2.251	2.202	2.225
Rating of doctor	0.205	0.157	0.205	1.224	1.342	1.228
Doctor communication	0.236	0.232	0.238	2.488	2.470	2.464
Get needed care	−0.365	−0.409	−0.352	1.610	1.864	1.648
Influenza immunization	−0.269	−0.305	−0.246	1.845	2.198	2.019
Pneumovax immunization	−0.473	−0.543	−0.448	1.940	2.611	2.196
Breast cancer screening	−0.126	−0.134	−0.118	1.150	1.192	1.161
Cholesterol screening (cardiac)	−0.121	−0.092	−0.145	1.003	0.635	0.912
Cholesterol screening (diabetic)	−0.126	−0.112	−0.136	1.082	0.867	1.047
Hemoglobin A1c test (diabetic)	−0.022	−0.027	−0.010	0.370	0.440	0.406
Retinal exam (diabetic)	0.068	0.054	0.064	0.960	0.962	0.961
Mean of all items	−0.101	−0.124	−0.094	1.491	1.598	1.522

NOTES: Entries summarize the variation among RUCC categories by the slope of the trend line across categories 1 to 9 (left 3 columns) and the standard deviation of category coefficients (right three columns), on a scale of percentage points. GAF = geographic adjustment factor; GPCI = geographic practice cost index; RUCC = Rural–Urban Continuum Code.

TABLE B-5 Coefficients of GAF and GPCI, Without Controls and With Controls for HPSA or RUCC

Measure	GAF Coefficients			GPCI Coefficients		
	PFC (only casemix controls)	PFH (also controlled for HPSA)	PFR (also controlled for RUCC)	PIC (only casemix controls)	PIH (also controlled for HPSA)	PIR (also controlled for RUCC)
Have personal doctor	−4.32	−6.49*	−8.80*	2.99*	−3.58#	−29.30#
Timely routine care	1.18	−0.90	−7.62	9.56	5.19	−18.91#
Timely care in illness	−4.82	−5.98	0.86	−11.34#	−12.67#	−1.33#
Wait <15 minutes	−32.98	−37.49	−27.02	−39.75#	−52.32#	−45.04#
Easy specialist appointment	−3.11	−4.00	−8.87	−9.89#	−12.45#	−36.05#
Rating of care overall	−7.45	−8.40*	−7.69	−18.25#	−20.83#	−21.64#
Rating of doctor	−0.89	−1.57	−7.27	−7.17#	−8.59#	−32.13#
Doctor communication	−4.86	−5.85	−2.58	−11.77#	−12.59#	−3.14#
Get needed care	−16.80#	−15.87+	−13.67*	−33.60#	−31.74#	−35.72#
Influenza immunization	−8.36	−11.98	−18.43+	9.04	−0.23#	−32.44#
Pneumovax immunization	−20.58*	−23.82+	−27.65#	−18.16#	−25.76#	−58.53#
Breast cancer screening	−1.26	−4.07	−4.90	12.33	4.89*	−9.84#
Cholesterol screening (cardiac)	18.23#	17.23#	14.01+	42.36	40.83	37.16
Cholesterol screening (diabetic)	13.33+	12.87+	5.84	45.09	44.84	17.13
Hemoglobin A1c test (diabetic)	−3.18	−3.68	−7.08*	9.51	7.83	−6.78#
Retinal exam (diabetic)	2.94	2.19	2.38	−0.72#	−2.97#	−17.67#
Mean of all items	−4.56	−6.11	−7.41	−1.24	−5.01	−18.39

NOTES: On scale of percentage points. Significance indications: * = p <.05; + = p <.01; # = p <.001. GAF = geographic adjustment factor; GPCI = geographic practice cost index; HPSA = Health Professional Shortage Area; RUCC = Rural–Urban Continuum Code.

TABLE B-6 Coefficients of Difference Between Current (CMS) and Proposed (IOM) Factors (as IOM–CMS), With and Without Control for RUCC

Measure	Coefficient of Change in GAF		Coefficient of Change in GPCI	
	PFD (only casemix controls)	PFDR (controlled for RUCC)	PID (only casemix controls)	PIDR (controlled for RUCC)
Have personal doctor	24.85#	18.26*	−19.70	20.53
Timely routine care	13.76	8.32	−12.16	19.47
Timely care in illness	−6.05	−6.87	24.99	36.93
Wait <15 minutes	−0.16	0.70	−8.45	−21.49
Easy specialist appointment	6.23	2.21	23.81	56.14
Rating of care overall	−4.00	−0.15	17.50	7.25
Rating of doctor	−8.48	−16.02	16.20	40.62
Doctor communication	−15.25	−10.67	29.52	15.33
Get needed care	9.40	18.96	6.98	−1.46
Influenza immunization	20.31#	5.77	−63.76+	−23.80
Pneumovax immunization	18.76*	7.86	−60.82+	−31.52
Breast cancer screening	12.34	5.62	−20.19	4.80
Cholesterol screening (cardiac)	22.64#	17.03+	−40.83#	−19.21
Cholesterol screening (diabetic)	25.51#	10.66*	−51.59#	−10.19
Hemoglobin A1c test (diabetic)	13.69+	14.07+	−18.96*	−6.55
Retinal exam (diabetic)	4.61	0.98	2.99	24.47
Mean of all items	8.64	4.80	−10.90	6.96

NOTE: On scale of percentage points. Significance indications: * = p <.05; + = p <.01; # = p <.001. CMS = Centers for Medicare & Medicaid Services; GAF = geographic adjustment factor; GPCI = geographic practice cost index; IOM = Institute of Medicine; RUCC = Rural–Urban Continuum Code.

Appendix C

Quality Assurance for RTI Payment Simulations

BACKGROUND

The committee took on a variety of oversight responsibilities for the RTI analysis. A data assurance plan was developed by Institute of Medicine (IOM) staff and the committee and submitted to the Report Review Committee (final version August 24, 2011), and a quality assurance subcommittee was designated to take the lead on technical aspects of the direction and oversight. The subcommittee was chaired by Dr. Alan Zaslavsky of Harvard, with members Dr. Frank Sloan of Duke (committee chair), Dr. Jack Kalbfleisch of University of Michigan, and Dr. Jane Sisk of the National Center for Health Statistics at the Centers for Disease Control and Prevention. The subcommittee had several conference calls and also reported back to the full committee at committee meetings.

An independent contractor, IHS Global Insight, was designated by the subcommittee to review the final RTI analyses, review all documentation of analyses, and prepare a report on its findings. The subcommittee and staff held two conference calls to direct the independent contractor in his role.

The RTI contract was modified to include a task to provide sufficient documentation of the data sources and methods used in the simulations so they could be replicated by other interested parties later on, if they so chose. Prior to preparing the report presented below, IHS interviewed RTI about the documentation and asked several clarifying questions.

The RTI team members presented data findings at every committee meeting, where they took questions and received direction from the full committee, and where some errors were caught by RTI or committee members as they discussed the findings. RTI was in regular contact with IOM staff and designated committee members about technical issues as they arose, and issues were usually resolved by e-mail or conference call. Weekly conference calls were held between RTI and IOM staff, and call notes were provided by RTI every week to document progress, including how the documentation was being written for public release, which analyses needed to be rerun because of the need for different categorical breakdowns, and so on.

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RTI instituted an internal triple check process for all data output. In some cases, they have rerun analyses to make sure the analysis was done correctly. Replication of the computer runs was not possible due to the number of iterations and refinements requested by committee members after the preliminary analyses started. The time and expense would have been prohibitive.

When the report is released to the public, all of the RTI data simulations in the form of Excel tables (Appendix A-2) will be released on the study website (http://www.iom.edu/GeoAdjust PaymentSimulations) in a downloadable format so they are available to anyone who chooses to review the data in detail.

In sum, the payment simulations were highly technical and complex, and multiple cross-checks were followed by RTI in preparing and executing programming code and reviewing output. To the extent feasible, qualified committee members provided direction and oversight for the simulations, but they were reluctant to review detailed documentation themselves and chose an independent contractor to perform that function on their behalf.

