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HOW IS A SHORTAGE OF PRIMARY CARE PHYSICIANS AFFECTING THE QUALITY AND COST OF MEDICAL CARE?

A Comprehensive Evidence Review

American College of Physicians
A White Paper
2008

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A White Paper of the
American College of Physicians

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Introduction

In January 2006, the American College of Physicians warned that primary care, the backbone of the nation's health care system, was on the verge of collapse (1). ACP noted that very few young physicians were going into primary care and many of those already in practice were leaving, at a time when the demand for primary care services would be expected to increase due to an aging population with more chronic disease. In that paper, and in several other position papers published over the subsequent 2.5 years, ACP proposed a number of policies to halt and reverse the decline in the numbers of physicians choosing primary care careers. (2,3,4) ACP's recommendations include: creating pathways to eliminate student debt for physicians choosing primary care careers; reforming dysfunctional payment policies to increase payments to primary care physicians linked to accountability for improved outcomes; and designing, implementing and evaluating new models of primary care, such as the Patient Centered Medical Home.

Since then, and notwithstanding a heightened interest and concern expressed by many physicians, policymakers and other stakeholders about the future of primary care, *the United States has yet to implement comprehensive strategies to recognize, support, and enhance primary care to the degree necessary to reverse a worsening primary care shortage.* With each passing year, the gap between the need for primary care, and the numbers of physicians in primary care specialties and practices, will continue to grow. A shortage of primary care physicians will have huge, adverse implications for access, quality, and cost of care in the United States.

The hallmarks of primary care medicine--first contact care, continuity of care, comprehensive care, and coordinated care--are going to be increasingly necessary in taking care of an aging population with growing incidence of chronic disease, and have proven to achieve improved outcomes and cost savings. Without primary care, the health care system will become increasingly fragmented and inefficient, leading to poorer quality care at higher costs.

With health care reform taking a central role in the 2008 presidential and congressional elections, it is imperative that the new president and Congress make a commitment to implementing federal policies to facilitate a sufficient supply of primary care physicians. Otherwise, policies designed to expand access to insurance coverage, although essential, will *not* by themselves achieve the intended result of assuring that all Americans have access to high-quality, affordable care. Moreover, the cost of providing coverage to more than 46 million uninsured Americans will be much higher--and the outcomes of care much poorer--if expansion of coverage is accomplished without also concurrently expanding the primary care workforce.

ACP believes that policymakers are more likely to take the steps necessary to assure a sufficient primary care workforce if they are aware of the research on the importance of primary care to a high-performing health care system. To this end, this white paper provides an overview of current trends in the primary care physician workforce, the importance and value of primary care, and the growing demand for primary care services in the United States.

Twenty years of research, reviewed in this paper, documents the value of primary care. An annotated bibliography based on a literature review documents the evidence to support the critical importance of primary care in providing patients with better outcomes at lower cost, and the urgency of the need to prevent shortages of primary care physicians. It demonstrates that primary care physicians deliver high-quality care, reduce mortality, provide continuity of care, and reduce health care costs. Results of international comparisons are also provided. Overall, the evidence described in this paper support the following findings:

- Absent changes in policies to make primary care more attractive and rewarding to new physicians and to sustain those already in practice, the supply of primary care physicians will fall behind increased patient demand, resulting in a shortfall of tens of thousand of primary care physicians over the next decade.
- The availability of primary care is positively and consistently associated with improved outcomes, reduced mortality, lower utilization of health care resources, and lower overall costs of care.
- Consequently, a shortage of primary care physicians will result in poorer health outcomes and more premature and preventable deaths for millions of Americans, and overall higher costs of care.

In addition to this white paper, ACP is developing a new policy paper to provide a comprehensive set of recommendations to assure that the supply of primary care physicians is sufficient to meet current and future needs. Later in 2009, ACP will release a position paper that will make recommendations on how primary care itself needs to change to meet the needs of an aging population with more chronic diseases¹.

Although the focus of these papers is on the importance of primary care physicians, ACP recognizes and respects the roles of other health professionals and clinicians, including independent nurse practitioners and physicians assistants, in meeting the United States' primary care needs in a collaborative and team-based manner that recognizes each profession's contributions to patient care. ACP is currently engaged in discussions with the nursing profession on the development of policies that support and recognize the contributions of both nurses and primary care physicians. ACP had previously endorsed legislation enacted by Congress to address the nursing profession shortage.

Summary of Evidence

Summary of the Evidence That Demand for Primary Care Will Exceed Supply

The current method of health care delivery in the United States, which emphasizes episodic treatment for acute care through private health insurance and governmental programs, is not optimally meeting the health care needs of patients with chronic diseases. Primary care physicians are at the forefront of managing chronic diseases, providing comprehensive care and coordinated long-term care, and the demand for such care is growing. Primary care physicians also focus on primary prevention--avoiding the chronic diseases that then require costly management.

The U.S. population is expected to increase by 18%, to 349 million, between 2005 and 2025. Within the next decade, the baby boomers will begin to be eligible for Medicare. By the year 2030, one fifth of Americans will be above the age of 65, with an increasing proportion above age 85. The population age 85 and over will increase 50% from 2000 to 2010. (5)

This rapid growth in population and increased proportion of elderly people is expected to raise the number of ambulatory care visits by 29% by 2025. The increased child population is estimated to increase patient visits by 13%. (6)

The number of patients with chronic diseases, those who benefit most from the coordination of care and continuity of care that primary care physicians provide, is also increasing. 45% of the U.S. population has a chronic medical condition and about half of these, 60 million people, have multiple chronic conditions. (5) For the Medicare program, 83% of beneficiaries have one or more chronic conditions and 23% have five or more chronic conditions. (7) It is important to note that the 23% of beneficiaries with five or more chronic conditions account for two-thirds of all Medicare spending.

By 2015, an estimated 150 million Americans will have at least one chronic condition. (5) Among nonelderly adults, the number who report having one or more of seven major chronic conditions has increased from 28% in 1997 to 31% (or 58 million) in 2006. (8)

While the demand for primary care is increasing, there has been a dramatic decline in the number of graduating medical students entering primary care. (9-11)

Factors affecting the supply of primary care physicians include excessive administrative hassles, high patient loads, and declining revenue coupled with the increased cost of providing care. As a result, many primary care physicians are choosing to retire early. (10) These factors, along with increased medical school tuition rates, high levels of indebtedness, and excessive workloads, have dissuaded many medical students from pursuing careers in general internal medicine and family practice. (12)

From 1997 to 2005, the number of U.S. medical graduates entering family medicine residencies dropped by 50%. (12) In 2007, only 23% of third-year internal medicine residents, planned to practice general internal medicine compared to 54% in 1998. Among first-year internal medicine residents, only 14% indicated that they planned to pursue careers in general medicine. (13) Even more disheartening, a 2007 study of fourth-year medical students' career decision making revealed that only 2% of students intended to pursue careers in general internal medicine. (14)

An increasing proportion of new primary care physicians are women, who tend to work fewer hours, further reducing the effective workforce. By 2025, half of all primary care physicians will be female. (6)

Approximately 21% of physicians who were board-certified in the early 1990s have left internal medicine, compared with a 5% departure rate for internal medicine subspecialists. (11)

A 2008 study predicted that the U.S. will experience a shortage of 35,000–44,000 adult primary care physicians by 2025. The study also predicted that population growth and aging will increase family physicians' and general internists' workloads by 29% between 2005 and 2025. Further, greater use of nurse practitioners and physicians assistants and increased primary care by specialists are not expected to make enough of an impact on this shortfall. (6)

Summary of the Evidence on the Value of Care Provided by Primary Care Physicians

Evidence from the available medical and scientific literature suggests that:

When compared with other developed countries, the United States ranked lowest in its primary care functions and lowest in health care outcomes, yet highest in health care spending. (15-17)

Primary care has the potential to reduce costs while still maintaining quality. (18-22)

States with higher ratios of primary care physicians to population have better health outcomes, including decreased mortality from cancer, heart disease, or stroke. (23, 24)

Individuals living in states with a higher ratio of primary care physicians to population are more likely to report good health than those living in states with a lower ratio. (25)

The supply of primary care physicians is also associated with an increase in life span. (26, 27) An increase of just one primary care physician is associated with 1.44 fewer premature deaths per 10,000 persons. (28)

Primary care physicians have been shown to deliver care similar in quality to that of specialists for certain conditions, such as diabetes and hypertension, often while using fewer resources, (14, 29, 30) although specialists often are the best qualified to provide care within their areas of training and expertise for patients with more advanced and complex clinical conditions. Cooperation between specialists and primary care physicians is of utmost importance in ensuring optimal care of patients. Specialty care is more effective when the patient also has an ongoing relationship with a primary care physician. Primary care physicians are adept at ensuring that patients get the right care, including care from specialists. (31)

Primary care physicians have also been shown to provide better preventive care than specialists, reflecting their ability to better manage the whole health of patients. (32-34)

The preventive care that primary care physicians provide can help to reduce hospitalization rates. (35-39) In 2000, an estimated 5 million admissions to U.S. hospitals, with a resulting cost of more than \$26.5 billion, may have been preventable with high-quality primary and preventive care treatment. Assuming an average cost of \$5,300 per hospital admission, a 5% decrease in the rate of potentially avoidable hospitalizations alone could reduce inpatient costs by more than \$1.3 billion. (18)

Hospital admission rates for five of 16 ambulatory care-sensitive conditions "for which good outpatient care can potentially prevent the need for hospitalization, or for which early intervention can prevent complications or more severe disease," increased between 1994 and 2003, suggesting worsening ambulatory care access or quality for those conditions.(40, 41) Studies of certain ambulatory care-sensitive conditions have shown that hospitalization rates and expenditures are higher in areas with fewer primary care physicians and limited access to primary care. (35)

An increase of 1 primary care physician per 10,000 population in a state was associated with a rise in that state's quality rank by more than 10 places and a reduction in overall spending by \$684 per Medicare beneficiary. (42) By comparison, an increase of 1 specialist per 10,000 population was estimated to result in a drop in overall quality rank of nearly 9 places and increase overall spending by \$526 per Medicare beneficiary.

The following annotated literature review provides a more detailed and comprehensive description of the evidence on the impact of primary care on quality and cost.

Annotated Literature Review

To characterize the relationship between primary care physicians and health care quality and costs, research published within the last 20 years was reviewed. This paper summarizes the evidence relating primary care physicians to individual and community health care outcomes.

An initial search of major medical and scientific databases for published articles resulted in more than 1000 documents. The search was conducted utilizing a computerized search of PubMed, scanning the bibliographies of articles, and reviewing reports from major health care surveys. The compiled research was ultimately narrowed down to approximately 100 documents. Evidence from the available medical and scientific literature suggests that:

Primary Care Physicians Reduce Mortality Rates

A U.S. state-level study conducted by Farmer et al examined the empirical relationship between the prevalence of poverty and the mortality experience of different age groups within the population. The study revealed that the higher the ratio of primary care physicians to population, the better the outcomes as measured by age-specific mortality rates. (43)

EXHIBIT 2

Relationship Between Primary Care And Specialist Physician Ratios And Mortality: Regression Coefficients, Standard Errors, And Statistical Significance, 1996–2000

Mortality measure (per 100,000)	Primary care				Specialist			
	Unadjusted		Adjusted ^a		Unadjusted		Adjusted ^a	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
All-cause	-0.0353****	0.0029	-0.0086**	0.0035	0.0264****	0.0068	-0.0031	0.0051
Heart	-0.0171****	0.0011	-0.0117****	0.0005	0.0031	0.0017	-0.004**	0.0016
Cancer	-0.0039****	0.0006	-0.0006	0.0005	0.0053****	0.0007	-0.0003	0.0007

SOURCE: National Center for Health Workforce Analysis, 2002 Area Resource File (Rockville, Md.: National Center for Health Workforce Analysis, 2002).

NOTES: Numbers are regression coefficients derived from Proc-Mixed analysis. The results are interpreted as in an ordinary regression: A one-unit change in the coefficient is associated with a one-unit change in the outcome. Negative values indicate an association with lower mortality; positive values indicate an association with higher mortality.

^aAll values for regression coefficients adjusted for per capita income, percent high school education, percent unemployment, percent elderly, percent African American, percent below the federal poverty level, and percent in a metropolitan statistical area (MSA) or non-MSA. SE is standard error. Tests of significance were based on z-statistics.

p < .05 **p < .001

In an analysis of mortality data from 1996-2000 for 3,075 U.S. counties (99.9% of all U.S. counties), Starfield et al found that the greater the supply of primary care physicians, the lower the total and heart disease mortality rates. These data, from 35 separate studies, remained statistically significant even after socioeconomic and demographic characteristics were controlled for. Upon analyzing the types of geographic areas and mortality, the authors concluded that the higher the primary care ratio, the lower the mortality for 28 of the 35 studies reviewed, with statistical significance reached in 20 of them. Further, when socioeconomic characteristics were added to the analyses the ratio of primary care to population remained significantly associated with lower total, heart disease, and cancer mortality. In contrast, the ratio of specialist to population was generally associated with higher mortality in 25 of the 35 studies. (44)

The addition of one primary care physician per 10,000 population in the U.S. resulted in 3.5 fewer people dying each year.

Shi et al conducted a U.S. state-level analysis to evaluate the associations among income inequality, primary care, specialty care, smoking, and health indicators. When state-level economic and demographic characteristics were controlled for, the authors concluded that an increase of one primary care physician per 10,000 population was associated with a 6% decrease in all-cause mortality and an approximately 3% decrease in infant, low-birthweight, and stroke mortality. The authors also estimated that an increase of 1 primary care doctor per 10,000 persons would result in a reduction of 34.6 deaths per 100,000 population. (38)

Macinko et al analyzed articles on primary care physician supply published between 1985 and 2005. The authors reanalyzed the results to assess primary care effect, size, and the predicted effect on health outcomes of a one-unit increase in primary care physicians per 10,000 population and determined that pooled results for all-cause mortality demonstrated that an increase of one primary care physician per 10,000 population was associated with an average mortality reduction of 5.3%, or 49 per 100,000 per year. (45)

In a study using U.S. state-level data from 1985 to 1995, Shi et al examined the relationship of primary care resources and income inequality with all-cause mortality within the entire population, and in black and white populations. After controlling for socioeconomic and demographic characteristics and modeling contemporaneous and time-lagged covariates, the authors found that in all models, primary care was associated with lower mortality. In fact, an increase of one primary care doctor per 10,000 population was associated with a reduction of 14.4 deaths per 100,000. In addition, the magnitude of primary care coefficients was higher for black mortality than for white mortality. (46)

Shi examined the relationship between the availability of primary care and specialty care and certain life chance indicators such as mortality rates and life expectancy using the multiple regression procedure. After controlling for sociodemographic measures such as percentages of education, urban, minority, pollution and lifestyle factors such as seatbelt use, obesity, and smoking, the author associated lower primary care physician supply and higher specialist-to-population ratios with higher overall age-adjusted mortality, mortality from cancer, mortality from heart disease, neonatal mortality, life span, and low-birthweight ratios. (23)

Shi studied the empirical relationship between the availability of health services resources (i.e., primary care, specialty care, hospital beds) and certain life chances indicators as measured by overall and disease-specific mortality rates, and life expectancy. The author found that there was a significant direct association between primary care and favorable mortality outcomes, though the same does not hold true for variables such as hospital beds or physician specialists. (24)

In a U.S. state-level study conducted by Vogel and Ackermann, the authors concluded that while specialist physician supply has no correlation with a wide range of health outcomes, the supply of primary care physicians was associated with an increase in life span and with reduced low birthweight rates. (26)

Shi et al conducted a longitudinal analysis using 11 years of state-level data from 1985 to 1996 to examine whether primary care reduces the impact of income inequality on stroke mortality. After adjusting for income inequality, educational level, unemployment, race, and percentage of urban residents, the authors concluded that the supply of primary care was significantly associated with reduced stroke mortality. The authors also found that primary care practically eliminated the impact of income inequality on stroke mortality. (47)

In another longitudinal analysis of U.S. state-level data from 1985 to 1995, Shi et al studied the extent to which primary care physician supply (office based primary care physicians per 10,000 population) moderated the association between social inequalities and infant mortality and low birthweight. After adjusting for state level education, unemployment, racial/ethnic composition, income inequality, and urban/rural differences, the authors found that primary care physician supply was associated with reduced low birthweight. These findings remained valid even after 1-, 3- and 5-year lag periods. The authors also found that primary care physician supply was associated with reduced infant mortality. (48)

In a cross-sectional analysis of county-level data stratified by urban compared with nonurban areas in 1990, Shi et al examined the association between primary care and income inequality on all-cause, heart disease and cancer mortality at the county level and whether it differed in urban and nonurban areas. The authors found that all-cause mortality, heart disease mortality, and cancer mortality were lower in areas where the supply of primary care physicians was greater. Nonurban counties with a greater number of primary care physicians had 2% lower all-cause mortality, 4% lower heart disease mortality, and 3% lower cancer mortality than nonurban counties with a smaller number of primary care physicians. (49)