REPORT ON QUALITY ASSURANCE OF RTI PAYMENT SIMULATIONS

Prepared by Tim Dall, IHS Global Insight

Since its establishment in 1970, the IOM has played a prominent role in helping to inform and shape the national debate on health care policy and delivery. IOM's current commission from the Department of Health and Human Services is to conduct analysis of data sources and methods available to calculate the geographic adjustments used by the Centers for Medicare & Medicaid Services (CMS) for fee-for-service Medicare payments to hospitals and providers.

IOM's Phase I report provided recommendations for improving the accuracy of the geographic adjustment factors. IOM's Phase II report investigates the extent to which recommendations in the Phase I report, if implemented, would affect access to health care services. With Medicare spending approaching $525 billion in 2010, ensuring the accuracy of the geographic adjustments has substantial implications for hospitals and providers of medical services and the people they serve.

With such prominence in shaping policy, and given the importance of Medicare reimbursement in care delivery, comes a responsibility to provide the highest quality of work possible given data and resource constraints. IOM engaged RTI International in this 2-year study to conduct analyses and simulations related to the accuracy of the data and methods used to develop CMS's geographic adjustments. IOM engaged IHS Global Insight to provide an independent quality assurance review of the work completed by RTI and presented in the second year report titled *Geographic Adjustment in Medicare Payment: Phase II: Implications for Access, Quality, and Efficiency*.

The goal of the independent analysis reported in this appendix is to review documentation provided by RTI detailing the data and methods used to develop their payment simulations and results, to verify the integrity of the underlying data, and to assess the transparency and completeness of work presented. This independent review is in addition to review activities conducted by members of IOM's Committee on Geographic Adjustment Factors in Medicare Payment, a group of prominent subject matter experts who have volunteered their time to participate in this study.

The committee determined early in its deliberations that replication of the payment simulations would not be practical, given the limited resources available. However, the committee did

develop a data assurance plan that involved several steps, including forming a subcommittee that directed and reviewed RTI's intermediate and final analyses, discussing interim analyses at full committee meetings, and engaging IHS Global Insight as an independent contractor to review all data sources and analyses when the simulations were completed.

Because of the prodigious amount of work completed by RTI over the past 2 years leading up to the final results presented, it is not feasible to verify 100 percent accuracy in study findings. However, IOM requires that contractors performing quantitative analysis have a quality assurance plan and implement quality control procedures. RTI appears to have rigorous internal processes to help ensure quality, and all indications are that RTI has complied with its internal quality assurance protocols and implemented its work in accordance with industry best practices. Dobson et al., in their 2011 assessment of RTI International's Year 1 report to IOM. provide an overview of RTI International's programming quality assurance (QA) protocols.[1] RTI's internal QA process is documented in the firm's *Quality Assurance Management Handbook*. Exhibit C-1 summarizes key quality assurance protocols relevant to the IOM study and discusses some of the quality control activities conducted by RTI and IHS.

IHS reviewed copies of the MS Excel files that RTI prepared for committee members to share the payment simulation results. During calls with committee members, RTI discussed the results of the simulations and described the key factors contributing to differences in the results between the various simulation scenarios. A review of the Excel files identified quality control mechanisms built into the spreadsheets to help ensure accuracy.

In conclusion, to the best of IHS's knowledge based on a review of work products and computer programming code produced by RTI, and through discussions with the RTI Project Director and team members, the payment simulations were completed in accordance with industry best practices for quality control. Where possible, information from the internal documentation was compared to findings in the report to verify accuracy.

Key conclusions are

1. The technical write-up in the Phase I and II reports, including Appendix A of the Phase II report, provide sufficient detail to understand the data and methods used to construct the payment simulations. Combined with the project team's internal documentation, there is sufficient information to replicate the results. However, key data used in the analysis are not publically available. Specifically, special data runs by the Census Bureau (with the American Community Survey) and by the Bureau of Labor Statistics were prepared by bureau staff because they used data in small markets that were suppressed from the public-use files due to privacy rules.
2. The prodigious amount of information produced by RTI did not allow for checking of the data and replicating the analysis to ensure that it is free of error. However, we verified that RTI has a rigorous quality assurance plan, and all indications are that RTI complied with its quality assurance protocols. Discussions with the RTI project director and team suggest that the quantitative work was completed in accordance with industry best practices. Simulation results were presented to committee members, and study findings appear consistent with expectations.
3. The analytical approach helps address the research question of how changes to the

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[1] Dobson, A., J. E. DaVanzo, A. El-Gamil, G. Berger, and J. Freeman. *An examination of the data, materials, and assumptions used in the Institute of Medicine report* Geographic Adjustment in Medicare Payment: Phase 1: Improving Accuracy. Dobson/DaVanzo final report to the Institute of Medicine. June 2011.

EXHIBIT C-1 Quality Assurance Protocols and Quality Control Activities

RTI Quality Assurance Protocol	Quality Control Activities
Analysts and programmers provide sufficient documentation so that their work can be audited if needed.	IHS reviewed the programming code and documentation prepared by RTI. The contents of Appendix A combined with the internal documentation appears sufficient that one can understand the data and methods used to complete the analyses and, if needed, replicate RTI's payment simulations.
Analysts and programmers check and compare outputs to available benchmarks.	While no benchmarks exist for which to compare the payment simulations, substantial efforts were made by RTI, the IOM committee members, and IHS to compare the payment simulation results to CMS's current geographic adjustments factors and to understand the drivers of differences between the various geographic indices.
Report tables identify the source computer run so that table contents can be verified against the program(s) that generated them.	The IOM report and Appendix A identify those tables where the table content was generated from an RTI simulation. RTI's internal documentation identifies which computer program produced each table. Computer logs of the program code were reviewed by IHS.
Key study findings are sufficiently documented to allow for replication by other researchers.	This QA protocol is similar to a requirement of peer-reviewed journal articles—that sufficient information is provided to allow for replication of study findings. While RTI's documentation does allow for researchers to understand the data and methods, some key data sources are not publically available. Consequently, replication of study findings would require access to special data tabulations prepared by various government agencies and purchase of nonpublic data.
All data tables shared with the IOM committee or included in the IOM should be closely reviewed by the project director.	Discussions with the RTI project team indicates that the RTI project co-directors were intimately involved with all aspects of this analysis—from reviewing programmer code to reviewing all data tables provided to the IOM committee and/or included in the IOM report.
Verify the correctness of the original and constructed variables before beginning the analysis.	In line with industry best practices, RTI produced frequency distributions and summary statistics (e.g., mean, minimum, maximum values) for both the original data and the variables created. This helped identify outliers or data anomalies that were then checked for accuracy.

NOTES: CMS = Centers for Medicare & Medicaid Services; IOM = Institute of Medicine; QA = quality assurance.

geographic reimbursement might impact access to services. However, the approach does not fully address the question. The payment simulations show the impact on redistribution of Medicare dollars by geographic area and shortage designation, and by different characteristics of facilities providing care to Medicare patients. The report notes the paucity of extant research to describe how changes in Medicare payments might affect the propensity of individual providers and facilities to serve Medicare patients. While one would expect that lower Medicare payments to a particular geographic area will have a detrimental effect on provider supply in that area (thus reducing patient access to care), additional research is required to fully understand the implications on patient access and quality of care. The data and methods used to quantify the financial implications of changes to Medicare's geographic adjustment appear appropriate.

Appendix D

Public Session:
Workforce, Access, and Innovation
Policy Levers for Geographic
Adjustment In Medicare Payment

September 22, 2011
20 F Street, NW
Washington, DC 20001

M. Roy Wilson, Committee Vice Chair and Moderator

2:00–2:55   **Panel One: Workforce Recruitment and Retention**

This panel will focus on finding and retaining primary care providers (physicians, nurses, nurse practitioners, and physician assistants) and specialists who treat Medicare beneficiaries, including factors that make it easier and more difficult to match and keep providers in communities.