Using data from Florida's population-based tumor registry, Campbell et al determined cervical cancer incidence and mortality rates for each of Florida's 67 counties over the 3-year period of 1993-1995. The study examined the relationship between physician supply and cervical cancer incidence and mortality rates, adjusting for other county-level characteristics such as education, income, urban/nonurban, white/nonwhite, and percentage of women who were married. The authors found that each increase in the supply of family physicians of one physician/10,000 persons was associated with a corresponding drop in the incidence rate of 1.5 cases/100,000 persons and a corresponding drop in mortality rate of .65 cases/100,000 persons. Cervical cancer mortality rates were also inversely associated with the supply of general internists. (50)

Roetzheim et al conducted a study measuring age-adjusted colorectal cancer incidence and mortality rates for Florida's 67 counties during the period 1993 to 1995 to determine if increasing primary care physician supply was associated with lower incidence and mortality rates for colorectal cancer. Using data from the state tumor registry and the American Medical Association physician masterfile, the authors concluded that increasing primary care physician supply was inversely correlated with both colorectal cancer (CC) incidence (CC = -0.46; P <.0001) and mortality rates (CC = -0.29; P =.02), that is, more primary care physicians are associated with fewer incidences of cancer and a reduction in avoidable deaths. After adjusting for county characteristics, the authors found that a 1% increase in the proportion of physicians who were in primary care specialties was associated with a corresponding reduction in colorectal cancer incidence of 0.25 cases per 100,000 (P < .0001) and a reduction in colorectal cancer mortality of 0.08 cases per 100,000 (P =.0008). (51)

Using 1990 data from 3081 U.S. counties, Shi et al conducted a cross-sectional analysis to test the association between the availability of primary care, income inequality, and several categories of mortality in U.S. counties. The authors found that counties with higher availability of primary care resources experienced between 2% and 3% lower mortality than counties with less primary care. (52)

Perrin et al studied pediatric hospitalizations in three U.S. communities during 1988 through 1990. The authors examined the relationship between a child's usual source of primary care and involvement of that source before and during hospitalization. They found that rates of hospital admissions were lower in communities where primary care physicians were more involved in caring for children both before and during hospitalization. (53)

Primary Care Physicians Are Essential to Optimal Preventive Care

Turner et al surveyed general internists, obstetrician-gynecologists, and cardiologists in a large metropolitan area to determine how their characteristics affected their performance and beliefs about breast cancer screening. The authors found that cardiology and pulmonary specialists were less informed about breast cancer screening guidelines than general internists. In addition, general internists were more likely to screen their patients for breast cancer. Consistent with the studies above, this suggests that patients who use a specialist as their usual source of care may not reliably receive indicated preventive services. (32)

Each 10th Percentile increase in primary care physician supply = 4% increase in odds of early-stage breast cancer diagnosis.

Ferrante et al studied 11,740 incident cases of breast cancer occurring in Florida in 1994 using data from the state cancer registry to determine the effects of physician supply on the odds of late-stage diagnosis. Measures of physician supply were obtained from the 1994 AMA Physician Masterfile. The authors found that each 10th percentile increase in primary care physician supply resulted in a 4% increase in the odds of early-stage breast cancer diagnosis. (54)

Lewis et al surveyed 1,349 internists who were members and fellows of the American College of Physicians to determine their counseling practices in the areas of smoking, exercise, and alcohol and seat belt use. The authors found that generalists were more likely than specialists to counsel at least one counseling session to all patients who were at risk and to be more persistent in counseling. (33)

O'Malley and Forrest conducted cross-sectional and decomposition analyses on a nationally representative sample of 18,013 noninstitutionalized Medicare beneficiaries who responded to the Medicare Current Beneficiary Survey (MCBS) in 2000 to 2002 to assess immunization disparities in the elderly population. The authors found that immunization rates were below recommended levels for all Medicare beneficiaries. However, beneficiaries with a primary care generalist as their usual physician had higher odds of immunization than those with a specialist as their usual physician. In addition, a higher number of primary care physicians per elderly resident was associated with higher rates of immunization at the county level. (34)

In another analysis of Medicare Current Beneficiary Survey (MCBS) data, O'Malley et al evaluated disparities in colorectal cancer (CRC) screening rates

for 9,985 Medicare Parts A and B beneficiaries with a usual physician. The authors found that having a primary care generalist (vs another specialist) as one's usual physician was associated with higher odds of screening after controlling for other factors. (55)

Morales et al conducted surveys of 1,915 men enrolled in 2 Medicare+Choice health plans. One of these surveys required enrollees to select a primary care provider to examine the effect of demographic and socioeconomic factors on use of preventive services. Preventive services evaluated included prostate-specific antigen testing, colorectal cancer screening (CRC), and influenza vaccination. The authors found that men in the plan that required beneficiaries to choose a primary care generalist as a usual health care provider had no socioeconomic differentials in use of CRC screening, whereas men in the plan not requiring a primary care physician had persistent socioeconomic differentials in screening use. (56)

O'Malley et al conducted a telephone survey of 1,205 low-income women over age 40 in Washington, D.C. to examine the effects of primary care, health insurance, and HMO participation on adherence to regular breast, cervical, and colorectal cancer screening. The authors found that continuity with a single primary care practitioner and higher patient satisfaction with the relationship with primary care practitioners were associated with higher adherence to the screening tests, even after controlling for other factors. Coordination of care also was associated with screening adherence for women age 65 and over. (57)

Bindman et al surveyed 3,846 English-speaking and Spanish-speaking women between the ages of 18 and 64 in urban California to examine whether health insurance, a regular place of care, and optimal primary care were independently associated with receiving preventive care services. The authors found that having a regular primary care source was the major determinant of receiving preventive care, including blood pressure screening, clinical breast exams, mammograms, and Pap smears. The authors concluded that primary care from a consistent locale increased the likelihood that women will receive preventive care. (58)

In a study on tuberculosis prevention activity in DeKalb County, Georgia, Braun and Wiesner surveyed the use of tuberculin skin testing among 198 primary care physicians, 95 surgeons, 215 medical and pediatric specialists, and 41 obstetricians-gynecologists. Primary care physicians were significantly more likely to report ordering at least one skin test in the previous year than the other physician groups. (59)

Rosenblatt et al studied ambulatory care data in Part B of the Washington State Medicare Claims Database in 1994 and 1995 to evaluate the extent to which specialists incorporate elements of primary care in their clinical work. The authors found that while a considerable proportion of patients only sought care from specialists, most specialists did not assume the principal care responsibility for their patients. Patients who received the majority of care from generalists were more likely to have received influenza immunization (55.4%) compared to those who received the majority of their care from medical specialists (47.7% immunization) or surgical specialists (39.6% immunization). (60)

Flocke et al conducted a cross-sectional study using a sample of 2,889 patients in Ohio who visited 138 primary care physicians. Four primary care attributes were measured, including patient preference for their regular physician, interpersonal communication, physician's accumulated knowledge of the patient, and coordination of care. After controlling for patients' age, race, health and insurance, the authors found that each of the measured primary care attributes was significantly associated with patients' being up to date on screening, immunization, and health habit counseling services. (61)

Primary Care Reduces Unnecessary Hospitalization and Emergency Room Admissions

Gill and Mainous analyzed data on 13,495 continuously enrolled fee-for-service Medicaid patients aged 0 to 64 years who had made at least 3 ambulatory physician visits using paid claims to the Delaware Medicaid program during a 2-year period from 1993 to 1995. Continuity with a single provider during year 1 of the study was computed for each participant to examine the association between provider continuity and future hospitalization in a Medicaid population. The authors concluded that patients with better provider continuity for 1 year had significantly lower rates of hospitalization in the subsequent year. (62) In further analysis of these data, the authors found that high continuity with a site but low continuity with a provider was found to be similar to having low continuity with an individual clinician. (63)

Living in a primary care shortage area represents an independent risk factor for a preventable hospitalization.

In a survey of Medicare beneficiaries from the 1991 Medicare Current Beneficiary Survey, Parchman and Culler examined whether Medicare beneficiaries in fair or poor health were at increased risk for a preventable hospitalization if they resided in primary care health professional shortage areas. The authors found that Medicare beneficiaries in fair or poor health were 1.82 times more likely to experience a preventable hospitalization if they resided in a primary care shortage area. The authors found that living in a primary care shortage area was an independent risk factor for a preventable hospitalization, even after controlling for other factors such as income, age, and race. (64)

Laditka et al studied the relationship between physician supply and hospitalization for ambulatory care sensitive conditions (ACSH) in 642 urban counties and 306 rural counties in 20 states. The authors found that across most of the urban counties studied, the supply of primary care physicians was negatively associated with ACSH. (65)

Mauskopf et al used data from the New York State Medicaid HIV/AIDS Research Data Base on patients diagnosed with AIDS from 1983 to 1990 to examine the use of the emergency department during the 6-month period after AIDS diagnosis. Patients without a regular provider were more likely to visit the emergency room than those who had a primary care physician or used AIDS specialty clinics or primary care clinics. Among those with a regular provider of care, the authors found that patients with a primary care physician or primary care clinic as their usual source of care were less likely to use emergency department services than patients whose regular provider was an AIDS specialty clinic. (36)

In a study on the effects of health maintenance organization (HMO) penetration on preventable hospitalizations, Zhan et al examined data on preventable hospitalizations due to 14 ambulatory care sensitive conditions for 932 urban counties in 22 states. The authors found that a 10% increase in HMO penetration was associated with a 3.8% decrease in preventable hospitalizations and that fewer primary care physicians per capita was significantly associated with more preventable hospitalizations. (38)

Rosenblatt et al studied emergency department use by Medicare patients older than 65 years in Washington State during 1994 using data from the Health Care Financing Administration's National Claims History File. The authors found that patients with principal-care physicians, 63.8% of whom

were generalists, were much less likely to use the emergency department for every category of disease severity: 184.6 visits per 1,000 patient-years vs 456.9 visits per 1,000 patient-years. The 58.4% of patients with a principal-care physician made only 36.2% of all the emergency department visits. (39)

Parchman and Culler studied statewide hospital discharge data for general acute care hospitals in Pennsylvania to determine the relationship between the availability of primary care physicians and the rate of avoidable hospitalizations. The authors found that as the number of family physicians/general practice physicians in each health service area increased, the avoidable hospital condition rate decreased. This relationship remained significant even after controlling for the effect of per capita income. (35)

Primary Care Physicians Improve Quality and Outcomes

In a cross-sectional survey of 12,707 adult patients in California, Grumbach et al examined the extent to which patients value the role of their primary care physicians as first-contact care providers and coordinators of referrals. The authors found that 94% of patients valued the role of a primary care physician as a source of first-contact care and 89% valued their role as coordinator of referrals. In addition, 75% to 91% of patients surveyed indicated that they preferred to seek care initially from their primary care physicians rather than specialists depending on the specific medical problem. (66)

Using data from the Robert Wood Johnson Foundation-sponsored 1996-1997 Community Tracking Study (CTS) Household Survey and state indicators of income inequality and primary care, Shi et al examined the extent to which good primary care experience diminishes the adverse association of income inequality with self-reported health. The authors found that enhanced accessibility and continuity to primary care was associated with better self-reported general and mental health. Good primary care experience was also able to reduce the adverse association of income inequality with general health. It was especially beneficial in areas with highest income inequality. (67)

Shi and Starfield used data from the 1996 CTS Household Survey from 60 nationally representative U.S. communities to examine whether income inequality and primary care predict individual morbidity as measured by self-rated health status. The authors found that individuals living in states with a higher ratio of primary care physician to population were more likely to report good health than those living in states with a lower ratio. (25)

Mahajan et al tracked 310 consecutive patients scheduled for open-access esophagogastroduodenoscopy (EGD) and colonoscopy by nongastroenterologist physicians over a 9-month period to examine whether nongastroenterologist physicians scheduled patients for appropriate indications. The American Society for Gastrointestinal Endoscopy guidelines were used as the standard for comparison. The authors found that family practitioners and general internists did a better job of scheduling patients for appropriate indications for EGD and colonoscopy than did internal medicine subspecialists and surgeons: 97.0% vs 81.3% for EGD and 84.9% vs 66.7% for colonoscopy respectively. (31)

Shea et al studied the characteristics of the medical care received by patients in order to identify risk factors for severe, uncontrolled hypertension. Data were obtained by interviewing patients at two New York City hospitals from 1989 through 1991 using a case-control study design. After adjusting for age, sex, race or ethnic background, education, smoking status, alcohol-related problems, use of illicit drugs during the previous year, and lack of health insurance, severe, uncontrolled hypertension was found to be more common among

patients who had no primary care physician. In fact, the authors found that those admitted for uncontrolled hypertension were four times more likely to lack a primary care physician than their sample overall. (68)

Schreiber et al studied the differences between general internists and cardiologists in their approaches to treating patients with unstable angina in a community hospital. Patterns of use of established pharmacotherapies for unstable angina, diagnostic testing and clinical outcomes were compared. The authors found that general internists were less likely than cardiologists to use aspirin, heparin, and β -blockers in their initial treatment of patients with chest pain. General internists had a tendency to use exercise tests more often for risk stratification and diagnosis while cardiologists performed coronary revascularization procedures 2 to 4 times as often. Yet the authors found no significant differences in the incidence of myocardial infarction or in mortality between the 2 groups. (30)

Weingarten et al evaluated data from 5,112 hospital admissions for community-acquired pneumonia, acute myocardial infarction, congestive heart failure, or upper gastrointestinal hemorrhage at 6 hospitals in the greater Cleveland, Ohio, area to compare the quality of care provided by subspecialists practicing outside of their specialty, general internists, and subspecialists practicing within their specialty. Using the severity-adjusted mortality rate and the severity-adjusted length of stay indices of quality of care, the authors found that patients cared for by subspecialists practicing outside of their subspecialty had longer lengths of stay; prolongations of stay were observed for patients with congestive heart failure (16% longer), upper gastrointestinal hemorrhage (15% longer), and community-acquired pneumonia (18% longer) than patients cared for by general internists.

Safran et al conducted a cross-sectional study of adults employed by the Commonwealth of Massachusetts in order to evaluate the characteristics of primary care that link it to important health outcomes. The authors examined the relationship between specific elements of primary care (accessibility, continuity, comprehensiveness, integration, clinical interaction, and trust) and adherence to physician's advice, patient satisfaction, and improved health status. The authors found that adherence rates were 2.6 times higher among patients who rated their physicians' comprehensive scores in the 95th percentile compared with the 5th percentile (44.0% adherence vs 16.8% adherence, $P < .001$). In addition, the likelihood of complete satisfaction was 87.5% for those with 95th percentile trust scores compared with 0.4% for patients with 5th percentile trust scores ($P < .001$). (69)

Greenfield et al studied patients sampled from health maintenance organizations, large multispecialty groups, and solo or single-specialty group practices in three cities to compare the outcomes of patients with hypertension and non-insulin-dependent diabetes mellitus (NIDDM) who were cared for in different systems of care and by generalist and subspecialist physicians. After 2 years, patients of endocrinologists and cardiologists were more likely to receive anti-hypertensive therapy, with no significant difference in the number of office visits, change in systolic blood pressure, change in diastolic blood pressure, or change in functional status. There was no difference in the adjusted mortality rates by physician specialty after 7 years. The authors found that there were also no significant differences between those cared for by internists, family practitioners, or endocrinologists in terms of receiving insulin therapy, frequency of blood sugar monitoring, frequency of foot examinations, or number of office visits in patients with NIDDM. For patients with NIDDM, change in physical function and adjusted mortality rates were not found to be different according to the specialty of the treating physician. (29)

O'Malley et al studied visits to community health centers, which emphasize primary care, between 1994 and 2001. The authors found that U.S. populations served by community health centers are healthier than populations with comparable levels of social deprivation receiving care in other types of physicians' offices or clinics. (70)

Regan et al used data from the 1999 Uniform Data System to compare rural health center patients with people in the general rural population for indicators of access to preventive services and health outcomes. Selected health status indicators, preventive services utilization, and health outcomes were also obtained from a survey of health center patients, and the results were compared with the National Health Interview Survey and National Vital Statistics. The study revealed that, despite having higher prevalence of traditional access barriers than the general rural population, rural health center patients were significantly more likely to receive certain preventive services and also to experience lower rates of low birthweight, particularly for African-American infants. (71)

Primary Care Physicians Provide Continuity in Health Care

Forrest and Starfield used data from the 1987 National Medical Expenditure Survey to examine the effects of access on use of primary care physicians as sources of first contact care and as sources of continuity for all ambulatory visits. The study revealed that generalists provided more first-contact care than specialists acting as primary care physicians, largely because of fewer access barriers (0.97 vs 1.31 access barriers, $P < .01$). (72)

Sox et al studied 1,952 nonretired, non-Medicare patients aged 18 to 64 years who presented with one of six chief complaints to five academic hospital emergency departments in Boston and Cambridge, Mass, during a 1-month study period in 1995. The authors evaluated access to care using three measures: delay in seeking care for the current complaint, no physician visit in the previous year, and no emergency department visit in the previous year. After controlling for clinical and socioeconomic characteristics, the study found that having a relationship with a regular physician was a stronger predictor of increased access to all health care than insurance status. (73)

Using data from the Robert Wood Johnson Foundation sponsored 1996-1997 CTS Household Survey and state indicators of income inequality and primary care, Shi et al compared the self-assessed health of those who received better primary care (as assessed by the health delivery characteristics of primary care) with those who reported less adequate primary care. The authors found that those who reported better primary care had 5% less reported poor health and 6% less reported depression. Upon examining those who reported the best primary care experiences, the authors found 8% less reported poor health and 10% less reported depression than those who reported receiving less adequate primary care. (67)

Saultz and Lochner conducted a meta-analysis of 40 studies addressing the relationship between interpersonal continuity and the outcomes and cost of health care. Of the 81 care outcomes that were tracked, 41 were significantly improved by continuity. Of the 41 cost variables associated with interpersonal continuity tracked, expenditures were significantly less for 35. The authors concluded that it was likely that a significant association existed between interpersonal continuity and improved preventive care and reduced hospitalization. (74)

Higashi et al reviewed measurements of the quality of medical care received in three cohorts of 7,680 community-dwelling adult patients in the Community Quality Index study, the Assessing Care of Vulnerable Elders study, and the Veterans Health Administration project, to evaluate the relationship between

the quality of care and the number of medical conditions a patient has. The authors found that patients with multiple medical problems actually get more preventive care and concluded that this is due to more frequent visits. For patients who received only generalist care, the relationship between the quality score and the number of conditions was found to remain positive. The data revealed that generalists can provide equivalent care to patients with complex conditions and to those with less complex conditions. (75)

In a large-scale, multisite, longitudinal evaluation of healthcare utilization in a managed care environment, Raddish et al examined the association between the degree of healthcare provider continuity and healthcare utilization and costs. 12,997 patients with arthritis, asthma, epigastric pain/peptic ulcer disease, hypertension, and otitis media were followed for more than 99,000 outpatient visits, 1,000 hospitalizations, and more than 240,000 prescriptions. The authors found that continuity of care was associated with a reduction in resource utilization and costs. (76)

O'Malley and Forrest analyzed 1988 Child Health Supplement to the National Health Interview Survey data to assess how continuity of care influenced receipt of preventive care and overall levels of ambulatory care among children and adolescents in community health clinics (CHCs). The authors found that receipt of preventive services in community health centers was greater for those who identified the community health clinic as their regular source of both preventive and illness care. Continuity of care was associated with an almost two-fold increase in the odds of receiving age-appropriate preventive care. (77)

Ryan et al surveyed 2 middle schools and 2 high schools in rural areas of a mid-Atlantic state to examine factors associated with the use of different types of ambulatory health services in a rural adolescent population. The authors found a greater use of emergency services when adolescents did not have a consistent provider for both preventive and illness care. Having a different source of care for preventive and illness care was estimated to double the likelihood that adolescents had used emergency services. In addition, those who reported greater satisfaction with their health were more likely to have received preventive care. (78)

Another study of the adolescent population and the role of continuity of care by Bartman et al used data from the 1987 National Medical Expenditure Survey. The authors found that inequities in accessing ambulatory care were more strongly associated with lack of a usual source of care than socioeconomic factors. (79)

Christakis et al used Washington State Medicaid claims data for 1997 to measure the impact of continuity of care, quality and utilization of services for children with type 1 diabetes mellitus who were covered by Medicaid. The authors found that children with high continuity of care were less likely to have diabetic ketoacidosis (DKA) as outpatients and children with medium or high continuity of care were less likely to be hospitalized for DKA. The authors concluded that low continuity of primary care is an independent risk factor for DKA. (80)

In a multicenter randomized, controlled trial at nine Veterans Affairs Medical Centers, Weinberger et al randomized veterans with a chronic disease who did not have an established relationship with a primary care physician to either intense post-discharge follow-up by a nurse and primary care physician or "usual care". The authors found that rehospitalization rates were higher in the group that received intensive primary care than controls six months after discharge, indicating that short-term relationships with physicians result in poorer outcomes. While the primary care intervention did not affect the quality of life of the patients who received it, they were substantially more satisfied than the controls with their care at both one month and six months. (81)

Primary Care Physicians Reduce Overall Healthcare Costs and Utilization

In U.S. Standard Metropolitan Statistical Areas*: An increase of one PCP/10,000 (approximately a 15% increase) would decrease.

Inpatient admissions	5.5%
Outpatient visits	5.0%
ER visits	10.9%
Surgeries	7.2%

Source: Kravet SJ, Shore AD, Miller R, Green GB, Kolodner K, Wright SM. Health care utilization and the proportion of primary care physicians. Am J Med 2008;121:142-8.

Kravet et al studied data on healthcare utilization over the 1990s to examine the impact of primary care physicians on health care utilization. The study examined healthcare utilization in 1990, 1995, and 1999 using the Area Resource File, a U.S. database compiling demographic and resource information. The authors found that increased proportions of primary care physicians across all U.S. counties was associated with significantly fewer hospital admissions, emergency department (ED) visits, and total surgeries. After controlling for patient and community factors, the association between primary care proportion and reduced utilization still remained significant. (82)

For population of 775,000, an increase from 35% to 40% primary care physicians could:

- Reduce inpatient admissions** by -2500/year
 - At approximately \$9000/admission = \$23M
- Reduce ED utilization** by 15,000 visits/year
- Reduce surgery** by about 2500 cases/year

Source: Kravet SJ, Shore AD, Miller R, Green GB, Kolodner K, Wright SM. Health care utilization and the proportion of primary care physicians. Am J Med 2008;121:142-8.

Kronman et al used a national random sample of 78,356 Medicare beneficiaries aged 66 and over who died in 2001 to measure hospital utilization during the final 6 months of life and the number of primary care physician visits in the 12 preceding months. The authors measured hospital days, costs, in-hospital death, and presence of two types of preventable hospital admissions (congestive heart failure and chronic obstructive pulmonary disease) during the final 6 months of life. According to the authors, medical treatments for the 6 % of Medicare beneficiaries who die each year comprise almost 30% of Medicare expenditures. Thirty-eight percent of adults did not have any primary care visits during their final six months of life, 22% had one to two primary care visits, 19% had three to five visits, 10% had six to eight visits, and 11% had nine or more visits. More primary care visits in the preceding year were associated with fewer hospital days at end of life and lower costs. In 2001, nine primary care visits cost Medicare \$3,000; 9 days in the hospital cost Medicare \$11,000. More primary care visits also resulted in less in-hospital death and fewer preventable hospitalizations for those with congestive heart failure and chronic obstructive pulmonary disease. (19)

Weiss and Blustein used a nationally representative sample of Americans 65 and older who participated in the Medicare Current Beneficiary Survey in 1991 and had a usual source of care to examine the impact of continuity of care on the processes and costs of medical care. The authors found that relationships of longer duration between patients and their physicians were associated with lower costs. Compared with patients with a relationship of 1 year or less, patients with relationships of 10 years or more incurred \$316.78 less in Part B Medicare costs, after adjustment for key demographic and health characteristics. Increased continuity in care was also associated with higher influenza immunization and lower hospitalization rates. (20)

Carey et al studied the differences in outcomes of costs of care in management of acute low back pain among primary care physicians, chiropractors, and orthopedic surgeons in North Carolina. The authors found the times to functional recovery, return to work, and complete recovery from low back pain were similar among patients seen by the various provider types. However, costs were lowest for the care provided by primary care physicians. (22)

Shekelle et al analyzed data from the RAND Health Insurance Experiment to compare the costs of an episode of back pain treated by different provider types, including chiropractors, general practitioners, and orthopedists. Visits were grouped into episodes using decision rules and clinical judgment. The primary provider was defined as the provider who delivered most of the care. The authors found that orthopedists had the highest mean total cost per episode, and general practitioners the lowest. Orthopedic surgeons had significantly higher mean total cost per episode of back pain care than general practitioners (\$531 vs \$281). (83)

Ozcan et al studied physician-level data from Virginia Medicaid claim files for 1993 to compare resource utilization between primary care physicians and specialists in the treatment of sinusitis in Virginia's Medicaid patients. The authors found that otolaryngologists were more costly than generalists in treating sinusitis yet there were no apparent differences in technical efficiency between the two. (84)

In a 1-year retrospective cohort study, Parekh et al examined the effects of internal medicine specialty and physician experience on inpatient resource utilization and clinical outcomes at the University of Michigan Hospitals. The authors reviewed data from 2,617 admissions to the general medicine service from July 2001 to June 2002 and found that the patients of general internists had shorter lengths of stay and lower costs than those of endocrinologists and

rheumatologists. Specifically, adjusted mean lengths of stay were significantly greater for rheumatologists (0.56 days greater; $P = .002$) and endocrinologists (0.38 days greater; $P = .03$) than general internists, and total costs were lower for general internists than for endocrinologists (\$1100 lower; $P = .01$) and rheumatologists (\$431 lower; $P = .07$). (85)

Fisher et al studied the health implications of regional differences in Medicare using data from the Medicare Current Beneficiary Survey (1992-1995). Upon examining patients' exposure to different levels of spending for those hospitalized between 1993 and 1995 for hip fracture ($n = 614,503$), colorectal cancer ($n = 195,429$), or acute myocardial infarction ($n = 159,393$), the authors found that the higher the ratio of specialists per population, the higher the surgery rates, performance of procedures, and expenditures. They also noted that the higher the level of spending in geographic areas, the more people see specialists rather than primary care physicians; and that quality and outcomes of care, for both illnesses and preventive care, were no better in higher-spending areas. The authors concluded that neither quality of care nor access to care appeared to be better for Medicare enrollees in higher-spending regions for both illnesses and preventive care. (86)

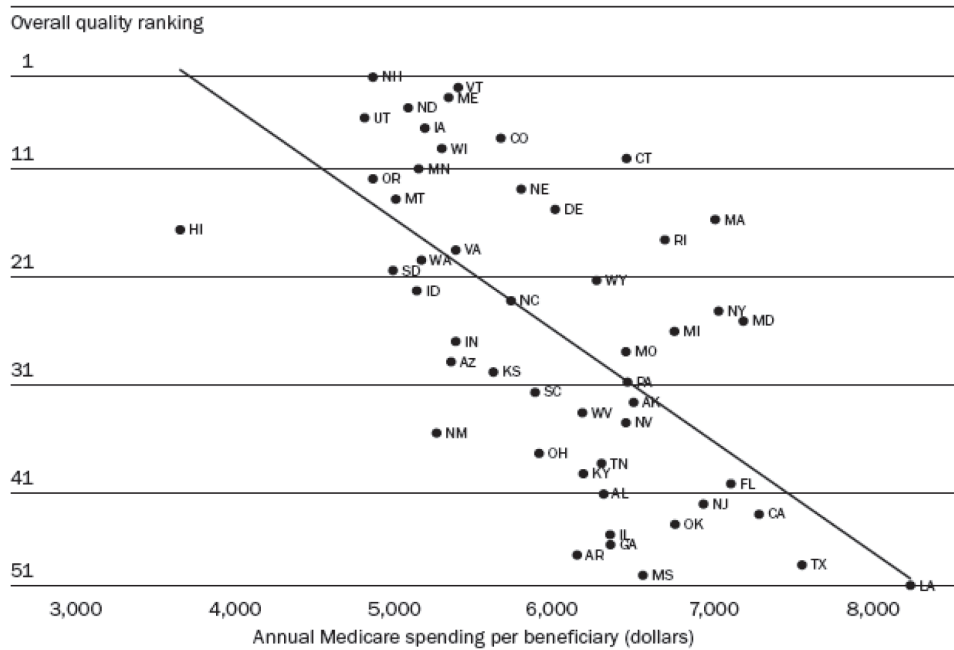
Mark et al used data from all U.S. metropolitan counties to examine the association between primary care physician supply and geographic location with respect to variation in Medicare Supplementary Medical Insurance (Part B) reimbursement. After adjusting for variables such as local price differences and county characteristics, the authors found that a greater supply of family physicians and general internists was significantly associated with lower Medicare Part B expenditures. (87)

Franks and Fiscella used data from the 1987 National Medical Expenditure Survey to examine the total annual health care expenditures and 5-year mortality experience of respondents who reported using a primary care physician than those who used a specialist as their personal physician. After adjustment for demographics, health insurance status, reported diagnoses, health perceptions, and smoking status, respondents reporting using a primary care physician had 33% lower annual adjusted health care expenditures and 19% lower adjusted mortality than those using a specialist. (88)

Welch et al used Medicare claims data for 1989 to examine geographic variations in expenditures for physicians' services use for beneficiaries living in the 317 U.S. urban areas. The authors found that areas with higher ratios of primary care physicians to U.S. elderly population had lower total health care costs than did other areas. (89)

Greenfield et al studied patients sampled from health maintenance organizations, large multispecialty groups, and solo or single-specialty group practices in three cities to compare the outcomes of patients with hypertension and NIDDM who were cared for in different systems of care and by generalist and subspecialist physicians. The authors found that primary care physicians were able to deliver care similar in quality to that of specialists while using fewer resources. (29)

EXHIBIT 1
Relationship Between Quality And Medicare Spending, As Expressed By Overall Quality Ranking, 2000–2001



SOURCES: Medicare claims data; and S.F. Jencks et al., “Change in the Quality of Care Delivered to Medicare Beneficiaries, 1998–1999 to 2000–2001,” *Journal of the American Medical Association* 289, no. 3 (2003): 305–312.
NOTE: For quality ranking, smaller values equal higher quality.

Baicker and Chandra studied the relationship between the provision of high-quality care for Medicare beneficiaries and Medicare spending at the state level. The study used states' overall rankings on 22 indicators of the quality of care as measured by the Medicare Quality Improvement Organization (QIO) program for Medicare fee-for-service beneficiaries during 2000–2001. Higher spending was associated with greater use of hospital resources but was not associated with higher patient satisfaction. The authors found that Medicare spending is less for states with more primary care physicians and that these states have more effective, higher-quality care. In fact, increasing the number of primary care physicians in a state by 1 per 10,000 population was associated with a rise in that state's quality rank of more than 10 places and a reduction in overall spending of \$684 per Medicare beneficiary. In contrast, the authors found that the supply of specialists was associated with increased spending and lower-quality care. An increase of 1 specialist per 10,000 population was estimated to result in a drop in overall quality rank of nearly 9 places and an increase in overall spending of \$526 per Medicare beneficiary. (42)

Forrest and Starfield used ambulatory claims data from the 1987 National Medical Expenditure Survey to examine the effect of first-contact care with primary care clinicians on ambulatory health care expenditures. The authors analyzed 20,282 episodes of care for 24 preventive care and acute illness conditions and found that for 23 of the 24 health problems studied, first-contact care with a primary care physician was associated with reductions in expenditures. The study associated first-contact care with reductions in ambulatory episode-of-care expenditures of over 50%. (90)

Rubenstein et al surveyed veterans who visited Veterans Affairs Medical Center in Sepulveda, California, to evaluate the impact of a recent reorganization emphasizing primary and ambulatory care. The authors found that the institution's reorganization toward primary and ambulatory care resulted in enhanced continuity of care, higher rates of preventive services, fewer hospitalizations, and lower death rates. (91)

Studies in Other Countries Confirm Primary Care's Benefits

Reduced Hospital Admissions and ED Visits

Gulliford conducted an ecological analysis of 99 health authorities in England in 1999 that evaluated whether population health was associated with general practitioner (GP) supply in England. Health outcomes included standardized mortality ratios, infant mortality rate (per 1,000), hospital admissions with acute and chronic conditions (per 100,000), and teenage conception rates (per 1,000). The author found that the higher the ratio of general practitioners, the lower the rate of all-cause mortality at 15 to 64 years of age. In fact, the standardized mortality ratio for all-cause mortality at 15-64 years decreased by about 6% with each additional general practitioner per 10,000 population. Hospital admission rates for both acute and chronic conditions were also found to have decreased with each additional general practitioner per 10,000 population. (92)

Burge et al conducted a retrospective, population-based study of patients who died of cancer and who had made at least three visits to a family physician during their last 6 months of life between 1992 to 1997 to evaluate the relationship between total emergency department (ED) visits and family physician continuity of care in Canada. The authors found that greater family physician continuity of care for cancer patients during the end-of-life was associated with decreased ED utilization. (93)

Menec et al studied data on all individuals who had at least one physician contact in 1998 or 1999 in a midwestern Canadian city to examine the relationship between continuity of care and preventive health care and emergency department (ED) use in a universal health care system. The authors found that having a long-term relationship with a single primary care physician resulted in better preventive care and fewer ED visits despite free access to health care services for all individuals. (37)