Challenges and Opportunities in Health Care Recruiting
Jennifer Grebenschikoff, President, The Physician Executive Leadership Center, Tampa, Florida

Challenges and Opportunities in Rural Recruiting
Cindy Bagwell, Vice President, Talent Acquisition, Geisinger Health System, Danville, Pennsylvania

Collaborative Approaches to Recruitment and Retention of Health Professionals
Anne Rosewarne, President, Michigan Health Council, Okemos, Michigan

3:00–3:55   **Panel Two: Impact of Delivery System Integration on the Provider Marketplace**

Panelists will describe the potential impact of current market trends on providers that serve Medicare beneficiaries, with a focus on changes in payment and organizational structures.

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Financial Performance and Access to Care
Mark Miller, Executive Director, Medicare Payment Advisory Commission (MedPAC), Washington, DC

Realities of the Health Care Marketplace
Blair Childs, Senior Vice President, Premier Inc., Washington, DC

4:00–4:55   Panel Three: Innovations in Expanding Primary Care Capacity and Access

This panel will describe innovative approaches to expanding workforce capacity and health care access and will include an overview of state scope of practice legislation, a description of a home care program in a large health system in Boston, and telemedicine in a rural hospital in Arizona.

Promising Practices in Expanding Scope of Practice
Rachel Morgan, National Conference of State Legislatures, Washington, DC

Moving Away from Visit-Based Care for Medicare Beneficiaries
Kathy Duckett, BSN, RN, Director of Clinical Programs, Partners Home Care, Boston, Massachusetts

Innovations in Expanding Capacity and Access
James Dickson, CEO, Copper Queen Community Hospital, Bisbee, Arizona

Note: In addition to approximately 35 in-person participants, more than 600 individuals participated via webinar.

Appendix E

Exchange of Letters Between House of Representatives Quality Coalition and Committee Chair Frank Sloan

Congress of the United States
Washington, DC 20515

November 10, 2011

The Institute of Medicine
Attn: Committee Chairman Frank Sloan
Committee on the Geographic Adjustment Factors in Medicare Payment
500 Fifth Street, NW
Washington, DC 20001

Dear Chairman Sloan:

As members of the Quality Care Coalition (Coalition), we are writing to express our concerns with the findings in the Institute of Medicine's (IOM) second edition of the Phase I Report on Geographic Adjustment Factors in Medicare Payment. While we appreciate the hard work and expertise of the IOM Committee on Geographic Adjustment Factors in Medicare Payment (Committee), we are concerned that the work of the Committee is not producing actionable recommendations that comprehensively address current inaccuracies in Medicare's geographic variables. When geographic adjustments cause large disparities in payments, physicians may choose to locate in regions that pay better, thus further affecting access negatively in rural areas.

The Coalition was pleased when HHS Secretary Sebelius fulfilled our request, by announcing her intent to commission the Institute of Medicine (IOM) to conduct a study to evaluate hospital and physician geographic payment adjustments, the validity of the adjustment factors, measures and methodologies used in those factors, and sources of data used for such adjustments. We turned to the IOM with the hope that the IOM could rise above geographic and partisan allegiances, dig into the root causes and effects of geographic variation, and come up with actionable recommendations to allow Secretary Sebelius to fulfill her next commitment to us: changing the geographic adjusters in Medicare to ensure they reflect accurate data and result is better access to care for seniors.

Given this charge to the IOM, we have a number of concerns with the report:

- The Committee recommended that CMS should continue to use proxies to measure geographic variation in the physician work GPCI. A determination of the validity of the current proxies was one of the key reasons why the Coalition pushed to get the IOM study funded. The Coalition sent a letter to the IOM in June reiterating that "it is critical that Phase II include full recommendations to update the work geographic adjuster." The Committee's failure to evaluate the validity of the proxies was thus very disappointing. How did the Committee justify finding that CMS should continue using proxies when it made no attempt to determine how accurately the current proxies, or any other proxies, reflected actual geographic variation?
- In its recommendations, the Committee concludes that using the Medicare Economic Index (MEI) cost share weights as the data for the Geographic Practice Cost Indices (GPCIs) cost share weights is "reasonable and should be continued." However, there is no evidence that the Committee analyzed the MEI weighting to determine that the GPCI weights accurately represent the real-world cost structure of physician practices. There

are many recent changes occurring in physician practices, including wider utilization of electronic health records, changes in the use of non-physician labor, and new organizational structures. Current payments based on practice structures from 5-6 years ago lack validity. Did the Committee analyze the MEI weights with the goal of determining whether they accurately reflect costs? If not, does the Committee intend to do this analysis as part of Phase 2? If not, how does the Committee justify a recommendation to continue the use of this data, without fulfilling its charge of analyzing the accuracy of such data?

- The MEI cost share weighting of 1:2 for the rent category (10.22%) vs. the wage category (19.15%) is inconsistent with the experience of physician practices that we have heard from, who indicate that the ratio of rent costs to wage costs is 1:4 or 1:5. There is concern that the previous MEI and GPCI weighting had erroneously included non-occupancy office costs in the rent portion of the PE GPCI which caused an "over-weighting" of the rent index and subsequent over-adjustment of rent. How is the Committee ensuring that the cost share weighting actually reflects real-world costs?

- Rural practices have additional burdens due to on-call time and outreach time/efforts. Though Medicare does not reimburse for these practices, physician salaries must recognize these aspects of rural practice. Many of our physician constituents pay nationally competitive salaries for physician work, regardless of Medicare's reimbursement. The Work GPCI should take into account the geographic differences in the cost of physician labor and not use unrelated professions as a proxy for physician work. The IOM should consider measuring the full costs of work, including the on-call burden, outreach time, and other unique regional differences. How can the IOM make the claim that the overall data is either accurate, or inaccurate, if it fails to measure all costs?
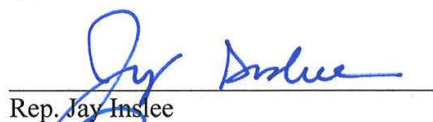
Our Coalition's goal to reward value depends on accurate measurement of the factors involved with physician care of beneficiaries. An essential part of physicians' ability to improve value is to correct regional disparities in Medicare reimbursement. Current unmerited regional disparities stifle overall quality and hinder incentives to promote more efficient care.

We look forward to our discussion of these concerns during our November 15th meeting. Thank you for your attention to this matter.

Sincerely,

_____   _____
Rep. Bruce Braley   Rep. Jay Inslee

_____   _____
Rep. Betty McCollum   Rep. Ron Kind

CC:
Roger C. Herdman, Institute of Medicine
Margaret Edmunds, Institute of Medicine

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

COMMITTEE ON GEOGRAPHIC ADJUSTMENT FACTORS IN MEDICARE PAYMENT

December 22, 2011

The Honorable Bruce Braley
The Honorable Jay Inslee
The Honorable Betty McCollum
The Honorable Ron Kind

Dear Members of the Leadership of the Quality Care Coalition (QCC):

As chair of the Institute of Medicine (IOM) Committee on Geographic Adjustment Factors in Medicare Payment, I am writing to respond to your letter of November 10, 2011, and to address questions that members of the QCC posed to Mr. Bruce Steinwald, committee member, and Dr. Margo Edmunds, IOM study director, during the November 15, 2011 meeting to discuss the committee's phase 1 report.

I would like to take this opportunity to clarify the committee's statement of assumptions and principles that led to these recommendations and to offer some additional clarification about the ongoing analysis of the impact of the phase 1 recommendations on stakeholders.

As described in Chapter 1 of the phase 1 report, the committee's technical and methodological approach to the study was evidence-based and grounded in the recognition that its primary charge in phase 1 of the study was to improve the accuracy of the adjustment factors and the methods and measures used to determine them.[1]

As described in the report, principles 3, 4, and 5 emphasized improving accuracy by reflecting market prices faced by all health care employers in local markets.[2] As labor is the most important input for both hospitals and physician practices, the committee devoted an entire chapter (Chapter 2) of the phase 1 report to an examination of the factors that cause labor costs faced by providers to vary geographically. This perspective led the committee to recommend a change in the payment areas for physician payments from the 89 areas currently used, to 441 areas based on metropolitan statistical areas, which are currently used for the hospital wage index. If adopted, this change would not only promote consistency in the two payment indexes, but would also anticipate market changes leading to a more integrated health care delivery system.