Casanova et al conducted a cross-sectional survey of 504 children hospitalized in a District General Hospital in Valencia, Spain, to identify sociodemographic and primary care factors associated with pediatric hospitalization for ambulatory care-sensitive conditions. The authors gathered data on sociodemographic disparities, the type of physician providing primary care, and ambulatory care use prior to hospitalization. The Spanish health system's primary care orientation was determined to reduce hospitalization rates for certain conditions despite socioeconomic disparities. (94)

In a review of medical records of patients admitted to medical wards of a non-teaching acute care hospital in Catanzaro Italy, Rizza et al confirmed the crucial role that primary care physicians play in reducing unnecessary hospitalizations. The authors quantified the proportion of avoidable hospital admissions for ambulatory care-sensitive conditions to assess the relationship between primary care access characteristics and preventable hospitalizations. Of the 31.5% of the hospitalizations in the sample that were judged to be preventable, 40% were for congestive heart failure, 23.2% for chronic obstructive pulmonary disease, 13.5% for angina without procedure, 8.4% for hypertension, and 7.1% for bacterial pneumonia. They found that poor access to primary health care increased the likelihood of hospitalization for ambulatory care-sensitive conditions, after controlling for most of the other factors that may affect hospital admission, such as sociodemographics and propensity to seek care. (95)

Reduced Mortality Rates

In another study of health authorities in England, Gulliford et al examined data for the supply and structure of primary medical services. Dependent variables included standardized mortality ratios (SMR), standardized hospital admission rates, and pregnancy in teenagers younger than 18 years. The authors found that the ratio of general practitioners to population was significantly associated with decreased all-cause mortality, acute myocardial infarction mortality, avoidable mortality, acute hospital admissions, and teenage pregnancies. After controlling for socioeconomic deprivation and for partnership size, the authors found that the structural characteristics of primary care practices may have had a greater impact on health outcomes than just the presence of primary care physicians. (96)

McAlister et al used data on 24,232 adults newly diagnosed with diabetes mellitus between 1991 and 2001 in a publicly funded health care system with universal access to study the effects of specialty care on patients with chronic conditions treated in the ambulatory care setting. Over 5 years of follow-up, the authors found that all-cause mortality was higher in specialty care patients (13.1%) than patients cared for solely by primary care doctors (11.7%). (97)

Jarman et al studied data on in-hospital mortality over a 4-year period in England, to determine which factors best explain variation in standardized hospital death ratios. The authors reviewed eight million discharges from NHS hospitals when the primary diagnosis was one of the diagnoses accounting for 80% of inpatient deaths. The study revealed that in hospital death rates fell significantly in association with increased numbers of general practitioners in the communities outside the hospitals and that this supply is more closely related with lower in-hospital death rates than is the total number of physicians per 100 beds. (98)

Gravelle et al linked data from 49,541 individuals from the Health Survey for England database with data from 351 English local authorities to examine the impact of family physicians supply on individual health. A 10% increase in family physician supply was associated with a 6% increased probability of reporting good health. This association remained significant even after allowing for endogeneity. (99)

Benefits of Continuity of Care

Hjortdahl and Laerum surveyed 3,918 Norwegian primary care patients to evaluate the influence of continuity of care on patient satisfaction. Continuity of care was recorded as the duration and intensity of the present patient-doctor relationship and as patients' perception of whether their current doctor was their personal doctor. The authors found that patients consulting a physician they regarded as their personal doctor were seven times more likely (95% CI 4.9 to 9.9) to rate the consultation as satisfactory compared with consultations where no such relationships existed. (100)

In a multipractice survey of consecutive adult patients consulting general practitioners in Norway, Gulbrandsen et al evaluated general practitioners' knowledge of a range of psychosocial problems among their patients. The authors measured doctors' knowledge of nine predefined psychosocial problems in patients and found that previous knowledge of a patient, reflecting continuity of care, increased the chances of a doctor recognizing psychosocial problems. (101)

De Maeseneer et al studied patient utilization patterns in the Belgian health care system over a 2-year period to assess whether provider continuity with a family physician was related to lower health care costs. The authors found that patients who were visiting the same family physician had a lower total cost for medical care. The study also revealed that provider continuity was one of the most significant variables related to total health care cost. (102)

U.S. Primary Care Weak in International Comparisons

In a 2004 survey of primary care experiences among adults in Australia, Canada, New Zealand, the United Kingdom, and the United States, Schoen et al examined recent experiences with access to care, emergency care, coordination, continuity, and doctor-patient interactions. The authors found that the U.S. primary care system ranked either last or significantly lower than the leaders on almost all dimensions of patient-centered care, including access, coordination, and physician-patient experiences. These findings stand in stark contrast to U.S. spending rates that outstrip those of the rest of the world. The survey also revealed that nearly 1 in 10 adults in the United States reported having no usual person or place and nearly one in five reported not having a usual doctor. People in the United States were also found to experience more adverse effects and more errors. (103)

The U.S. primary care system ranked either last or significantly lower than leading industrialized nations on access, coordination, and physician-patient experiences.

In a 1991 study by Starfield, 10 Western industrialized nations were compared on the extent of their primary health service, their population's score on 12 health indicators, and the satisfaction of their populations in relation to overall costs of the systems. The author found that there was general concordance for primary care, the health indicators, and the satisfaction-expense ratio in 9 of the 10 countries. The United States ranked low on all three measures. (15)

Americans spend less time with a primary care physician than patients in countries with better health outcomes.

Bindman et al reviewed 79,790 office visits in Australia, 10,064 in New Zealand, and 25,838 in the U.S. in a comparison of three comparable cross sectional surveys performed in 2001-2002. The authors found that while primary care visits were longer in the U.S. than in New Zealand and Australia, the per capita annual exposure to primary care physicians in the U.S. (29.7 minutes) was about half that of New Zealand (55.5 minutes) and about a third that of Australia (83.4 minutes) because of higher rates of primary care visits in these countries. The authors note that the provision of prevention services recommended by the U.S. Prevention Services Task Force requires an estimated average of 37 minutes per patient a year for children and 40 minutes per patient for adults. (104)

Starfield and Shi compared the association of primary care with health outcomes in 13 industrialized countries. The authors found that primary care-oriented countries showed better health outcomes even after income inequality, smoking rates, post-neonatal mortality, and low birthweight were controlled for. The authors also found that countries with weak primary care did not perform as well on most major aspects of health, including mental health including years of potential life lost due to suicide. Another finding was that the stronger primary care, the lower the costs. (16)

Macinko et al analyzed the contribution of primary care in 18 wealthy Organization for Economic Cooperation and Development (OECD) countries over three decades. The authors found that the stronger the country's primary care orientation was, the lower the rates were for all-cause mortality, all-cause premature mortality, and cause-specific premature mortality from asthma and

bronchitis, emphysema and pneumonia, cardiovascular disease, and heart disease. Even after controlling for system and population characteristics, this relationship was significant. The analyses estimated that increasing a country's primary care score by 5 points on a 20-point scale could reduce premature deaths from asthma and bronchitis by up to 6.5%. The same increase in a country's primary care score could impact premature mortality from heart disease by up to 15%. The authors concluded that strong primary care system and practice characteristics, such as geographic regulation, longitudinality, coordination, and community orientation, were associated with improved population health. (105)

A 2005 Commonwealth Fund report based on two surveys of patients ranked patients' ratings of various dimensions of their health care, according to the Institute of Medicine's framework for quality. The first survey was conducted in 2004 among a nationally representative sample of adults in Australia, Canada, New Zealand, the United Kingdom, and the United States. The second survey in 2005 was conducted among a sample of adults with health problems in the same five countries and Germany. Of 51 indicators of quality of care, the United States ranked first on only 6 indicators, including effectiveness of care, but was last or tied for last on 27 (106).

Conclusion

The evidence for the value of primary care is clear: better quality of life, more productive longevity, and lower costs as a result of reduced hospitalization improved prevention and better coordination of chronic disease care. The nation must take immediate steps to address the issues that threaten primary care's survival. ACP calls on the federal government, large employers and other purchasers, health plans, and the medical profession itself to take immediate action to create a comprehensive national health care workforce policy with a focus on primary care (2); adopt a patient-centered physician guided model of health care delivery to provide Americans with optimal care (3); and restructure payment policies to support the value of care provided by primary care physicians (4). The consequences of failing to act will be higher costs, greater inefficiency, lower quality, more uninsured persons, and growing patient and physician dissatisfaction. Averting the collapse of primary care is the best cure for an ailing health care system.

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We predict that population growth and aging will increase family physicians' and general internists' workloads by 29% between 2005 and 2025. We expect a 13% increased workload for care of children by pediatricians and family physicians. However, the supply of generalists for adult care, adjusted for age and sex, will increase 7%, or only 2% if the number of graduates continues to decline through 2008. We expect deficits of 35,000-44,000 adult care generalists, although the supply for care of children should be adequate. These forces threaten the nation's foundation of primary care for adults.

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Both the connection to health care and its affordability worsened for many nonelderly U.S. adults living with chronic conditions between 1997 and 2006. This erosion varied by health insurance coverage, fundamental as it is to securing health services. Access to care among uninsured adults with chronic conditions deteriorated on all of our basic measures between 1997 and 2006. In addition, more of both the privately and publicly insured with chronic conditions went without health care because of its cost over this ten-year span, even while they were just as likely as or more likely than others to have a usual source of care over time. [*Health Affairs* 27, no. 5 (2008): w340-w348 (published online 22 July 2008; 10.1377/hlthaff.27.5.w340)].
9. **American Academy of Pediatrics Committee on Pediatric Workforce.** Pediatrician workforce statement. *Pediatrics*. 2005 Jul;116(1):263-9
This statement discusses the importance of pediatrician-workforce issues and their relevance to the provision of pediatric health care. It reviews previous work in the health policy arena on physician and pediatrician workforce. Key pediatrician-workforce trends are described, including the growth in the number of pediatricians in relation to the child population, the increase in the number of female pediatricians, the role of international medical graduates, the diversity of the pediatrician workforce, the contributions of internal medicine-pediatrics physicians, the increasing number of nonpediatrician providers of pediatric care, geographic distribution of physicians, and the future of pediatric subspecialists. Methods of influencing the pediatrician workforce are also considered. In the concluding series of recommendations, the statement identifies both overarching policy goals for the pediatrician workforce and implementation strategies designed to ensure that all of America's infants, children, adolescents, and young adults have access to appropriate pediatric health care.

10. **Hauer KE, Alper EJ, Clayton CP, Hershman WY, Whelan AJ, Woolliscroft JO.** Educational responses to declining student interest in internal medicine careers. *Am J Med.* 2005 Oct;118(10):1164-70
11. **Lipner RS, Bylsma WH, Arnold GK, Fortna GS, Tooker J, Cassel CK.** Who is maintaining certification in internal medicine--and why? A national survey 10 years after initial certification. *Ann Intern Med.* 2006 Jan 3;144(1):29-36

BACKGROUND: The American Board of Medical Specialties (ABMS) adopted a framework, called Maintenance of Certification (MOC), for all certifying boards to evaluate physicians' competence throughout their careers, with the goal of improving the quality of health care. The MOC participation rates of the American Board of Internal Medicine (ABIM) show that 23% of general internists and 14% of subspecialists choose not to renew their respective certificates. OBJECTIVE: To study U.S. internists' perceptions about the forces driving them to maintain certification. DESIGN: Mail survey. SETTING: A nationally representative sample of certified internists in the United States. PARTICIPANTS: Physicians originally certified in internal medicine, a subspecialty, or an area of added qualifications in 1990, 1991, or 1992. RESULTS: The overall rate of response to the survey was 51%. Although 91% of all participants are still working in internal medicine or its subspecialties, this percentage is notably lower among general internists (79%). Of those still working in the field of internal medicine or its subspecialties, approximately half report being required to maintain their specialty certificate by at least 1 employer, but only approximately one third of those who completed or enrolled in MOC report this requirement as a reason for participating. Those who completed or enrolled in MOC do so more for positive professional reasons than for monetary benefits or professional advancement. The most common reasons for not participating are the perceptions that it takes too much time, is too expensive, and is not required for employment. LIMITATIONS: Respondents were volunteers from an early cohort of diplomates entering the program, and those with less positive attitudes may have responded at higher rates. Results are based on self-reported data, and misconceptions about program requirements may have led to some inaccurate responses. CONCLUSIONS: The relatively large percentage of general internists who left internal medicine mostly to work in another medical field explains why rates of MOC participation for general internists seem lower than those for subspecialists (77% vs. 86%). Although positive professional reasons clearly have a compelling internal influence on program participation, it is less clear whether employers' requirements are an equally compelling external influence. Although half of all respondents report that MOC is required by 1 of their employers, only one third of those who participate in the program describe it as a reason for participating.
12. **Pugno PA, McGaha AL, Schmittling GT, DeVilbiss A, Kahn NB Jr.** Results of the 2007 National Resident Matching Program: family medicine. *Fam Med.* 2007 Sep;39(8):562-71

The results of the 2007 National Resident Matching Program (NRMP) reflect a currently stable level of student interest in family medicine residency training in the United States. Compared with the 2006 Match, five fewer positions (with 25 fewer US seniors) were filled in family medicine residency programs through the NRMP in 2007, at the same time as 20 fewer (two more US seniors) in primary care internal medicine, the same number of pediatrics-primary care (four fewer US seniors), and one more (19 fewer US seniors) in internal medicine-pediatrics programs. Multiple forces, including student perspectives of the demands, rewards, and prestige of the specialty; the turbulence and uncertainty of the health care environment; lifestyle issues; and the impact of faculty role models continue to influence medical student career choices. Eighty-four more positions (12 more US seniors) were filled in categorical internal medicine. Fifty-four more positions (22 more US seniors) were filled in categorical pediatrics programs. The 2007 NRMP results suggest that interest in family medicine and primary care careers continues to decline. With the needs of the nation calling for the roles and services of family physicians, family medicine matched too few graduates through the 2007 NRMP to meet the nation's needs for primary care physicians.

13. **American College of Physicians.** Internal Medicine In-Training Exam Survey Data.
14. **Hauer KE, Durning SJ, Kernan WN, Fagan MJ, Mintz M, O'Sullivan PS, Battistone M, DeFer T, Elnicki M, Harrell H, Reddy S, Boscardin CK, Schwartz MD.** Factors associated with medical students' career choices regarding internal medicine. *JAMA.* 2008 Sep 10;300(10):1154-64.
15. **Starfield B.** Primary care and health. A cross-national comparison. *JAMA.* 1991 Oct 23-30;266(16):2268-71

Ten western industrialized nations were compared on the basis of three characteristics: the extent of their primary health service, their levels of 12 health indicators (e.g., infant mortality, life expectancy, and age-adjusted death rates), and the satisfaction of their populations in relation to overall costs of the systems. Information was derived primarily from published sources. Indices were developed to characterize the extent of primary care in each country and the standing of each country relative to the others on the health indicators. There was general concordance for primary care, the health indicators, and the satisfaction-expense ratio in nine of the 10 countries. Ratings for the United States were low on all three measures. West Germany also had low ratings. In contrast, Canada, Sweden, and the Netherlands had generally high ratings for all three measures. The lack of concordance in the ratings in the United Kingdom may be a result of relatively low expenditures for other social services and public education in that country. The findings may add to the debate and deliberations concerning modifications in organization and financing of care that are currently being considered in the United States.
16. **Starfield B, Shi L.** Policy relevant determinants of health: an international perspective. *Health Policy.* 2002 Jun;60(3):201-18

BACKGROUND: International comparisons can provide clues to understanding some of the important policy-related determinants of health, including those related to the provision of health care services. An earlier study indicated that the strength of the primary care infrastructure of a health services system might be related to overall costs of health services. The purpose of the current research was to determine the robustness of the findings in the light of the passage of 5-10 years, the addition of two more countries, and the findings of other research on the possible importance of other determinants of country health levels. **METHODS:** Thirteen industrialized countries, all with populations of at least 5 million, were characterized by the relative strength of their primary care infrastructure, the degree of national income inequality, and a major manifestation of a behavioral determinant of health that is amenable to policy intervention (smoking), using international data sets and national informants. Health system and primary care practice characteristics were judged according to preset criteria. Major indicators of health were used as dependent variables, as were health care costs. **FINDINGS:** The stronger the primary care, the lower the costs. Countries with very weak primary care infrastructures have poorer performance on major aspects of health. Although countries that are intermediate in the strength of their primary care generally have levels of health at least as good as those with high levels of primary care, this is not the case in early life, when the impact of strong primary care is greatest. A subset of characteristics (equitable distribution of resources, publicly accountable universal financial coverage, low cost sharing, comprehensive services, and family-oriented services) distinguishes countries with overall good health from those with poor health at all ages. Neither income inequality nor smoking status accurately identified those countries with either consistently high or consistently poor performance on the health indicators. **Interpretation:** A certain level of health care expenditures may be required to achieve overall good health levels, even in the presence of strong primary care infrastructures. Very low costs may interfere with achievement of good health, particularly at older ages, although very high levels of costs may signal excessive and potentially health-compromising care. Five policy-relevant characteristics appear to be related to better population health levels. There is no consistent relationship between income inequality, smoking, and health levels as measured by various indicators of health in different age groups.
17. **Starfield B.** Primary care: concept, evaluation, and policy. New York: Oxford University Press, 1992:6, 213-35.

18. **Kruzikas, D. T., H. J. Jiang, D. Remus et al.** 2004. Preventable Hospitalizations: A Window into Primary and Preventive Care, 2000. AHRQ Pub. No. 04-0056. Rockville, Md.: Agency for Healthcare Research and Quality.
19. **Kronman AC, Ash AS, Freund KM, Hanchate A, Emanuel EJ.** Can Primary Care Visits Reduce Hospital Utilization Among Medicare Beneficiaries at the End of Life? *J Gen Intern Med.* 2008 May 28. [Epub ahead of print]

BACKGROUND: Medical care at the end of life is often expensive and ineffective. **OBJECTIVE:** To explore associations between primary care and hospital utilization at the end of life. **DESIGN:** Retrospective analysis of Medicare data. We measured hospital utilization during the final 6 months of life and the number of primary care physician visits in the 12 preceding months. Multivariate cluster analysis adjusted for the effects of demographics, comorbidities, and geography in end-of-life healthcare utilization. **SUBJECTS:** National random sample of 78,356 Medicare beneficiaries aged 66+ who died in 2001. Nonwhites were oversampled. All subjects with complete Medicare data for 18 months prior to death were retained, except for those in the End Stage Renal Disease program. **MEASUREMENTS:** Hospital days, costs, in-hospital death, and presence of two types of preventable hospital admissions (Ambulatory Care Sensitive Conditions) during the final 6 months of life. **RESULTS:** Sample characteristics: 38% had 0 primary care visits; 22%, 1-2; 19%, 3-5; 10%, 6-8; and 11%, 9+ visits. More primary care visits in the preceding year were associated with fewer hospital days at end of life (15.3 days for those with no primary care visits vs. 13.4 for those with ≤ 9 visits, $P < 0.001$), lower costs (\$24,400 vs. \$23,400, $P < 0.05$), less in-hospital death (44% vs. 40%, $P < 0.01$), and fewer preventable hospitalizations for those with congestive heart failure (adjusted odds ratio, aOR = 0.82, $P < 0.001$) and chronic obstructive pulmonary disease (aOR = 0.81, $P = 0.02$). **CONCLUSIONS:** Primary care visits in the preceding year are associated with less, and less costly, end-of-life hospital utilization. Increased primary care access for Medicare beneficiaries may decrease costs and improve quality at the end of life.
20. **Weiss LJ, Blustein J.** Faithful patients: the effect of long-term physician-patient relationships on the costs and use of health care by older Americans. *Am J Public Health.* 1996 Dec;86(12):1742-7

OBJECTIVES: This study examined the impact of duration of physician-patient ties on the processes and costs of medical care. **METHODS:** The analyses used a nationally representative sample of Americans 65 years old or older who participated in the Medicare Current Beneficiary Survey in 1991 and had a usual source of care. **RESULTS:** Older Americans have long-standing ties with their physicians; among those with a usual source of care, 35.8% had ties enduring 10 years or more. Longer ties were associated with a decreased likelihood of hospitalization and lower costs. Compared with patients with a tie of 1 year or less, patients with ties of 10 years or more incurred \$316.78 less in Part B Medicare costs, after adjustment for key demographic and health characteristics. However, substantial impacts on the use of selected preventive care services and the adoption of certain healthy behaviors were not observed. **CONCLUSIONS:** This preliminary study suggests that long-standing physician-patient ties foster less expensive, less intensive medical care. Further studies are needed to confirm these findings and to understand how duration of tie influences the processes and outcomes of care.
21. **Bodenheimer T, Fernandez A.** High and rising health care costs. Part 4: can costs be controlled while preserving quality? *Ann Intern Med.* 2005 Jul 5;143(1):26-31

Several interrelated strategies involving physician leadership and participation have been proposed to contain health care costs while preserving or improving quality. These include programs targeting the 10% of the population that incurs 70% of health care expenditures, disease management programs to prevent costly complications of chronic conditions, efforts to reduce medical errors, the strengthening of primary care practice, decision support tools to avoid inappropriate services, and improved diffusion of technology assessment. An example of a cost-reducing, quality-enhancing program is post-hospital nurse monitoring and intervention for patients at high risk for repeated hospitalization for congestive heart failure. Disease management programs that target groups with

a chronic condition rather than focusing efforts on high-utilizing individuals may be effective in improving quality but may not reduce costs. Error reduction has great potential to improve quality while reducing costs, although the probable cost reduction is a small portion of national health care expenditures. Access to primary care has been shown to correlate with reduced hospital use while preserving quality. Inappropriate care and overuse of new technologies can be reduced through shared decision-making between well-informed physicians and patients. Physicians have a central role to play in fostering these quality-enhancing strategies that can help to slow the growth of health care expenditures.

22. **Carey TS, Garrett J, Jackman A, McLaughlin C, Fryer J, Smucker DR.** The outcomes and costs of care for acute low back pain among patients seen by primary care practitioners, chiropractors, and orthopedic surgeons. The North Carolina Back Pain Project. *N Engl J Med.* 1995 Oct 5;333(14):913-7

BACKGROUND. Patients with back pain receive quite different care from different types of health care practitioners. We performed a prospective observational study to determine whether the outcomes of and charges for care differ among primary care practitioners, chiropractors, and orthopedic surgeons. **METHODS.** Two hundred eight practitioners in North Carolina were randomly selected from six strata: urban primary care physicians (n = 39), rural primary care physicians (n = 48), urban chiropractors (n = 32), rural chiropractors (n = 32), orthopedic surgeons (n = 29), and primary care providers at a group-model health maintenance organization (HMO) (n = 28). The practitioners enrolled consecutive patients with acute low back pain. The patients were contacted by telephone periodically for up to 24 weeks to assess functional status, work status, use of health care services, and satisfaction with the care received. **RESULTS.** The status at six months was ascertained for 1555 of the 1633 patients enrolled in the study (95%). The times to functional recovery, return to work, and complete recovery from low back pain were similar among patients seen by all six groups of practitioners, but there were marked differences in the use of health care services. The mean total estimated outpatient charges were highest for the patients seen by orthopedic surgeons and chiropractors and were lowest for the patients seen by HMO and primary care providers. Satisfaction was greatest among the patients who went to the chiropractors. **CONCLUSIONS.** Among patients with acute low back pain, the outcomes are similar whether they receive care from primary care practitioners, chiropractors, or orthopedic surgeons. Primary care practitioners provide the least expensive care for acute low back pain.

23. **Shi L.** Primary care, specialty care, and life chances. *Int J Health Serv.* 1994;24(3):431-58

The relationship between the availability of primary care and specialty care and certain life chance indicators such as mortality rates and life expectancy is analyzed using the multiple regression procedure. Dependent variables are life chance indicators; independent variables were selected based on Starfield's and Blum's health determinant models and include socioeconomic environment, lifestyles, demographics, and medical care. The author also examines the rankings of states in terms of these indicators, using Spearman's rho coefficient. Among the medical care variables, primary care is by far the most significant variable related to better health status, correlating with lower overall mortality, lower death rates due to diseases of the heart and cancer, longer life expectancy, lower neonatal death rate, and lower low birthweight. In contrast, the number of specialty physicians is positively and significantly related to total mortality, deaths due to heart diseases and cancer, shorter life expectancy, higher neonatal mortality, and higher low birthweight. From a policy perspective, a likely implication is to reorient the medical profession from its current expensive, clinically based, treatment-focused practice to a more cost-effective, prevention-oriented primary care system.

24. **Shi L.** The relationship between primary care and life chances. *J Health Care Poor Underserved*. 1992 Fall;3(2):321-35
Many researchers criticize clinical medicine for its failure to improve mortality rates. But in their critiques, few distinguish primary care from expensive, high-technology specialized care. This research is concerned with the empirical relationship between the availability of health services resources (i.e., primary care, specialty care, hospital beds) and certain "life chances," as measured by overall and disease-specific mortality rates, and life expectancy. The model shows a significant direct association between primary care and favorable mortality outcomes, though the same does not hold true for variables such as hospital beds or physician specialists. There should be greater emphasis on prevention-oriented primary care as a mechanism for health improvement and cost control.
25. **Shi L, Starfield B.** Primary care, income inequality, and self-rated health in the United States: a mixed-level analysis. *Int J Health Serv*. 2000;30(3):541-55
Using the 1996 Community Tracking Study household survey, the authors examined whether income inequality and primary care, measured at the state level, predict individual morbidity as measured by self-rated health status, while adjusting for potentially confounding individual variables. Their results indicate that distributions of income and primary care within states are significantly associated with individuals' self-rated health; that there is a gradient effect of income inequality on self-rated health; and that individuals living in states with a higher ratio of primary care physician to population are more likely to report good health than those living in states with a lower such ratio. From a policy perspective, improvement in individuals' health is likely to require a multi-pronged approach that addresses individual socioeconomic determinants of health, social and economic policies that affect income distribution, and a strengthening of the primary care aspects of health services.
26. **Vogel RL, Ackermann RJ.** Is primary care physician supply correlated with health outcomes? *Int J Health Serv*. 1998; 28(1):183-96.
Assessment of the relation between life indicators and health outcomes is a complex problem. The authors' analysis uses descriptive canonical correlation, and their solution suggests that socioeconomic factors play a major role in health outcomes. The supply of primary care physicians has a lesser but still important role: canonical correlation suggests no apparent role in enhancing health outcomes among the elderly but a larger role in improving health among the young. The authors' analysis does support the notion that specialist physician supply has no correlation with a wide range of health outcomes.
27. **Colwill JM, Cultice JM, Kruse RL.** Will generalist physician supply meet demands of an increasing and aging population? *Health Aff (Millwood)*. 2008 May-Jun;27(3):w232-41. Epub 2008 Apr 29
We predict that population growth and aging will increase family physicians' and general internists' workloads by 29% between 2005 and 2025. We expect a 13% increased workload for care of children by pediatricians and family physicians. However, the supply of generalists for adult care, adjusted for age and sex, will increase 7%, or only 2% if the number of graduates continues to decline through 2008. We expect deficits of 35,000-44,000 adult care generalists, although the supply for care of children should be adequate. These forces threaten the nation's foundation of primary care for adults.

28. **Shi L, Starfield B, Kennedy B, Kawachi I.** Income inequality, primary care, and health indicators. *J Fam Pract.* 1999 Apr;48(4):275-84.

BACKGROUND: The significant association of income inequality with a variety of health indicators is receiving increasing attention. There has also been increasing evidence of a link between primary care and improved health status. We examined the joint relationship between income inequality, availability of primary care, and various health indicators to determine whether primary care has an impact on health indicators by modifying the adverse effect of income inequality. **METHODS:** Our ecologic study used the US states as the units of analysis. In analyzing the data, we looked at the associations among income inequality, primary care, specialty care, smoking, and health indicators, using Pearson's correlation coefficients for inter-correlations and the adjusted multiple regression procedure. To examine the effect of inequality and primary care on health outcome indicators, we conducted path analyses according to a causal model in which inequality affects health both directly and indirectly through its impact on primary care. **RESULTS:** Our study indicates that both primary care and income inequality exerted a strong and significant direct influence on life expectancy and total mortality ($P < .01$). Primary care also exerted a significant direct influence on stroke and post-neonatal mortality ($P < .01$). Although levels of smoking are also influential, the effect of income inequality and primary care persists after controlling for smoking. Primary care serves as one pathway through which income inequality influences population-level mortality and at least some other health outcome indicators. **CONCLUSIONS:** It appears possible that a primary care orientation may, in part, overcome the severe adverse effects on health of income inequalities.

29. **Greenfield S, Rogers W, Mangotich M, Carney ME, Tarlov AR.** Outcomes of patients with hypertension and noninsulin dependent diabetes mellitus treated by different systems and specialties. Results from the medical outcomes study. *JAMA.* 1995 Nov 8;274(18):1436-44.

OBJECTIVE--To compare the outcomes of patients with hypertension and noninsulin-dependent diabetes mellitus (NIDDM) who were cared for in three different systems of care and by generalist and subspecialist physicians. **DESIGN--**An observational study with follow-up at three periods: (1) a 2-year study of 532 patients with hypertension and 170 patients with NIDDM who had entrance and exit histories, physical examinations, and laboratory tests; (2) a 4-year follow-up of 1044 patients with hypertension and 317 patients with NIDDM based on patient-reported functional status; and (3) 7-year mortality for 1296 patients with hypertension and 424 patients with NIDDM. **SETTING AND PARTICIPANTS--**Patients sampled from health maintenance organizations, large multispecialty groups, and solo or single-specialty group practices in Boston, Mass, Los Angeles, Calif, and Chicago, Ill. Patients were designated as belonging to one of three systems of care: fee for service; prepaid patients in solo or small single-specialty groups or in large multispecialty group practices, referred to as independent practice associations; and staff-model health maintenance organizations. The principal providers were family practitioners, general internists, cardiologists, or endocrinologists. **MAIN OUTCOME MEASURES--**Physiological, functional, and mortality. For hypertension, we measured blood pressure and stroke incidence. For NIDDM, we measured blood pressure, glycosylated hemoglobin level, visual function, vibration sense, ulcers and infections in the feet, and albumin excretion rate. Functional outcomes were assessed using the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). Mortality was assessed for the 7 years following the entrance examination. **RESULTS--**We found no evidence that any one system of care or physician specialty achieved consistently better 2-year or 4-year outcomes than others for patients with NIDDM or hypertension. Endocrinologists appeared to achieve better foot-ulcer and infection outcomes for patients with NIDDM, particularly when compared with family practitioners. However, no other specialist differences were found in any individual measures for either condition. Moreover, no adjusted mortality differences among systems or among physicians specialties were observed in the 7-year follow-up period. **CONCLUSION--**No meaningful differences were found in the mean health outcomes for patients with hypertension or NIDDM, whether they were treated by different care systems or by different physician specialists. Although prepaid medicine relies more heavily on generalist physicians than does fee for service, there is no evidence from these analyses that the quality of care of moderately ill patients with these two common disease was adversely affected. These findings must be viewed in light of the historically higher costs of fee-for-service medicine and of subspecialty physician practice.

30. **Schreiber TL, Elkhatib A, Grines CL, O'Neill WW.** Cardiologist versus internist management of patients with unstable angina: treatment patterns and outcomes. *J Am Coll Cardiol.* 1995 Sep;26(3):577-82

OBJECTIVES. This study sought to assess the impact of generalist versus specialist direction on the pattern of care and outcome in patients admitted to the hospital for unstable angina. **BACKGROUND.** Physicians trained as internists or as cardiologists may have different approaches to treating patients with unstable angina. **METHODS.** We reviewed a prospectively collected cohort of patients discharged with a diagnosis-related group (DRG) diagnosis of unstable angina from William Beaumont Hospital, a large community-based hospital in southeast Michigan. Of 890 consecutive patients, 225 were treated by internists and 665 by cardiologists. We compared these two groups with respect to patterns of use of established pharmacotherapies for unstable angina, diagnostic testing and clinical outcome. **RESULTS:** Patients treated by internists less often had a previous cardiac history (53% vs. 80%, $p < \text{or} = 0.0001$). Internists were less likely to use aspirin (68% vs. 78%, $p = 0.032$), heparin (67% vs. 84%, $p < \text{or} = 0.001$) or beta-adrenergic blocking agents (18% vs. 30%, $p < \text{or} = 0.004$) in their initial management. Exercise tests were performed more frequently by internist-treated patients (37% vs. 22%, $p < \text{or} = 0.001$), but catheterization (27% vs. 61%, $p < \text{or} = 0.0001$) and angioplasty (7% vs. 40%, $p < \text{or} = 0.0001$) were utilized less frequently. The incidence of myocardial infarction was similar (11% vs. 9%) in the two groups, but the mortality rate tended to be higher (4.0% vs. 1.8%, $p = 0.06$) in the internist group. **CONCLUSIONS.** Patients with unstable angina treated by internists were less likely to receive effective medical therapy or revascularization procedures and experienced a trend to poorer outcome. This study does not support a positive gatekeeper role for generalists in the treatment of unstable angina.