The committee recognizes that its recommended change in physician payment areas, if implemented, could result in a significant redistribution of physician and other clinical provider payments, particularly in the 34 states that currently have only one statewide payment area. In

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[1] Refer to page S-3, Box 5-1, Statement of Task, in *Geographic Adjustment in Medicare Payment Phase 1: Improving Accuracy, Second Edition*, in press.

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

COMMITTEE ON GEOGRAPHIC ADJUSTMENT FACTORS IN MEDICARE PAYMENT

carrying out its charge, the committee is currently overseeing an analysis by RTI International of the potential impact of the payment area change, as well as other recommended changes. The committee will identify areas where payments might decline and determine whether beneficiary access or other concerns might indicate the need for policy interventions. This approach is consistent with another phase 1 principle, that policy issues should be addressed directly rather than sacrificing the accuracy of Medicare payment adjustments.

The committee's emphasis on local labor markets also led to its recommendation that the hospital wage index and the practice expense GPCI should include all occupations rather than the limited number currently in use. This will help to recognize changes in the mix of skilled employees over time, such as increased employment of information technology specialists.

CMS has already adopted this recommendation, which was in the proposed rule for physician payment in 2012. However, the committee did not recommend changes to the Medicare Economic Index (MEI) or weighting factors in the Practice Expense GPCI. On one hand, the committee concluded that the evidence supporting regional, as opposed to national, weights was inadequate. On the other hand, the committee could not find a basis for recommending changes to the weighting factors in the data that were available that would improve the accuracy of Medicare payments.

Finally, the committee understands that the QCC is dissatisfied with our recommendations on the occupational proxies and percentage calculation pertaining to the physician work GPCI. As noted in the phase 1 report and the November 15, 2011 meeting, the committee laid out a specific process for CMS to follow to conduct analysis and modify the work adjustment based on the analytical results. Rest assured, the committee would have been glad to conduct this analysis itself if it had had the necessary time and data. Although we appreciate your concern about the willingness and ability of CMS to follow the process spelled out by the committee, we understand that CMS has already begun a reassessment of the occupational proxies, as we recommended.

As you know, the committee is conducting analyses and working on recommendations that will be contained in its phase 2 report, scheduled to be released in the spring of 2012. If you have any questions about the process being followed by the committee, please contact the study director, Dr. Margo Edmunds, at (202) 334-2397 or Dr. Roger Herdman at (202) 334-1302.

Sincerely yours,

Frank A. Sloan, PhD
Chair, Committee on Geographic Adjustment Factors in Medicare Payment

Appendix F

Committee and Staff Biographies

COMMITTEE MEMBERS

Frank A. Sloan, Ph.D. (*Chair*), has been the J. Alexander McMahon Professor of Health Policy and Management and professor of economics at Duke University since 1993. He is also the director of the Center for Health Policy, Law, and Management at Duke. Professor Sloan did his undergraduate work at Oberlin College and received his Ph.D. in economics from Harvard University. Before joining the faculty at Duke in July 1993, he was a research economist at the RAND Corporation and on the faculties of the University of Florida and Vanderbilt University. He was chair of the department of economics at Vanderbilt from 1986 to 1989. His current research interests include alcohol use prevention, long-term care, medical malpractice, and cost-effectiveness analyses of medical technologies. Professor Sloan also has a longstanding interest in hospitals, health care financing, and health manpower. He has served on several national advisory public and private groups. He is a member of the Institute of Medicine of the National Academy of Sciences and was recently a member of the Physician Payment Review Commission.

M. Roy Wilson, M.D., M.S. (*Vice-Chair*), is chancellor emeritus of the University of Colorado Denver (UC Denver), where he served from July 2006 until June 2010. UC Denver consists of a general academic campus with eight schools and colleges and a health sciences campus with five schools and colleges and serves approximately 28,000 students. Dr. Wilson is an elected member of the Institute of Medicine of the National Academies, the American Ophthalmological Society, and the Glaucoma Research Society. He served as chair of the Board of Trustees at Charles R. Drew University of Medicine and Science from 2010 to 2011. In addition to the board of the University of Colorado Hospital, for which he has been the chairman, Dr. Wilson has served on the governing boards of the Denver Children's Hospital, Auraria Higher Education Center, Fitzsimons Redevelopment Authority, Institute of International Education, Colorado Bioscience Association, Association of Academic Health Centers, and the Association of Public and Land Grant Universities. Dr. Wilson was an initial advisory council member of the National Center on Minority Health and Health Disparities of the National Institutes of Health and served

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4 years as chair of its strategic plan subcommittee. Dr. Wilson received his medical degree from Harvard Medical School and his master of science in epidemiology from the University of California, Los Angeles, School of Public Health. He performed both his ophthalmology residency and glaucoma fellowship at the Massachusetts Eye and Ear Infirmary, Harvard Medical School. Dr. Wilson was named president of the Texas Tech University Health Sciences Center in 2003. In 1998, he was appointed dean of the School of Medicine at Creighton University, and then served as both dean and Vice President for Health Sciences from 1999 to 2003. Prior to that time, he was dean of the School of Medicine at Charles R. Drew University of Medicine and Science. Dr. Wilson's major scientific contributions have been in bridging the fields of epidemiology and ophthalmology. He has delivered more than 200 invited lectures, many of these internationally, and has published more than 300 articles, book chapters, and abstracts. Dr. Wilson was selected for "Best Doctors in America" for consecutive years from 1996 to 2008. Among his many awards are the Distinguished Physician Award from the Minority Health Institute, the Honored Alumnus Award from the Massachusetts Eye and Ear Infirmary, the Senior Achievement Award from the American Academy of Ophthalmology, the Gold Citation from Allegheny College, and the Association of American Medical College's Herbert W. Nickens Award.

Jon B. Christianson, Ph.D., is professor and James A. Hamilton Chair in Health Policy and Management in the division of health policy and management at the University of Minnesota School of Public Health. His research interests include competition and competitive health care markets, health insurance, financial incentives in health care, public reporting, employer strategies for purchasing health care, implementation of evidence-based treatment processes in health care organizations, and tracking change in health care markets. He is a member of the Synthesis Project Advisory Group at the Robert Wood Johnson Foundation; holds current editorial appointments at *Medical Care Research and Review*, the *Journal of Health Administration Education*, and the *American Journal of Managed Care*; and was recently appointed to the Consumer Operated and Oriented Plan Advisory Board (Department of Health and Human Services, Office of Consumer Information and Insurance Oversight). Previously, he was chair of the 2007 Academy Health Annual Research Meeting, cochairperson of the Seventh Biennial Research Conference on the Economics of Mental Health, and a member of the Institute of Medicine Subcommittee on Maximizing the Value of Health Investments, Committee on Quality of Health Care in America. Dr. Christianson received his Ph.D. in economics from the University of Wisconsin–Madison.

Stuart Guterman, M.A., is vice president for the Commonwealth Fund's program on payment and system reform, based in Washington, DC. He is responsible for the Fund's research agenda on the use of payment incentives to elicit changes in health care delivery that can achieve high performance; the development, management, and review of grants to be funded under the program; and analyses related to the current performance and future improvements in the payment system and the health system overall. Mr. Guterman was director of the Office of Research, Development, and Information at the Centers for Medicare & Medicaid Services from 2002 to 2005. Prior to that, he was a senior analyst at the Congressional Budget Office, a principal research associate in the health policy center at the Urban Institute, and deputy director of the Medicare Payment Advisory Commission (and its predecessor, the Prospective Payment Assessment Commission) from 1988 through 1999. Previously, Mr. Guterman was chief of institutional studies in the Health Care Financing Administration's Office of Research, where

he directed the evaluation of the Medicare Prospective Payment System for inpatient hospital services and other intramural and extramural research on hospital payment. He holds an A.B. in Economics from Rutgers College and an M.A. in Economics from Brown University, and did further work toward the Ph.D. in economics at the State University of New York at Stony Brook.