31. **Mahajan RJ, Barthel JS, Marshall JB.** Appropriateness of referrals for open-access endoscopy. How do physicians in different medical specialties do? *Arch Intern Med.* 1996 Oct 14; 156(18):2065-9

BACKGROUND: Open-access endoscopy allows nongastroenterologist physicians the opportunity to directly schedule elective common endoscopic procedures for their patients without having them first examined in the gastrointestinal clinic. There are few data as to whether nongastroenterologist physicians in the United States schedule patients for appropriate indications. **OBJECTIVES:** To examine our practice to see whether patients undergoing open-access endoscopy were scheduled for appropriate indications and to see whether there were differences among physicians in various medical specialties. **METHODS:** We prospectively tracked 310 consecutive patients scheduled for open-access esophagogastroduodenoscopy (EGD) and colonoscopy by nongastroenterologist physicians over a 9-month period in our academic practice setting to determine whether the indications for performing the procedures were appropriate. The American Society for Gastrointestinal Endoscopy criteria (revised in 1992) were used as the standard for comparison. **RESULTS:** Primary care physicians (family practitioners and general internists) did a superior job of scheduling patients for appropriate indications for EGD and colonoscopy than did nonprimary care physicians (internal medicine subspecialists and surgeons): 97.0% vs 81.3% for EGD ($P = .04$) and 84.9% vs 66.7% for colonoscopy ($P = .02$), respectively., **CONCLUSIONS:** Primary care physicians were significantly more likely to schedule patients for open-access EGD and colonoscopy for appropriate indications than were nonprimary care physicians. The frequency of inappropriate indications for colonoscopy referrals was greater than for EGD. The reasons for the differences among primary care physicians, surgeons, and internal medicine subspecialists require further exploration.

32. **Turner BJ, Amsel Z, Lustbader E, Schwartz JS, Balslem A, Grisso JA.** Breast cancer screening: effect of physician specialty, practice setting, year of medical school graduation, and sex. *Am J Prev Med.* 1992 Mar-Apr;8(2):78-85.

We surveyed physicians of different specialties in a large metropolitan area to determine how their characteristics affected their performance and beliefs about breast cancer screening. Of 664 general internists, obstetrician-gynecologists, and cardiologists surveyed, we received 298 responses (45%). We found significant differences in reported performance of breast cancer screening and physicians' beliefs about mammography screening among practicing obstetrician-gynecologists, internists, and cardiopulmonary specialists. Cardiopulmonary specialists performed the fewest breast examinations and screening mammograms and were most likely to believe annual mammography screening unnecessary even for women in their 50s. We observed no difference between physicians graduating before 1960 and those graduating afterward and no differences according to physician sex. We found similar screening practices and beliefs in the three types of practice settings examined: community-based, private practices, a large health maintenance organization (HMO), and academic medical centers. Obstetrician-gynecologists and internists differed only in the frequency with which they performed breast examinations. Physicians graduating before 1960 in these two groups reported somewhat poorer performance and knowledge of breast cancer screening than those graduating more recently. A majority of all respondents disagreed with American Cancer Society guidelines for mammography screening. Physicians of all specialties reported performing far more breast examinations than screening mammograms on women of all ages, even for those 50-59 years of age. We conclude that all physicians need to improve their screening rates. However, intervention programs should first target those physicians with the greatest deficiencies in breast cancer screening performance and knowledge; these include medical specialists and older physicians in primary care specialties.

33. **Lewis CE, Clancy C, Leake B, Schwartz JS.** The counseling practices of internists. *Ann Intern Med.* 1991 Jan 1;114(1):54-8.

OBJECTIVES: To determine the counseling practices of a group of internists in the areas of smoking, exercise, and alcohol and seat belt use, and to determine the associations among physicians' personal health habits and their counseling practices. **DESIGN:** A random stratified sample of members and fellows of the American College of Physicians in 21 regions selected to represent all areas of the United States. Because of the relatively small proportion of women in this group, they were oversampled. **SETTING:** Physicians' practices. **PARTICIPANTS:** One thousand three hundred and forty-nine internists (members or fellows of the College) returned questionnaires, for a response rate of 75%; 52% defined themselves as general internists. **INTERVENTIONS:** A questionnaire was used to obtain information on internists' use of cigarettes, alcohol, and seat belts and their level of physical activity. Data were obtained on the indications used for counseling and the aggressiveness of counseling about each of these four habits. **MEASUREMENTS AND MAIN RESULTS:** Bivariate and logistic regression analyses were used to compare the tendencies of internist subgroups both in using various indications for counseling and in the thoroughness of counseling. Generalists were more likely than specialists to counsel at least once all patients who were at risk and to be more aggressive in counseling. Ninety% of respondents counseled all of their patients who smoked, but 64.5% never discussed the use of seat belts. Only 3.8% of these internists currently smoked cigarettes, 11.3% drank alcohol daily, 38.7% were extremely or quite active, and 87.3% used seat belts all or most of the time. Among men internists, for every habit except alcohol use, personal health practices were substantially associated with counseling patients; for example, nonsmoking internists were more likely to counsel smokers, and very physically active internists were more likely to counsel about exercise. Among women internists, being very physically active was associated with counseling more patients about exercise and alcohol use. **CONCLUSIONS:** The low level of self-reported counseling among these internists suggests that further emphasis on training in these skills is needed. The association between personal and professional practices suggests that medical schools and housestaff training programs should support health promotion activities for future internists.

34. **O'Malley AS, Forrest CB.** Immunization disparities in older Americans: determinants and future research needs. *Am J Prev Med.* 2006 Aug;31(2):150-8. Epub 2006 Jun 8.
- BACKGROUND:** Marked racial disparities persist in influenza and pneumococcal vaccinations among Medicare beneficiaries. This study sought to assess the contribution that patient, physician, health system, and area-level characteristics make to these racial disparities in immunization. **METHODS:** Cross-sectional and decomposition analyses were performed on a nationally representative sample of 18,013 noninstitutionalized Medicare beneficiaries who responded to the Medicare Current Beneficiary Survey (MCBS) in 2000 to 2002. The physician characteristics of interest included specialty type, accessibility, information-giving skills, perceived quality, and continuity of care. Health system characteristics included HMO enrollment and numbers of primary care physicians per elderly. The outcomes were receipt of influenza vaccine in the past year and ever having received a pneumococcal vaccine. **RESULTS:** Immunization rates were below recommended levels for all Medicare beneficiaries. Disparities between white and black beneficiaries in the receipt of vaccinations were large—an absolute 17% difference for each vaccine. After adjusting for patient, physician, health system, and area-level characteristics, white beneficiaries had significantly higher odds of vaccination than did black beneficiaries: adjusted odds ratio (aOR) = 1.52 (95% confidence interval [CI] = 1.35-1.71) for influenza vaccination, and aOR = 1.82 (95% CI = 1.61-2.07) for pneumococcal vaccination. Beneficiaries with a usual physician that they rated as having good information-giving skills and whose practice was more accessible, had higher immunization rates. Beneficiaries with a primary care generalist as their usual physician had higher odds of immunization than those with a specialist as their usual physician. At the county level, a higher number of primary care physicians per elderly resident was associated with higher odds of immunization. Only 7% of the racial disparity in influenza immunization was explained by the measured characteristics of beneficiaries and their health systems. **CONCLUSIONS:** Despite similar insurance coverage and presence of a usual physician, black beneficiaries were significantly less likely than their white counterparts to receive influenza and pneumococcal vaccinations. The implications for future research are discussed, including the need for system-based interventions that make the offering and discussion of vaccination routine.
35. **Parchman ML, Culler S.** Primary care physicians and avoidable hospitalizations. *J Fam Pract.* 1994 Aug;39(2):123-8.
- BACKGROUND.** The rate of admission for avoidable hospital conditions (AHCs) has been proposed as a measure of the ability of a population to access health care. The purpose of this study was to determine the relationship between the availability of primary care physicians and the rate of avoidable hospitalizations. **METHODS.** Statewide hospital discharge data for general acute care hospitals in Pennsylvania were used to determine age- and sex-adjusted AHC rates in the 26 health service areas (HSAs) in Pennsylvania. The number and type of primary care physician as well as the per capita income for each HSA were obtained from the Area Resource File. Correlations of number and type of physician with AHC rates were obtained. **RESULTS.** Only the number of family and general practice physicians (FPs/GPs) per population was significantly correlated with adult and pediatric AHC rates. As the number of FPs/GPs in each HSA increased, the AHC rate decreased. The significant relationship between FPs/GPs and the AHC rate remained after controlling for the effect of per capita income. No significant correlation was found between either the number of general internists and the adult AHC rate or the number of general pediatricians and the pediatric AHC rate. **CONCLUSIONS.** The availability of FPs/GPs is related to lower rates of hospitalization for certain conditions. Family physicians may provide more effective first-contact access to health care than is provided by either general internists or pediatricians in Pennsylvania. Future studies should address whether care by family physicians is more cost-effective as a result of this reduction in avoidable hospitalizations.

36. **Mauskopf J, Turner BJ, Markson LE, Houchens RL, Fanning TR, McKee L.** Patterns of ambulatory care for AIDS patients, and association with emergency room use. *Health Serv Res.* 1994 Oct;29(4):489-510

OBJECTIVE. We examined the association of patterns of ambulatory care for AIDS patients with any use of the emergency room (ER) and the monthly rate of ER visits in the six months after AIDS diagnosis. **DATA SOURCES/STUDY SETTING.** The study population was obtained from the New York State Medicaid HIV/AIDS Research Data Base and includes patients diagnosed with AIDS from 1983 to 1990. **DATA COLLECTION/EXTRACTION METHODS.** To examine patterns of care and ER use not leading to hospitalization, we studied patients who survived at least six months after their first AIDS-defining diagnosis. The data base included person level information on visits to different provider sites and patient demographic and clinical characteristics. **STUDY DESIGN.** We defined the dominant provider as the site delivering the majority of ambulatory care for patients with a minimum of four ambulatory visits in the six months after AIDS diagnosis. Dominant providers were classified by specialty and setting: generalist physician; general medicine clinic; AIDS specialty clinic; and other specialty clinic or physician (e.g., cardiology). Patients without a dominant provider were grouped into those with four or more visits and those with fewer than four visits. Regression analysis was used to estimate relationships between ER use and patterns of ambulatory care and patient demographic and severity of illness characteristics. **PRINCIPAL RESULTS.** The study population included 9,155 AIDS patients aged 13 to 60 years at diagnosis, continuously Medicaid-enrolled, and surviving at least six months after AIDS diagnosis. Among those with four or more visits (56%), over 70% had a dominant provider. Overall, 39% of the study population visited the ER while, in the group with four or more visits, 53% of those without a dominant provider had an ER visit. Patients without a dominant provider were estimated to have 32% higher odds of ER use than patients with a dominant provider. Among patients with a dominant provider, patients with a generalist or primary care clinic dominant site of care were estimated respectively to have 18% and 23% lower odds than patients with an AIDS specialty clinic as the dominant site of care. Drug users had higher odds of ER use, as did women. **CONCLUSIONS.** In this Medicaid AIDS population, a dominant provider delivering the majority of a patient's care was associated with less use of the ER by the patient. Among patients with a dominant provider, ER use was lowest for those with a primary care provider. Further examination of the type and availability of ambulatory services in AIDS specialty clinics and primary care settings, as well as more detailed information on patient characteristics, may reveal reasons for these patterns of ER use.

37. **Menec VH, Sirski M, Attawar D.** Does continuity of care matter in a universally insured population? *Health Serv Res.* 2005 Apr;40(2):389-400.

OBJECTIVE: To examine the relation between continuity of care and preventive health care and emergency department (ED) use in a universal health care system. **DATA SOURCES/STUDY SETTING:** Administrative data that capture health care use of the entire population of a midwestern Canadian city. **STUDY DESIGN:** A population-based, retrospective study of all individuals who had a least one physician contact in 1998 or 1999 (total N=536,893). **METHODS:** Logistic regressions were conducted to examine the relation between continuity of care, defined in terms of the proportion of total visits to family physicians (FPs) made to the same FP, and cervical cancer screening, breast cancer screening, influenza vaccination, pneumococcal vaccination, and ED visits, controlling for demographic variables, socioeconomic status (defined in terms of relative affluence of neighborhood of residence), and health status. **PRINCIPAL FINDINGS:** Continuity of care was related to better preventive health care and reduced ED use. A consistent socioeconomic gradient also emerged. For instance, the odds of having a mammogram was double for individuals living in the wealthiest neighborhoods, relative to those in the poorest neighborhoods (adjusted odds ratio=2.31, 99% CI 2.13-2.50). **CONCLUSIONS:** Having a long-term relationship with a single physician makes a difference even in a universal health care system. Moreover, socioeconomic disparities remain, suggesting the need to target specifically individuals from lower socioeconomic strata for preventive health care

38. **Zhan C, Miller MR, Wong H, Meyer GS.** The effects of HMO penetration on preventable hospitalizations. *Health Serv Res.* 2004 Apr;39(2):345-61
OBJECTIVE: To examine the effects of health maintenance organization (HMO) penetration on preventable hospitalizations. DATA SOURCE: Hospital inpatient discharge abstracts for 932 urban counties in 22 states from the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID), hospital data from American Hospital Association (AHA) annual survey, and population characteristics and health care capacity data from Health Resources and Services Administration (HRSA) Area Resource File (ARF) for 1998. METHODS: Preventable hospitalizations due to 14 ambulatory care sensitive conditions were identified using the Agency for Healthcare Research and Quality (AHRQ) Prevention Quality Indicators. Multiple regressions were used to determine the association between preventable hospitalizations and HMO penetration while controlling for demographic and socioeconomic characteristics and health care capacity of the counties. PRINCIPAL FINDINGS: A 10% increase in HMO penetration was associated with a 3.8% decrease in preventable hospitalizations (95% confidence interval, 2.0%-5.6%). Advanced age, female gender, poor health, poverty, more hospital beds, and fewer primary care physicians per capita were significantly associated with more preventable hospitalizations. CONCLUSIONS: Our study suggests that HMO penetration has significant effects in reducing preventable hospitalizations due to some ambulatory care sensitive conditions.
39. **Rosenblatt RA, Wright GE, Baldwin LM, Chan L, Clitherow P, Chen FM, Hart LG.** The effect of the doctor-patient relationship on emergency department use among the elderly. *Am J Public Health.* 2000 Jan;90(1):97-102
OBJECTIVES: This study sought to determine the rate of emergency department use among the elderly and examined whether that use is reduced if the patient has a principal-care physician. METHODS: The Health Care Financing Administration's National Claims History File was used to study emergency department use by Medicare patients older than 65 years in Washington State during 1994. RESULTS: A total of 18.1% of patients had 1 or more emergency department visits during the study year; the rate increased with age and illness severity. Patients with principal-care physicians were much less likely to use the emergency department for every category of disease severity. After case mix, Medicaid eligibility, and rural/urban residence were controlled for, the odds ratio for having any emergency department visit was 0.47 for patients with a generalist principal-care physician and 0.58 for patients with a specialist principal-care physician. CONCLUSIONS: The rate of emergency department use among the elderly is substantial, and most visits are for serious medical problems. The presence of a continuous relationship with a physician--regardless of specialty--may reduce emergency department use.
40. **The Commonwealth Fund.** Hospitalizations for Ambulatory Care-Sensitive Conditions. Performance Snapshots. The Commonwealth Fund. December 2006.
41. **AHRQ (Agency for Healthcare Research and Quality).** 2004. AHRQ Quality Indicators: Guide to Prevention Quality Indicators. Hospital Admission for Ambulatory Care Sensitive Conditions. Rockville, Md.: U.S. Department of Health and Human Services.
42. **Baicker K, Chandra A.** Medicare spending, the physician workforce, and beneficiaries' quality of care. *Health Aff (Millwood).* 2004 Jan-Jun;Suppl Web Exclusives:W4-184-97.
The quality of care received by Medicare beneficiaries varies across areas. We find that states with higher Medicare spending have lower-quality care. This negative relationship may be driven by the use of intensive, costly care that crowds out the use of more effective care. One mechanism for this trade-off may be the mix of the provider workforce: States with more general practitioners use more effective care and have lower spending, while those with more specialists have higher costs and lower quality. Improving the quality of beneficiaries' care could be accomplished with more effective use of existing dollars.

43. **Farmer FL, Stokes CS, Fiser RH, Papini DP.** Poverty, primary care and age-specific mortality. *J Rural Health.* 1991 Spring;7(2):153-69.

An important area of concern among rural health researchers and policy analysts is the social and ecological correlates of mortality levels. This research is concerned with the empirical relationship between the prevalence of poverty and the mortality experience of different age groups within the population. Poverty is viewed as a characteristic of the social organization of local areas and operationalized by employing several indicators, including a measure of rurality. The empirical results indicate that the magnitude of the association between the prevalence of poverty and mortality varies among different age groups. The impact of rurality, while being consistently positive, is shown to be statistically nonsignificant. The research also shows that the availability of primary care is associated with lower mortality.

44. **Starfield B, Shi L, Grover A, Macinko J.** The effects of specialist supply on populations' health: assessing the evidence. *Health Aff (Millwood).* 2005 Jan-Jun;Suppl Web Exclusives: W5-97-W5-107.

Analyses at the county level show lower mortality rates where there are more primary care physicians, but this is not the case for specialist supply. These findings confirm those of previous studies at the state and other levels. Increasing the supply of specialists will not improve the United States' position in population health relative to other industrialized countries, and it is likely to lead to greater disparities in health status and outcomes. Adverse effects from inappropriate or unnecessary specialist use may be responsible for the absence of relationship between specialist supply and mortality.

45. **Macinko J, Starfield B, Shi L.** Quantifying the health benefits of primary care physician supply in the United States. *Int J Health Serv.* 2007;37(1):111-26

This analysis addresses the question, Would increasing the number of primary care physicians improve health outcomes in the United States? A search of the PubMed database for articles containing "primary care physician supply" or "primary care supply" in the title, published between 1985 and 2005, identified 17 studies, and 10 met all inclusion criteria. Results were reanalyzed to assess primary care effect size and the predicted effect on health outcomes of a one-unit increase in primary care physicians per 10,000 population. Primary care physician supply was associated with improved health outcomes, including all-cause, cancer, heart disease, stroke, and infant mortality; low birthweight; life expectancy; and self-rated health. This relationship held regardless of the year (1980-1995) or level of analysis (state, county, metropolitan statistical area (MSA), and nonMSA levels). Pooled results for all-cause mortality suggest that an increase of one primary care physician per 10,000 population was associated with an average mortality reduction of 5.3%, or 49 per 100,000 per year.

46. **Shi L, Macinko J, Starfield B, Politzer R, Xu J.** Primary care, race, and mortality in US states. *Soc Sci Med.* 2005 Jul;61(1):65-75. Epub 2005 Jan 22

This study used US state-level data from 1985 to 1995 to examine the relationship of primary care resources and income inequality with all-cause mortality within the entire population, and in black and white populations. The study is a pooled ecological design with repeated measures using 11 years of state-level data (n=549). Analyses controlled for socioeconomic and demographic characteristics. Contemporaneous and time-lagged covariates were modeled, and all analyses were stratified by race/ethnicity. In all models, primary care was associated with lower mortality. An increase of one primary care doctor per 10,000 population was associated with a reduction of 14.4 deaths per 100,000. The magnitude of primary care coefficients was higher for black mortality than for white mortality. Income inequality was not associated with mortality after controlling for state-level sociodemographic covariates. The study provides evidence that primary care resources are associated with population health and could aid in reducing socioeconomic disparities in health.

47. **Shi L, Macinko J, Starfield B, Xu J, Politzer R.** Primary care, income inequality, and stroke mortality in the United States: a longitudinal analysis, 1985-1995. *Stroke*. 2003 Aug;34(8):1958-64. Epub 2003 Jul 3

BACKGROUND AND PURPOSE: The goal of this study was to test whether primary care reduces the impact of income inequality on stroke mortality. **METHODS:** This study used pooled time-series cross-sectional analysis of 11 years of state-level data (n=549). Analyses controlled for education levels, unemployment, racial/ethnic composition, and % urban. Contemporaneous and time-lagged covariates were modeled. **RESULTS:** Primary care was negatively associated with stroke mortality in models including all covariates (P<0.0001). The impact of income inequality on stroke mortality was reduced in the presence of primary care (P<0.0001) but disappeared with the addition of covariates (P<0.05). **CONCLUSIONS:** In the absence of social policy that addresses sociodemographic determinants of health, primary care promotion may serve as a palliative strategy for combating stroke mortality and reducing the adverse impact of income inequality on health.

48. **Shi L, Macinko J, Starfield B, Xu J, Regan J, Politzer R, Wulu J.** Primary care, infant mortality, and low birthweight in the states of the USA. *J Epidemiol Community Health*. 2004 May;58(5):374-80

STUDY OBJECTIVE: The study tests the extent to which primary care physician supply (office based primary care physicians per 10 000 population) moderates the association between social inequalities and infant mortality and low birthweight throughout the 50 states of the USA. **DESIGN:** Pooled cross sectional, time series analysis of secondary data. Analyses controlled for state level education, unemployment, racial/ethnic composition, income inequality, and urban/rural differences. Contemporaneous and time lagged covariates were modeled. **SETTING:** Eleven years (1985-95) of data from 50 US states (final n = 549 because of one missing data point). **MAIN RESULTS:** Primary care was negatively associated with infant mortality and low birthweight in all multivariate models (p < 0.0001). The association was consistent in contemporaneous and time lagged models. Although income inequality was positively associated with low birthweight and infant mortality (p < 0.0001), the association with infant mortality disappeared with the addition of sociodemographic covariates. **CONCLUSIONS:** In US states, an increased supply of primary care practitioners-especially in areas with high levels of social disparities-is negatively associated with infant mortality and low birthweight.

49. **Shi L, Macinko J, Starfield B, Politzer R, Wulu J, Xu J.** Primary care, social inequalities and all-cause, heart disease and cancer mortality in US counties: a comparison between urban and nonurban areas. *Public Health*. 2005 Aug;119(8):699-710.

OBJECTIVE: The objective of this study was to test whether the association between primary care and income inequality on all-cause, heart disease and cancer mortality at county level differs in urban (Metropolitan Statistical Area-MSA) compared with nonurban (nonMSA) areas. **STUDY DESIGN:** The study consisted of a cross-sectional analysis of county-level data stratified by MSA and nonMSA areas in 1990. Dependent variables included age and sex-standardized (per 100,000) all-cause, heart disease and cancer mortality. Independent variables included primary care resources, income inequality, education levels, unemployment, racial/ethnic composition and income levels. **METHODS:** One-way analysis of variance and multivariate ordinary least squares regression were employed for each health outcome. **RESULTS:** Among nonMSA counties, those in the highest income inequality category experienced 11% higher all-cause mortality, 9% higher heart disease mortality, and 9% higher cancer mortality than counties in the lowest income inequality quartile, while controlling for other health determinants. NonMSA counties with higher primary care experienced 2% lower all-cause mortality, 4% lower heart disease mortality, and 3% lower cancer mortality than nonMSA counties with lower primary care. MSA counties with median levels of income inequality experienced approximately 6% higher all-cause mortality, 7% higher heart disease mortality, and 7% higher cancer mortality than counties in the lowest income inequality quartile. MSA counties with low primary care (less than 75th %ile) had significantly lower levels of all-cause, heart disease and cancer mortality than those counties with high primary care. **CONCLUSIONS:** In nonMSA counties, increasing primary physician supply could be one way to address the health needs of rural populations. In MSA counties, the association between primary care and health outcomes appears to be more complex and is likely to require intervention that focuses on multiple fronts.

50. **Campbell RJ, Ramirez AM, Perez K, Roetzheim RG.** Cervical cancer rates and the supply of primary care physicians in Florida. *Fam Med.* 2003 Jan;35(1):60-4
BACKGROUND AND OBJECTIVES: This study's aim was to determine if an increased supply of primary care physicians is associated with lower incidence and mortality rates for cervical cancer. METHODS: We determined cervical cancer incidence and mortality rates for each of Florida's 67 counties over the 3-year period of 1993-1995 using data from Florida's population-based tumor registry. Data on physician supply were obtained from the 1994 American Medical Association Physician Masterfile. We used multiple linear regression analysis to examine the relationship between physician supply and cervical cancer incidence and mortality rates, adjusting for other county-level characteristics. RESULTS: In regression analysis that adjusted for other county-level characteristics, each increase in the supply of family physicians of one physician/10,000 persons was associated with a corresponding drop in the incidence rate of 1.5 cases/100,000 persons and a corresponding drop in mortality rate of .65 cases/100,000 persons. CONCLUSIONS: Our results indicate that a greater supply of primary care physicians is likely associated with a lower incidence of cervical cancer and a lower cervical cancer mortality rate. More studies are needed at the individual patient level to confirm this association.
51. **Roetzheim RG, Gonzalez EC, Ramirez A, Campbell R, van Durme DJ.** Primary care physician supply and colorectal cancer. *J Fam Pract.* 2001 Dec;50(12):1027-31.
OBJECTIVES: Our goal was to determine if increasing primary care physician supply was associated with lower incidence and mortality rates for colorectal cancer. STUDY DESIGN: We performed an ecologic study of Florida's 67 counties, using data from the state tumor registry and the American Medical Association physician masterfile. POPULATION: Florida residents were included. OUTCOMES MEASURED: We measured age-adjusted colorectal cancer incidence and mortality rates for Florida's 67 counties during the period 1993 to 1995. RESULTS: Increasing primary care physician supply was negatively correlated with both colorectal cancer (CC) incidence (CC = -0.46; P < .0001) and mortality rates (CC = -0.29; P = .02). In linear regression that controlled for other county characteristics, each 1% increase in the proportion of county physicians who were in primary care specialties was associated with a corresponding reduction in colorectal cancer incidence of 0.25 cases per 100,000 (P < .0001) and a reduction in colorectal cancer mortality of 0.08 cases per 100,000 (P = .0008). CONCLUSIONS: Incidence and mortality of colorectal cancer decreased in Florida counties that had an increased supply of primary care physicians. This suggests that a balanced work force may achieve better health outcomes.
52. **Shi L, Macinko J, Starfield B, Politzer R, Wulu J, Xu J.** Primary care, social inequalities, and all-cause, heart disease, and cancer mortality in US counties, 1990. *Am J Public Health.* 2005 Apr;95(4):674-80.
OBJECTIVES: We tested the association between the availability of primary care and income inequality on several categories of mortality in US counties. METHODS: We used cross-sectional analysis of data from counties (n=3081) in 1990, including analysis of variance and multivariate ordinary least squares regression. Independent variables included primary care resources, income inequality, and sociodemographics. RESULTS: Counties with higher availability of primary care resources experienced between 2% and 3% lower mortality than counties with less primary care. Counties with high income inequality experienced between 11% and 13% higher mortality than counties with less inequality. CONCLUSIONS: Primary care resources may partially moderate the effects of income inequality on health outcomes at the county level.

53. **Perrin JM, Greenspan P, Bloom SR, Finkelstein D, Yazdgerdi S, Leventhal JM, Rodewald L, Szilagyi P, Homer CJ.** Primary care involvement among hospitalized children. *Arch Pediatr Adolesc Med.* 1996 May;150(5):479-86.

OBJECTIVE: To examine relations between characteristics of a child's usual source of primary care and involvement of that source before and during hospitalization. **DESIGN:** Medical record review of pediatric hospitalizations. **SETTING:** All hospitals in Boston, Mass; New Haven, Conn; and Rochester, NY admitting children during the calendar years 1988 through 1990. **PATIENTS:** The study included 1875 randomly selected pediatric hospitalizations for five diagnostic groups (i.e., asthma and other lower respiratory tract disease, abdominal pain [including appendicitis], meningitis [bacterial and viral], toxic ingestions, and head injury). Hospital records selected were limited to children aged between 1 month and 12 years and residing in the three study communities. **OUTCOME MEASURES:** Whether the primary care source examined the child before admission to the hospital, referred the child to the emergency department, or served as the in-hospital attending physician. **RESULTS:** Of the medical charts reviewed, 85.7% identified primary care sources. Children in Rochester had higher rates of medical visits before admission ($P < .04$), referrals ($P < .001$), and in-hospital care provided by the primary care physician ($P < .001$, chi 2) than children in Boston and New Haven. Patterns of primary care involvement also varied by source of care within cities, after controlling for income and severity of illness. Compared with children from Rochester community-based private practices, children in Boston receiving care from health centers, hospitals, or community-based private practices generally had 25% to 50% lower likelihood of positive findings on all primary care involvement measures. Children in New Haven receiving care from community-based private or hospital-based practices also had lower rates, but involvement rates were not higher when they received care from health centers. Other children in Rochester and children receiving care from health maintenance organizations in all cities demonstrated almost no significant differences compared with data from Rochester community practices. **CONCLUSION:** The source of primary care is associated with patterns of pre-hospital and hospital care among hospitalized children, although specific associations vary by city.

54. **Ferrante JM, Gonzalez EC, Pal N, Roetzheim RG.** Effects of physician supply on early detection of breast cancer. *J Am Board Fam Pract.* 2000 Nov-Dec;13(6):408-14.

BACKGROUND: There are few studies examining the effects of physician supply on health-related outcomes. We hypothesized that increasing physician supply and, in particular, increasing primary care supply would be related to earlier detection of breast cancer. **METHODS:** Information on incident cases of breast cancer occurring in Florida in 1994 ($n = 11,740$) was collected from the state cancer registry. Measures of physician supply were obtained from the 1994 AMA Physician Masterfile. The effects of physician supply on the odds of late-stage diagnosis were examined using multiple logistic regression. **RESULTS:** There was no relation between overall physician supply and stage of breast cancer at diagnosis. Each 10th%ile increase in primary care physician supply, however, resulted in a 4% increase in the odds of early-stage diagnosis (adjusted odds ratio = 1.04, 95% confidence interval = 1.01-1.06). **CONCLUSIONS:** The supply of primary care physicians was significantly associated with earlier stage of breast cancer at diagnosis. This study suggests that an appropriate balance of primary care and specialty physician supply might be an important predictor of health outcomes.

55. **O'Malley AS, Forrest CB, Feng S, Mandelblatt J.** Disparities despite coverage: gaps in colorectal cancer screening among Medicare beneficiaries. *Arch Intern Med.* 2005 Oct 10; 165(18):2129-35.

BACKGROUND: Despite its effectiveness in reducing mortality, colorectal cancer (CRC) screening rates are low, especially among low-income and minority groups; however, physician recommendation can increase screening rates. **METHODS:** We performed a multilevel analysis of the Medicare Current Beneficiary Survey data linked to Medicare claims and the Area Resource File to identify determinants of racial and socioeconomic disparities in CRC screening among 9985 Medicare Parts A and B beneficiaries with a usual physician. Recent CRC screening was defined as receipt of a home fecal occult blood test, flexible sigmoidoscopy, or colonoscopy at recommended intervals. **RESULTS:** Unadjusted rates of screening were 48% for white and 39% for black beneficiaries ($P < .001$). Racial differences in CRC screening receipt were eliminated after adjustment for socioeconomic status as measured by income and education. Socioeconomic status disparities decreased but remained significant after adjustment for personal and health system factors. Awareness of CRC (adjusted odds ratio, 2.76; 95% confidence interval, 2.29-3.33) and having a primary care generalist (vs another specialist) as one's usual physician (adjusted odds ratio, 1.31; 95% confidence interval, 1.12-1.53) were associated with higher odds of screening, controlling for other factors. The odds of screening were also higher among those whose usual physician was rated more highly on information-giving skills. **CONCLUSIONS:** Racial differences in CRC screening rates among Medicare beneficiaries with a usual physician are explained by differences in socioeconomic status. Beneficiaries with a primary care generalist as their usual physician had higher rates of CRC screening receipt. Increased efforts to make Medicare beneficiaries aware of the benefits of CRC screening may capitalize on the associations found in this study between CRC knowledge, physician information giving, and timely screening.

56. **Morales LS, Rogowski J, Freedman VA, Wickstrom SL, Adams JL, Escarce JJ.** Use of preventive services by men enrolled in Medicare+Choice plans. *Am J Public Health.* 2004 May;94(5):796-802

OBJECTIVES: We examined the effect of demographic and socioeconomic factors on use of preventive services (prostate-specific antigen testing, colorectal cancer screening, and influenza vaccination) among elderly men enrolled in 2 Medicare+Choice health plans. **METHODS:** Data were derived from administrative files and a survey of 1915 male enrollees. We used multivariate logistic regression to assess the effects of enrollee characteristics on preventive service use. **RESULTS:** Age, marital status, educational attainment, and household wealth were associated with receipt of one or more preventive services. However, the effects of these variables were substantially attenuated relative to earlier studies of Medicare. **CONCLUSIONS:** Some Medicare HMOs have been successful in attenuating racial and socioeconomic disparities in the use of preventive services by older men.