Carlos Roberto Jaén, M.D., Ph.D., FAAFP, is the John Smith Jr. Endowed Professor and Chair of the Department of Family and Community Medicine at the University of Texas Health Science Center at San Antonio, where he codirects the Center for Research in Family Medicine and Primary Care. Over the last 18 years, the Center has studied almost 500 mostly independent, community-based primary care practices and recently completed the evaluation of the American Academy of Family Physicians' national demonstration project of the patient-centered medical home in 36 practices. Dr. Jaén has special interests that include improving preventive care for individuals of all ages, preventing complications from such chronic diseases as diabetes, high blood pressure, and heart disease. He is passionate about building and studying high-performance primary care offices. He served on the panels that published smoking cessation guidelines in 1996 and 2000 and was cochair of the panel that published an update in May 2008. In 2005, he was appointed to a 3-year term on the National Advisory Council to the Agency for Healthcare Research and Quality. He received a Generalist Physician Faculty Scholar Award from the Robert Wood Johnson Foundation and a Cancer Control Career Development Award for Primary Care Physicians from the American Cancer Society. He is a practicing family physician and has been selected for "Best Doctors in America" annually since 2002. His interests include building a healthier San Antonio through efforts in community wellness. He obtained a B.S. and M.S. from Niagara University in Lewiston, New York, and an M.D./Ph.D. in epidemiology and community health from the State University of New York in Buffalo. He completed a Family Medicine Residency and a Primary Care Research Fellowship at Case Western Reserve University in Cleveland, Ohio. Previously, he has served as medical director at the Niagara Family Health Center and has been in private practice in Ohio.

Jack Kalbfleisch, Ph.D., is a professor of biostatistics and statistics and he serves as director of the Kidney Epidemiology and Cost Center at the University of Michigan. He served as chair of the department of biostatistics from 2002 to 2007. He received his Ph.D. in statistics in 1969 from the University of Waterloo. He was an assistant professor of statistics at the State University of New York at Buffalo (1970–1973) and on faculty at the University of Waterloo (1973–2002). At Waterloo, he served as chair of the department of statistics and actuarial science (1984–1990) and as dean of the faculty of mathematics (1990–1998). He has held visiting appointments as professor at the University of Washington; the University of California, San Francisco; the University of Auckland, Fred Hutchinson Cancer Research Center, and the National University of Singapore. He has interests in and has published in various areas of statistics and biostatistics including life history and survival analysis, likelihood methods of inference, bootstrapping, and estimating equations, mixture and mixed effects models, and medical applications. Dr. Kalbfleisch is a fellow of the American Statistical Association and the Institute of Mathematical Statistics. He is also an elected member of the International Statistical Institute, a fellow of the Royal Society of Canada, and a Gold Medalist of the Statistical Society of Canada.

Marilyn Moon, Ph.D., is a nationally known expert on Medicare, having served as a senior fellow at the Urban Institute and as a public trustee for the Social Security and Medicare trust

funds. She is also an expert on health care financing and benefits, and has increasingly worked in the area of patient information and engagement. As senior vice president and director of the health program at American Institutes for Research, Dr. Moon is responsible for ensuring client satisfaction with all aspects of the health program's research and development activities and products. In addition, she provides overall direction of the health program, supervising 120 staff members. She also leads strategic planning efforts and supervises senior-level researchers, unit directors, research assistants, and support staff. Dr. Moon is responsible for overseeing the allocation of resources for 50 currently active projects, with a total annual value of more than $30 million. Other duties include serving as corporate monitor on two Centers for Medicare and Medicaid Services indefinite delivery/indefinite quantity (IDIQ) contracts, and as project director on one Agency for Healthcare Research and Quality IDIQ contract, while continuing to conduct research on a range of health policy issues. In addition to a long list of awards and honorary positions, Dr. Moon has a large number of peer-reviewed journal articles, books and book chapters, other publications, testimonies, and professional presentations to her credit.

Cathryn Nation, M.D., is the Associate Vice President for Health Sciences in the University of California's (UC's) Office of the President. She completed her undergraduate studies at the University of California, Davis, earning honors in political science/public policy and Spanish. She earned her medical degree from the University of California, San Francisco, in 1989. Her UC duties include leadership and coordination of health sciences academic affairs; liaising with deans and faculty involving educational policy and program planning; development of enrollment plans for UC's 16 health sciences schools; monitoring of health workforce needs; and representation of UC health sciences programs internally and externally. She oversees the university's anatomical materials programs and directs the systemwide Academic Geriatric Resource Program—a state-funded, multicampus program in geriatrics. Dr. Nation has extensive knowledge of undergraduate and graduate medical education, medical school admissions, health professions workforce issues, and matters related to health sciences instruction and institutional accreditation. In 2008, she was appointed as a commissioner on the California Healthcare Workforce Policy Commission—a statewide body established by statute to promote primary care training and workforce diversity. Within UC, she has primary responsibility for coordinating new initiatives in telemedicine supported by $200 million in voter-approved bond funding. Dr. Nation has authored numerous reports and studies addressing medical and health sciences education and was invited by the Institute of Medicine Committee on Institutional and Policy-Level Strategies for Increasing the Diversity of the U.S. Health Care Workforce to serve as author of a commissioned paper on health professions admissions practices. This paper identifies best practices in admissions and was published in 2004 by the National Academies Press in a report titled *In the Nation's Compelling Interest: Ensuring the Diversity in the Health-Care Workforce*. Dr. Nation continues to lead efforts with UC medical schools to develop new programs in medical education, which provide specialized training to prepare future graduates to meet the needs of the underserved. Five programs are offered, each involving a unique area of focus: program-specific standards for admission, specialized coursework, structured clinical experiences, independent study, and faculty mentoring. Areas of focus include rural health and telemedicine (Davis); Latino health (Irvine); diverse and disadvantaged communities (Los Angeles); promotion of health equity (San Diego); and the urban underserved (San Francisco).

Joanne M. Pohl, Ph.D., ANP-BC, FAAN, FAANP, is a health services researcher with 30 years of clinical experience as a nurse practitioner. She is currently professor emerita and principal investigator, Institute for Nursing Centers at the University of Michigan School of Nursing. Dr. Pohl's research has focused on health care quality and outcomes, cost of care in nurse-managed health centers, disparities, and health informatics in safety-net practices and has been funded by the Agency for Healthcare Research and Quality, Health Resources and Services Administration, and private foundations. At the University of Michigan, she served as associate dean for community partnerships from 2001 to 2008 and directed the Adult Nurse Practitioner Program from 1992 to 2001. From 2003 to 2008, she was a research fellow with the Michigan Public Health Institute. She is a recent past president of the National Organization of Nurse Practitioner Faculties, a member of the expert advisory panel of the Health Professional Workforce Initiative of the Bipartisan Policy Center, and a member of the advisory board for the Nursing Alliance for Quality Care. She also has been involved in the quality and safety education for nurses and is actively involved in policy related to primary care and nurse practitioners. She earned her Ph.D. from University of Michigan, her M.S.N. from Wayne State University, and her B.S. from Southern Connecticut State University. Dr. Pohl has received many awards, including a Lifetime Achievement Award from the National Organization of Nurse Practitioner Faculties and a President's Leadership Award from the Michigan Council of Nurse Practitioners, and is a fellow in the American Academy of Nursing and the American Academy of Nurse Practitioners.

Thomas C. Ricketts III, Ph.D., M.P.H., is professor of health policy and management and social medicine at the University of North Carolina (UNC) Gillings School of Global Public Health and the UNC School of Medicine. In 2008, he was named Gillings Visiting Professor at the École des Hautes Études en Santé Publique in Paris and Rennes, France. He is also codirector of the American College of Surgeons (ACS) Institute for Health Policy Research. His work with the ACS focuses on the future supply of surgeons and access to surgical care. Dr. Ricketts works actively in health workforce policy making and research and has developed national and state policies to influence the distribution of health care practitioners, including the development of a new approach to designating primary care and dental health professional shortage and medically underserved areas. From 2001 to 2010, he chaired the scientific advisory committee for the United Health Foundation's America's Health Rankings. In 2008 he was appointed to the secretary of Veterans' Affairs Rural Advisory Committee. He previously served on the secretary's National Advisory Committee on Rural Health and Human Services (Department of Health and Human Services). In 1997, Dr. Ricketts received the Distinguished Rural Health Researcher award from the National Rural Health Association, and in 1998, the Cecil G. Sheps Distinguished Investigator award from the University of North Carolina at Chapel Hill. He is a member of the North Carolina Institute of Medicine and serves as an advisor to national and state health policy organizations. Dr. Ricketts is editor of the *North Carolina Medical Journal*, having previously served as editor of the *Journal of Rural Health* from 1990 until 1996. Dr. Ricketts has authored many scientific articles, book chapters, and monographs and edited texts on rural health and geographic methods in health services research.

Jane E. Sisk, Ph.D., M.A., is an Institute of Medicine (IOM) scholar in residence and former director of the Division of Health Care Statistics for the National Center for Health Statistics at the Centers for Disease Control and Prevention. This division collects data from health care providers in different settings, including physicians, hospitals, and long-term care facilities. Dr.

Sisk has been a professor in the department of health policy, Mount Sinai School of Medicine, and before that at the Mailman School of Public Health, Columbia University. While a senior associate at the Congressional Office of Technology Assessment, she directed studies on Medicare payment for physician services and measures of the quality of hospital and physician care. Her research has focused on interventions to improve the quality of care, especially to reduce disparities among population subgroups; evaluation of Medicaid managed care; and the cost-effectiveness of health care interventions, including pneumococcal and influenza vaccination for elderly people. At Mount Sinai, she led randomized controlled trials in Harlem on the effectiveness and cost-effectiveness of nurse-management interventions for heart failure and hypertension. Dr. Sisk holds a Ph.D. in economics from McGill University, an M.A. in economics from George Washington University, and a B.A. with a major in international relations from Brown University. She serves on editorial boards for *Health Services Research, Medical Decision Making*, and the *International Journal of Technology Assessment in Health Care*. Dr. Sisk has been elected a fellow of AcademyHealth; a fellow of the New York Academy of Medicine; and a member of the IOM of the National Academies.

A. Bruce Steinwald, M.B.A., is an independent consultant in Washington, DC, who focuses on health policy, health economics and financing, and Medicare payment issues. Prior to this, he was director of health care at the U.S. Government Accountability Office (GAO). There, he testified before Congress on Medicare payment systems and other health care financing issues; supervised the preparation of health policy analyses, testimony, and reports to Congress; and met routinely with congressional staff to advise, inform, and instruct on health policy, financing, and payment issues. Prior to joining GAO, he served with the National Health Policy Forum of George Washington University, Covance Health Economics and Outcomes Services, Inc., and as deputy director of the Prospective Payment Assessment Commission (now the Medicare Payment Advisory Commission). He has served as an expert panelist/presenter at policy institutes and other organizations. He has a B.A. in business from Johns Hopkins University and an M.B.A. in hospital administration from the University of Chicago.

David Vlahov, Ph.D., R.N., is dean and professor, University of California, San Francisco, School of Nursing. Previously, he was Senior Vice President for Research and director of the Center for Urban Epidemiologic Studies at the New York Academy of Medicine. He has been professor of clinical epidemiology at the Mailman School of Public Health at Columbia University, and adjunct professor in epidemiology at the Johns Hopkins Bloomberg School of Public Health. Dr. Vlahov has conducted studies of urban populations in Baltimore for over 20 years, including several longitudinal cohort studies for which he received the National Institutes of Health MERIT Award. He brings expertise in epidemiology, infectious diseases, substance abuse, and mental health, and he has served on the National Advisory Council on Drug Abuse. More recently, Dr. Vlahov led epidemiologic studies in Harlem and the Bronx, which have served as a platform for subsequent individual- and community-level intervention studies and community-based participatory research (involving partnerships with residents, community-based organizations, and academic and public health departments) to address social determinants of health. This work has contributed information on racial/ethnic disparities in health and approaches to address such disparities. Dr. Vlahov led population-based studies on mental health and substance abuse in New York City residents following the September 11, 2001, attacks on the World Trade Center. Uniting all of these interests, Dr. Vlahov initiated the International Society for Urban Health (the

website is www.isuh.org), serving as its first president. The society brings together an interdisciplinary and international group of scientists to examine the health effects of urbanicity (in developed countries) and urbanization (in both developed and developing countries). He is a visiting professor at the Medical School in Belo Horizonte, Brazil, where he develops programs in urban health, and is working with the World Health Organization's Urban Health Center in Kobe, Japan. Dr. Vlahov is the editor-in-chief of the *Journal of Urban Health,* and serves as an editor for the *American Journal of Epidemiology* and *Epidemiology.* He has edited three books on urban health and published more than 600 scholarly papers. Dr. Vlahov received a baccalaureate and masters in nursing from the University of Maryland and a doctorate in epidemiology from the Johns Hopkins School of Hygiene and Public Health.

Barbara O. Wynn, M.A., is a senior policy analyst at RAND Corporation, where she has been principal investigator on a variety of studies involving Medicare issues, such as studies examining differences in Medicare patient characteristics, cost and quality of procedures performed in multiple ambulatory settings, and an evaluation of severity-adjusted patient classification systems and relative weight methodologies. She also conducts research related to financing of graduate medical education and federal support for safety net hospitals. She has led cost and quality studies for the California workers' compensation system, TRICARE, the Department of Veterans Affairs, and the State of Qatar. Prior to joining RAND in 1999, Ms. Wynn spent 24 years with the Health Care Financing Administration (HCFA, the predecessor agency to the Centers for Medicare & Medicaid Services). As deputy director of the Bureau of Policy Development and later director of the Plan and Provider Purchasing Policy Group, she was responsible for the full range of Medicare payment and coverage issues. Ms. Wynn led major Medicare regulatory initiatives, including the Medicare hospital inpatient capital prospective payment system, the hospital outpatient prospective payment system, the resource-based practice expense for physician services, and implementation of the Medicare+Choice program. For a number of years, she directed HCFA's Division of Hospital Payment Policy and was responsible for the policies and annual updates to the Medicare prospective payment system for inpatient hospital services.

Alan M. Zaslavsky, Ph.D., is a professor of health care policy (statistics) in the Department of Health Care Policy at Harvard Medical School. His methodological research interests include surveys, census methodology, microsimulation models, missing data, hierarchical modeling, small-area estimation, and applied Bayesian methodology. His health services research focuses primarily on developing methodology for quality measurement of health plans and providers and understanding the implications of these quality measurements. An important part of his work concerns the development, implementation, and analysis of the Consumer Assessments of Healthcare Providers and Systems (CAHPS) survey, a comprehensive program involving a survey instrument for eliciting enrollee reports and ratings of their health plans and the care they receive through them, a standard analysis package, and methods for reporting results to potential enrollees and purchasers. As a statistical leader in the implementation of the CAHPS survey for the Medicare population, he has studied individual characteristics affecting responses to the survey, the main dimensions of quality measured by the survey, the contributions of the health plan and geographical location to CAHPS-measured quality, comparisons of traditional Medicare to Medicare Advantage, and risk selection among health plans. In collaboration with Dr. Ronald Kessler, he leads analyses of the National Comorbidity Survey-Adolescent, a large study of mental health in U.S. adolescents aimed at validation and improvement of the CIDI-A

instrument and estimation of mental disorder for small geographic areas and schools. He also collaborates with Dr. Kessler on analyses for the World Mental Health Surveys and for the STARRS study of suicides in the armed forces. Another of Dr. Zaslavsky's research areas is methodology for measuring racial and ethnic disparities in care and determining their causes. Finally, Dr. Zaslavsky is part of the Statistical Coordinating Center of the Cancer Care Outcomes Research and Surveillance consortium, a major study sponsored by the National Cancer Institute to study process-outcomes relationships and sources of disparities in cancer care. He is developing methods of integrating cancer registry data with surveys and medical record reviews to better detect such relationships. Dr. Zaslavsky earned his B.A. from Harvard College, his M.S. in statistics and computer science from Northeastern University, and his Ph.D. in applied mathematics, with a specialty in statistics, from the Massachusetts Institute of Technology. He is a fellow of the American Statistical Association, an elected member of the International Statistical Institute, and a National Associate of the National Academy of Sciences. He has served on numerous panels on decennial census methodology, small-area estimation, and measurement of race for health and health services research, and health care quality reporting for the Institute of Medicine and the Committee on National Statistics of the National Academy of Sciences, of which he is a member.

Stephen Zuckerman, Ph.D., is a senior fellow in the Health Policy Center of the Urban Institute. He received his doctorate in economics from Columbia University in 1983. During his 25 years as a health economist, he has studied issues related to physician payment, insurance coverage and market reforms, and the health care safety net. His current research is focused on Medicare physician payment, the development of "medical homes," Medicare benefit design, the tax treatment of employer-sponsored health insurance premiums, and health care among undocumented immigrants. He recently coauthored a study examining the determinants of geographic differences in Medicare spending across individuals. Dr. Zuckerman's research on Medicare physician payment includes several studies that developed the geographic practice cost indices used in the fee schedule for physician services, estimated the extent of the volume offset in the market for physician services, analyzed the growth in the volume and intensity of physician services, and outlined an approach to Medicare assignment that could avoid mandatory assignment of all claims yet protect low-income beneficiaries. He has also studied hospital rate setting, Medicaid managed care, state coverage expansions for adults, the Indian Health Service, the effects of the State Children's Health Insurance Program on private insurance coverage, state budget problems and their impact on health policies, and medical malpractice. He directed the health care component of the National Survey of America's Families (NSAF)—the Assessing the New Federalism's household survey. Dr. Zuckerman used the NSAF to study the effects of modifying health insurance survey questions like those used in the Current Population Survey by including a question confirming that those who did not report coverage were actually uninsured. Results from this study were cited as part of the justification for including a confirmation question at the end of the Current Population Survey insurance coverage sequence. Prior to joining the Urban Institute, he worked at the American Medical Association's Center for Health Policy Research.

RTI INTERNATIONAL CONSULTANTS

Walter Adamache, Ph.D., received his Ph.D. in economics from Vanderbilt University in 1982. His 25-year career in health economics includes both behavioral and policy-related research.

His hospital research includes studies on hospital costs, hospital labor markets, capital costs, investment, closures, and mergers. He examined geographic variation of prices paid by hospitals and physicians for labor and nonlabor input prices and suggested to the Health Care Financing Administration (HCFA, now the Centers for Medicare & Medicaid Services) a methodology to smooth out intertemporal changes in Inpatient Prospective Payment System (IPPS) area wage index values. During the 1990s, he submitted recommendations to HCFA regarding updating the physician malpractice insurance component of the Medicare Geographic Practice Cost Index. Recent work includes examining alternative methods for configuring payment localities for the Medicare Physician Fee Schedule and an examination of the relative merits of the Bureau of Labor Statistics versus hospital-specific wage data for the IPPS area wage index. He is currently evaluating the impact of the alignment of hospital and physician incentives on hospital costs.

Justine L. E. Allpress is a research geographic information systems analyst in RTI International's Environmental Health and Safety Division. Ms. Allpress has extensive experience in working with clients and production and editorial staff to coordinate the production of mapping for reports and major projects. She is responsible for the development and production of automated mapping in support of survey and statistical projects. Her technical skills include data manipulation, map preparation, map production and design, and the development of software and tools to automate complicated mapping and analysis tasks.

Kathleen Dalton, Ph.D., has experience in health care finance that spans the roles of management, industry consultant, trustee, and researcher. Following a 20-year career in health care finance, she earned her doctorate in health policy from the School of Public Health at the University of North Carolina (UNC). After completing a Centers for Medicare & Medicaid Services–funded dissertation on payments to teaching hospitals under the Medicare prospective payment system, she remained at UNC for 5 years as a research faculty member and also a fellow at the Cecil G. Sheps Center for Health Services Research. Her work focused on hospital reimbursement, financial performance, and Medicare payment policy, including two studies of geographic wage variation in hospitals and in skilled nursing facilities. Since joining RTI in 2005, she has continued to focus Medicare payment policy, financial performance of hospitals and postacute care providers, and the effects of reimbursement incentives on care delivery. She is a quantitative analyst specializing in secondary data modeling, is a recognized expert in prospective payment systems, and has extensive experience in analysis of Medicare claims data and cost reports.

Gregory C. Pope, M.S., directs RTI's Health Care Financing and Payment Program based in Waltham, Massachusetts. Mr. Pope has more than 25 years of experience in health economics and health policy research, after completing his graduate education in economics at the Massachusetts Institute of Technology. Much of Mr. Pope's work has focused on design and evaluation of provider payment methods for the Medicare program. Mr. Pope is a codeveloper of the Geographic Practice Cost Index used in Medicare physician payment and has conducted analyses of Medicare's hospital wage index for the Centers for Medicare & Medicaid Services (CMS) and the Medicare Payment Advisory Commission. He has led the development and refinement of the CMS's Hierarchical Condition Categories system for risk adjustment of managed care capitation payment. A current focus of Mr. Pope's work is developing shared savings payment methods for Medicare accountable care organizations.

Elizabeth Seeley, Ph.D., M.P.H., is a health policy researcher at RTI International. She has more than a decade of research and practical work experience in both domestic health policy and international health policy issues. While at the London School of Economics, her research focused on pharmaceutical purchasing efficiency, through which she constructed sophisticated pharmaceutical price indices in order to conduct international pharmaceutical price comparisons. As a manager of policy analysis at the Massachusetts Hospital Association, Dr. Seeley worked directly on Medicare hospital wage index issues as well as on other issues relevant to hospital pricing, including helping hospital managers develop fair pricing guidelines for low-income populations. At the Center for Studying Health System Change and as an independent consultant, Dr. Seeley has led site visits to multiple states, where she has gained insight on geographic differences in health system delivery. Dr. Seeley has a doctorate in social policy from the London School of Economics, a master's degree in health policy and management from the Harvard School of Public Health, and a bachelor's degree in economics from Boston College.

Nathan West, M.P.A., is a health research analyst for RTI International. Mr. West has nearly 15 years of experience in health services and health policy research after completing his undergraduate education in public policy from the University of North Carolina at Chapel Hill and graduate education in public administration from North Carolina State University. Much of Mr. West's work has focused on the evaluation of Medicare demonstration programs related to quality measurement, quality improvement, and payment reform. He assisted with the analyses of Medicare's hospital wage index for the Medicare Payment Advisory Commission in 2006–2007.

Alton Wright, B.S., joined RTI in 2009 as a public health analyst in RTI's Health Care Financing and Payment Program. Before joining RTI, Alton attended the University of North Carolina at Chapel Hill, where he completed his degree in health policy and administration. While completing his degree, he worked for the North Carolina Office of Emergency Medical Services as a research assistant for a cost study of the State Medical Response System. Since joining RTI, Mr. Wright has served as project coordinator for various projects. In this role he has assisted project managers by monitoring achievement milestones, drafting meeting notes and progress reports, and coordinating the logistics of team meetings and interviews with stakeholders and experts.

IHS GLOBAL INSIGHT CONSULTANTS

Tim Dall is a health economist with more than 17 years' experience conducting research and policy analysis in the areas of burden of disease, health promotion, and the health workforce. He is currently managing director, Health Care Consulting, at IHS Global Insight and previously was vice president at The Lewin Group. His work applies economic theory, statistical and econometric analysis, cost/benefit analysis, program evaluation, and computer modeling skills. His recent publications have appeared in journals such as *Health Affairs, Medical Care, American Journal of Managed Care, Diabetes Care, Population Health Management, American Journal of Health Promotion, Military Medicine,* and *Circulation.* Mr. Dall specializes in forecasting and predictive modeling, health workforce, burden of disease, and health promotion, and conducts health economic studies for federal and state government agencies, associations, insurers, and for-profit companies. He received his master's in economics from the University of Wisconsin–Madison.

Paul Gallo is an economist and analyst in the health care consulting practice at IHS Global Insight. He has extensive experience analyzing pricing and reimbursement data and developing computer models.

Mike Storm is an analyst in the health care consulting practice at IHS Global Insight. With a background in economics, he has extensive experience analyzing the pricing and reimbursement landscapes of European markets and has also worked extensively with modeling supply and demand for health care services in the United States.

INSTITUTE OF MEDICINE STAFF

Margaret Edmunds, Ph.D., director of the Institute of Medicine (IOM) Study of Geographic Adjustment Factors in Medicare Payment, is a health policy analyst with a clinical background in disease management. She has designed, implemented, and evaluated initiatives on health care coverage and access, health information technology adoption, health information exchange, and consumer health communications for federal and state government, foundations, and associations. Previously, she was a vice president of The Lewin Group, adjunct associate professor of health policy and management at the Johns Hopkins Bloomberg School of Public Health, and a senior associate on the Health IT team at Booz Allen Hamilton, where she coauthored white papers on meaningful use of electronic health records and public health informatics. She also served as study director for previous IOM studies on the State Children's Health Insurance Program and quality assurance for managed behavioral health care. Dr. Edmunds chairs the Public Policy Committee of the American Medical Informatics Association, chaired the Health IT Interest Group for AcademyHealth from 2007 to 2010, and is a fellow and former member of the board of directors of the Society of Behavioral Medicine. Her published work also includes three reports for the National Academies Press, book chapters, journal articles, white papers, technical reports, media backgrounders, and online commentary. She began her health care career as a Research and Clinical Fellow at the Johns Hopkins School of Medicine and as a member of the affiliate staff at the Johns Hopkins Hospital. Dr. Edmunds completed her doctoral degree in human development at The Pennsylvania State University and completed postdoctoral fellowships at the Johns Hopkins School of Medicine and School of Hygiene and Public Health.

Kathleen Haddad, Ph.D., senior program officer for the Institute of Medicine (IOM) Study of Geographic Adjustment Factors in Medicare Payment, is a health services researcher with extensive background in Medicare claims data analysis, Medicare payment systems, Medicare quality, chronic disease management, health insurance policy, and geriatric mental health. In addition, Dr. Haddad has a background in journalism and communications. She came to the IOM from the Centers for Medicare & Medicaid Services Office of Policy, where she designed a standardized and risk-adjusted database of all Medicare claims and a set of composite quality measures based on four consensus-based measure sets for use in small area variation studies. She directed a Robert Wood Johnson Foundation–funded research group on chronic care at Johns Hopkins Bloomberg School of Public Health, where she received her Ph.D. in health services research. Dr. Haddad served as director of health policy at Families USA, senior associate for policy at the American College of Physicians, and director of communications in the Office of the New York State Assembly Majority Leader. She began her career in Albany, New York, as health writer for the *Albany Times Union*, reporting on and writing about public health and

health care financing issues emerging from the state department of health and state legislature. Her published work also includes journal articles and numerous reports on Medicare, Medicaid, and private health insurance policy. She is a reviewer for the American Public Health Association Dissertation Awards Committee and a former member of the board of the New York State Mental Health Association. In addition to completing her Ph.D., Dr. Haddad also completed an M.S. degree at the Columbia University Graduate School of Journalism.

Ashley McWilliams, B.S., joined the Institute of Medicine (IOM) in September 2008 as a senior program assistant for the Board on Health Care Services and the National Cancer Policy Forum. Besides assisting on the Geographic Adjustment Factors project, she worked on the Breast Cancer and the Environment: The Scientific Methodology, Research Findings, and Future Directions study funded by Susan G. Komen for the Cure; the Defining and Revising an Essential Health Benefits Package for Qualified Health Plans study; and the Expert Panel on Access to Medicare Part D Routine Vaccines project. She has also worked with the IOM's Roundtable on Evidence-Based Medicine and in the Office of Reports and Communication. Prior to joining the IOM, Ashley graduated magna cum laude and as a member of Phi Beta Kappa from Howard University with a degree in biology in 2008. During college, Ashley was copresident of the Health Professions Society, an inductee into Who's Who Among Students at American Colleges and Universities, and a member of several honor societies. Ashley has also participated in summer research programs at the University of California, San Francisco; Massachusetts Institute of Technology; and Virginia Polytechnic and State University. She also participated in a summer health careers program at Case Western Reserve University.

Serina S. Reckling, M.P.H., joined the Institute of Medicine (IOM) in August 2010 as a research associate for the Board of Health Care Services study on Geographic Adjustment Factors in Medicare Payment. Her previous experience includes work in community health in Santa Cruz and Watsonville, California, and Monte Christi, Dominican Republic. Prior to joining the IOM, Serina interned at Insure the Uninsured Project in Los Angeles, where she assisted staff in collecting health care reform literature and analyzing the impact of health insurance exchanges on California. She also interned for Grantmakers in Health in Washington, DC, where she conducted research on program and policy initiatives among grantees. She developed a passion for health policy after working with uninsured patients in a small community hospital in a rural area of California and serving as a community health promoter in the Peace Corps. Serina is a member of the Delta Omega Honorary Society in Public Health and an associate member of the National Academy of Social Insurance. She earned a master's in public health and health services policy from the University of California, Los Angeles, School of Public Health and received a B.A. in sociology from University of California, Santa Cruz. She is fluent in Spanish and a native speaker of German.

Sara Spizzirri, M.P.A., joined the Institute of Medicine in August 2010 as a research assistant on the Board on Health Care Services. She provides research and administrative support to her team members working on the study of Geographic Adjustment Factors in Medicare Payment for the Centers for Medicare & Medicaid Services. Previously, Sara supported a variety of programmatic and administrative activities at the *Proceedings of the National Academy of Sciences*. She also completed internships with the British Parliament and a general practice law firm in upstate New York. Sara graduated from Ithaca College in 2008 with a B.A. in politics and a

minor in biology. She earned her M.P.A. with a double concentration in nonprofit management and science policy from American University in May 2010.

Joi D. Washington, B.S., is a research assistant for the Institute of Medicine (IOM) Board on the Health of Select Populations. Prior to joining the IOM in May 2008, Ms. Washington held the position of registrar at the National Minority AIDS Council, in which she oversaw the registration process for two large national conferences. Ms. Washington received her B.S. in public and community health from the University of Maryland, College Park, in 2007 and is currently pursuing a dual master's degree in health care administration and business administration from the University of Maryland, University College.

Roger C. Herdman, M.D., is director of the Institute of Medicine (IOM) Board on Health Care Services. He received his undergraduate and medical school degrees from Yale University. Following an internship at the University of Minnesota and a stint in the U.S. Navy, he returned to Minnesota, where he completed a residency in pediatrics and a fellowship in immunology and nephrology and also served on the faculty. He served as professor of pediatrics at Albany Medical College until 1979. In 1969, Dr. Herdman was appointed director of the New York State Kidney Disease Institute in Albany, New York, and shortly thereafter was appointed deputy commissioner of the New York State Department of Health (1969–1977). In 1977 he was named New York State's director of public health. From 1979 until joining the U.S. Congress Office of Technology Assessment (OTA), he served as a vice president of Memorial Sloan-Kettering Cancer Center in New York City. In 1983, Dr. Herdman was named assistant director of OTA, where he subsequently served as director from 1993 to 1996. He later joined the IOM as a senior scholar and directed studies on graduate medical education, organ transplantation, silicone breast implants, and the Department of Veterans Affairs national formulary. Dr. Herdman was appointed director of the IOM/National Research Council National Cancer Policy Board from 2000 through 2005. From 2005 until 2009, Dr. Herdman directed the IOM National Cancer Policy Forum. In 2007, he was also appointed director of the IOM Board on Health Care Services. During his work at the IOM, Dr. Herdman has worked closely with the U.S. Congress on a wide variety of health care policy issues.

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