57. **O'Malley AS, Forrest CB, Mandelblatt J.** Adherence of low-income women to cancer screening recommendations. *J Gen Intern Med.* 2002 Feb;17(2):144-54.
- BACKGROUND:** African-American and low-income women have lower rates of cancer screening and higher rates of late-stage disease than do their counterparts. **OBJECTIVE:** To examine the effects of primary care, health insurance, and HMO participation on adherence to regular breast, cervical, and colorectal cancer screening. **DESIGN:** Random-digit-dial and targeted household telephone survey of a population-based sample. **SETTING:** Washington, D.C. census tracts with \leq or \geq 30% of households below 200% of federal poverty threshold. **PARTICIPANTS:** Included in the survey were 1,205 women over age 40, 82% of whom were African American. **MAIN OUTCOME MEASURES:** Adherence was defined as reported receipt of the last 2 screening tests within recommended intervals for age. **RESULTS:** The survey completion rate was 85%. Overall, 75% of respondents were adherent to regular Pap smears, 66% to clinical breast exams, 65% to mammography, and 29% to fecal occult blood test recommendations. Continuity with a single primary care practitioner, comprehensive service delivery, and higher patient satisfaction with the relationships with primary care practitioners were associated with higher adherence across the 4 screening tests, after considering other factors. Coordination of care also was associated with screening adherence for women age 65 and over, but not for the younger women. Compared with counterparts in nonHMO plans, women enrolled in health maintenance organizations were also more likely to be adherent to regular screening (e.g., Pap, odds ratio [OR] 1.89, 95% confidence interval [CI] 1.11 to 3.17; clinical breast exam, OR 2.04, 95% CI 1.21 to 3.44; mammogram, OR 1.95, 95% CI 1.15 to 3.31; fecal occult blood test, OR 1.70, 95% CI 1.01 to 2.83.) **CONCLUSIONS:** Organizing healthcare services to promote continuity with a specific primary care clinician, a comprehensive array of services available at the primary care delivery site, coordination among providers, and better patient-practitioner relationships are likely to improve inner-city, low-income women's adherence to cancer screening recommendations.
58. **Bindman AB, Grumbach K, Osmond D, Vranizan K, Stewart AL.** Primary care and receipt of preventive services. *J Gen Intern Med.* 1996 May;11(5):269-76.
- OBJECTIVE:** To examine whether health insurance, a regular place of care, and optimal primary care are independently associated with receiving preventive care services. **DESIGN:** A cross-sectional telephone survey. **SETTING:** Population based. **PARTICIPANTS:** Probability sample of 3,846 English-speaking and Spanish-speaking women between the ages of 18 and 64 in urban California. **INTERVENTIONS:** Women were asked about their demographic characteristics, financial status, health insurance status, need for ongoing care, regular place of care, and receipt of blood pressure screening, clinical breast examinations, mammograms, and Pap smears. Women who reported a regular place of care were asked about four components of primary care: availability, continuity, comprehensiveness, and communication. **MEASUREMENTS AND MAIN RESULTS:** In multivariate analyses that controlled for differences in demographics, financial status, and need for ongoing care, having a regular place of care was the most important factor associated with receiving preventive care services ($p < .0001$). Having health insurance ($p < .001$) and receiving optimal primary care from the regular place of care ($p < .01$) further significantly increased the likelihood of receiving preventive care services. **CONCLUSION:** A regular source of care is the single most important factor associated with the receipt of preventive services, but optimal primary care from a regular place increases the likelihood that women will receive preventive care.

59. **Braun MM, Wiesner PJ.** Tuberculosis prevention practices and perspectives of physicians in DeKalb County, GA. *Public Health Rep.* 1994 Mar-Apr;109(2):259-65

Knowing the reasons some physicians do not adhere to the disease prevention and treatment recommendations of expert committees can assist in the development of future recommendations more likely to be adopted by physicians. The authors describe the attitudes and practices of physicians relative to tuberculosis prevention in DeKalb County, GA. Tuberculosis is an important problem in the county, which includes part of the City of Atlanta, as well as suburban areas. Questionnaires for anonymous reply were mailed to 1,621 physicians in the county in 1991, and 848 (53%) were completed and returned. The final sample was 793 physicians, who were grouped into 5 specialty areas. Primary care physicians were the group most commonly involved in specific tuberculosis screening and prevention activities. Medical and pediatric specialists, surgeons, obstetricians-gynecologists, and other physicians were significantly less likely to be involved in such activities. Given that primary care physicians constitute a decreasing proportion of physicians in the United States, the findings suggest the importance of ensuring that future strategies for tuberculosis prevention take into account the increasingly specialized nature of the medical practice environment.

60. **Rosenblatt RA, Hart LG, Baldwin LM, Chan L, Schneeweiss R.** The generalist role of specialty physicians: is there a hidden system of primary care? *JAMA.* 1998 May 6; 279(17):1364-70
- CONTEXT: Despite increased emphasis on primary care in the United States, most care continues to be provided by specialists. The extent to which specialists incorporate elements of primary care in their approach to ambulatory patients is unknown. OBJECTIVES: To examine the extent to which selected medical and surgical subspecialties provide generalist care to Medicare patients, and to compare patterns of care between specialists and generalists. DESIGN: A cross-sectional study of all ambulatory care recorded in Part B of the Washington State Medicare Claims Database in 1994 and 1995. SETTING: Ambulatory practices in Washington State. PATIENTS: Medicare beneficiaries 65 years or older who made office visits to the study physicians. MAIN OUTCOME MEASURES: The extent to which individual specialties accounted for the majority of visits made by patients to physicians (a measure of continuity), provided care outside the traditional domain of their specialty (a measure of comprehensiveness), and provided influenza immunization. RESULTS: A total of 373 505 patients constituted the sample. Patients had an average of 7.48 outpatient visits per year; 9.6% saw only generalists, while 14.7% saw only specialists. The practices of general internists and family physicians differ systematically from the practices of most specialists. Approximately half (49.8%) of all ambulatory visits to general internists and family physicians are made by patients for whom they provide the majority of outpatient care, compared with 21.0% of medical specialist and 11.7% of surgical specialist visits. The rate of influenza immunization was 55.4% for patients who received the majority of their care from generalists, 47.7% from medical specialists, and 39.6% from surgical specialists. Pulmonologists, general surgeons, and gynecologists were more likely than other specialists to provide services outside their specialty. CONCLUSIONS: Most specialists do not assume the principal care responsibility for elderly patients, although a substantial proportion of patients see only specialists for their care. Selected specialties assume the generalist role more often, particularly when they provide the majority of outpatient care for an individual patient.

61. **Flocke SA, Stange KC, Zyzanski SJ.** The association of attributes of primary care with the delivery of clinical preventive services. *Med Care.* 1998 Aug; 36(8 Suppl.):AS21-30.
- OBJECTIVES:** Evidence is building that primary care is associated with quality of care and cost effectiveness. Still, little is known of the contribution of specific attributes of primary care to important health outcomes, such as the delivery of preventive services. This study tests the association of specific attributes of primary care with a comprehensive measure of the delivery of preventive services. **METHODS:** A cross-sectional multimethod study design was used to examine 2,889 patient visits to 138 community-based primary care physicians. Four primary care attributes were measured: patient preference for their regular physician, interpersonal communication, physician's accumulated knowledge of the patient, and coordination of care. Delivery of US Preventive Service Task Force-recommended services were based on data collected from direct observation and medical record review. Hierarchical linear regression models (HLM) were used to test the association of each of the primary care attributes with being up to date on screening, immunization, and health habit counseling preventive services. Each regression model was adjusted for patient age, race, health status, and insurance type. **RESULTS:** Interpersonal communication and coordination of care scale scores were associated with being more up to date on screening services and health habit counseling. Accumulated knowledge and preference for regular physician were associated with being more up to date on immunizations. **CONCLUSIONS:** The attributes of primary care measured in this study are associated with the receipt of preventive services. Fostering the tenets of primary care may have an impact on the delivery of preventive services and possibly other important health outcomes.
62. **Gill JM, Mainous AG 3rd.** The role of provider continuity in preventing hospitalizations. *Arch Fam Med.* 1998 Jul-Aug;7(4):352-7
- OBJECTIVES:** To examine the association between provider continuity and future hospitalization in a Medicaid population, and to determine if this association is greater for ambulatory care-sensitive conditions. **DESIGN:** Analysis of paid claims to the Delaware Medicaid program during a 2-year period (July 1, 1993, to June 30, 1995). Continuity with a single provider during year 1 of the study was computed for each participant. **PARTICIPANTS:** A total of 13,495 continuously enrolled fee-for-service Medicaid patients aged 0 to 64 years who had made at least 3 ambulatory physician visits during the first year of the study. **MAIN OUTCOME MEASURE:** Likelihood of hospitalization in year 2 of the study for all conditions and for ambulatory care-sensitive conditions. **RESULTS:** The mean continuity score was 0.50 in year 1 and 11.9% of patients were hospitalized in year 2. After controlling for demographics, number of ambulatory visits, and case mix, higher provider continuity was associated with a lower likelihood of hospitalization for any condition (odds ratio [OR] = 0.56; 95% confidence interval [CI], 0.46-0.69). For chronic ambulatory care-sensitive conditions there was a similar association between provider continuity and hospitalization (OR = 0.54; 95% CI, 0.34-0.88), but for acute ambulatory care-sensitive conditions there was no significant association (OR = 0.80; 95% CI, 0.48-1.34). **CONCLUSIONS:** Continuity of care with a provider is associated with a decreased future likelihood of hospitalization in the Delaware Medicaid population. This suggests that policies that encourage patients to concentrate their care with a single provider may lead to lower hospitalization rates and possibly lower health care costs. This study does not support the hypothesis that a certain set of conditions are particularly ambulatory care sensitive.

63. **Mainous AG 3rd, Gill JM.** The importance of continuity of care in the likelihood of future hospitalization: is site of care equivalent to a primary clinician? *Am J Public Health.* 1998 Oct;88(10):1539-41
OBJECTIVES: This study examined the effect of continuity with clinicians and health care sites on likelihood of future hospitalization. METHODS: Delaware Medicaid patient data were analyzed. Logistic regression models supplied adjusted effects of continuity on hospitalization. RESULTS: Patients in the high clinician continuity group had lower odds of hospitalization than patients in the high site/low clinician continuity group (odds ratio [OR] = 0.75, 95% confidence interval [CI] = 0.66, 0.87). The latter group did not differ from the low site/low clinician continuity group (OR = 0.93, 95% CI = 0.80, 1.08). CONCLUSIONS: A location providing health care without clinician continuity may not be sufficient to ensure cost-effective care.
64. **Parchman ML, Culler SD.** Preventable hospitalizations in primary care shortage areas. An analysis of vulnerable Medicare beneficiaries. *Arch Fam Med.* 1999 Nov-Dec;8(6):487-91
BACKGROUND: Health care outcomes among vulnerable elderly populations (defined in this study as Medicare beneficiaries who rated their overall general health as "fair" or "poor") are a growing concern. Recent studies suggest that potentially preventable hospitalizations may be useful for identifying poor ambulatory health care outcomes among vulnerable populations. OBJECTIVES: To determine if Medicare beneficiaries in fair or poor health are at increased risk of experiencing a preventable hospitalization if they reside in primary care health professional shortage areas. DESIGN: A survey of Medicare beneficiaries from the 1991 Medicare Current Beneficiary Survey. PATIENTS: Medicare beneficiaries living in the community. RESULTS: Medicare beneficiaries in fair or poor health were 1.82 times more likely to experience a preventable hospitalization if they resided in a primary care shortage area (95% confidence interval, 1.18-2.81). After controlling for educational level, income, and supplemental insurance, Medicare beneficiaries in fair or poor health were 1.70 times more likely to experience a preventable hospitalization if they resided in a primary care shortage area (95% confidence interval, 1.09-2.65). CONCLUSIONS: Medicare beneficiaries in fair or poor health are more likely to experience a potentially preventable hospitalization if they live in a county designated as a primary care shortage area. Provision of Medicare coverage alone may not be enough to prevent poor ambulatory health care outcomes such as preventable hospitalizations. Improving health care outcomes for vulnerable elderly patients may require structural changes to the primary care ambulatory delivery system in the United States, especially in designated shortage areas.
65. **Laditka JN, Laditka SB, Probst JC.** More may be better: evidence of a negative relationship between physician supply and hospitalization for ambulatory care sensitive conditions. *Health Serv Res.* 2005 Aug;40(4):1148-66
OBJECTIVE: To conduct an empirical test of the relationship between physician supply and hospitalization for ambulatory care sensitive conditions (ACSH). DATA SOURCES/STUDY SETTING: A data set of county ACSH rates compiled by the Safety Net Monitoring Initiative of the Agency for Healthcare Research and Quality (AHRQ). The analytical data set consists of 642 urban counties and 306 rural counties. We supplemented the AHRQ data with data from the Area Resource File and the Environmental Protection Agency. STUDY DESIGN: Ordinary least squares regression estimated ACSH predictors. Physician supply, the independent variable of interest in this analysis, was measured as a continuous variable (MDs/100,000). Urban and rural areas were modeled separately. Separate models were estimated for ages 0-17, 18-39, and 40-64. DATA EXTRACTION METHODS: Data were limited to 20 states having more than 50% of counties with nonmissing data. PRINCIPAL FINDINGS: In the urban models for ages 0-17, standardized estimates indicate that, among the measured covariates in our model, physician supply has the largest negative adjusted relationship with ACSH ($p < .0001$). For ages 18-39 and 40-64, physician supply has the second largest negative adjusted relationship with ACSH ($p < .0001$, both age groups). Physician supply was not associated with ACSH in rural areas. CONCLUSIONS: Physician supply is positively associated with the overall performance of the primary health care system in a large sample of urban counties of the United States.

66. **Grumbach K, Selby JV, Damberg C, Bindman AB, Quesenberry C Jr, Truman A, Uratsu C.** Resolving the gatekeeper conundrum: what patients value in primary care and referrals to specialists. *JAMA*. 1999 Jul 21;282(3):261-6

CONTEXT: Few data are available regarding how patients view the role of primary care physicians as "gatekeepers" in managed care systems. OBJECTIVE: To determine the extent to which patients value the role of their primary care physicians as first-contact care providers and coordinators of referrals, whether patients perceive that their primary care physicians impede access to specialists, and whether problems in gaining access to specialists are associated with a reduction in patients' trust and confidence in their primary care physicians. DESIGN, SETTING, AND PATIENTS: Cross-sectional survey mailed in the fall of 1997 to 12707 adult patients who were members of managed care plans and received care from 10 large physician groups in California. The response rate among eligible patients was 71%. A total of 7718 patients (mean age, 66.7 years; 32 % female) were eligible for analysis. MAIN OUTCOME MEASURES: Questionnaire items addressed 3 main topics: (1) patient attitudes toward the first-contact and coordinating role of their primary care physicians, (2) patients' ratings of their primary care physicians (trust and confidence in and satisfaction with), and (3) patient perceptions of barriers to specialty referrals. Referral barriers were analyzed as predictors of patients' ratings of their physicians. RESULTS: Almost all patients valued the role of a primary care physician as a source of first-contact care (94%) and coordinator of referrals (89%). Depending on the specific medical problem, 75% to 91% of patients preferred to seek care initially from their primary care physicians rather than specialists. Twenty-three% reported that their primary care physicians or medical groups interfered with their ability to see specialists. Patients who had difficulty obtaining referrals were more likely to report low trust (adjusted odds ratio [OR], 2.7; 95% confidence interval [CI], 2.1-3.5), low confidence (OR, 2.2; 95% CI, 1.6-2.9), and low satisfaction (OR, 3.3; 95% CI, 2.6-4.2) with their primary care physicians. CONCLUSIONS: Patients value the first-contact and coordinating role of primary care physicians. However, managed care policies that emphasize primary care physicians as gatekeepers impeding access to specialists undermine patients' trust and confidence in their primary care physicians.

67. **Shi L, Starfield B, Politzer R, Regan J.** Primary care, self-rated health, and reductions in social disparities in health. *Health Serv Res*. 2002 Jun;37(3):529-50

OBJECTIVE: To examine the extent to which good primary-care experience attenuates the adverse association of income inequality with self-reported health. DATA SOURCES: Data for the study were drawn from the Robert Wood Johnson Foundation sponsored 1996-1997 Community Tracking Study (CTS) Household Survey and state indicators of income inequality and primary care. STUDY DESIGN: Cross-sectional, mixed-level analysis on individuals with a primary-care physician as their usual source of care. The analyses were weighted to represent the civilian noninstitutionalized population of the continental United States. DATA COLLECTION/ EXTRACTION METHODS: Principal component factor analysis was used to explore the structure of the primary-care indicators and examine their construct validity. Income inequality for the state in which the community is located was measured by the Gini coefficient, calculated using income distribution data from the 1996 current population survey. Stratified analyses compared proportion of individuals reporting had health and feeling depressed with those with good and bad primary-care experiences for each of the four income-inequality strata. A set of logistic regressions were performed to examine the relation between primary-care experience, income inequality, and self-rated health. PRINCIPAL FINDINGS: Good primary-care experience, in particular enhanced accessibility and continuity, was associated with better self-reported health both generally and mentally. Good primary-care experience was able to reduce the adverse association of income inequality with general health although not with mental health, and was especially beneficial in areas with highest income inequality. Socioeconomic status attenuated, but did not eliminate, the effect of primary-care experience on health. In conclusion, good primary-care experience is associated not only with improved self-rated overall and mental health but also with reductions in disparities between more- and less-disadvantaged communities in ratings of overall health.

68. **Shea S, Misra D, Ehrlich MH, Field L, Francis CK.** Predisposing factors for severe, uncontrolled hypertension in an inner-city minority population. *N Engl J Med.* 1992 Sep 10;327(11):776-81

BACKGROUND. Hypertensive emergency and urgent hypertension are the most severe forms of uncontrolled hypertension and are now seen predominantly in poor, minority populations. We studied the characteristics of the medical care received by patients with these conditions in order to identify risk factors for severe, uncontrolled hypertension. **METHODS.** Using a case-control study design, we interviewed 93 patients with severe, uncontrolled hypertension who presented in the hospital emergency room and 114 control patients with hypertension; both groups were seen at two New York City hospitals from 1989 through 1991. All the patients were black or Hispanic. Multiple logistic-regression models were used to adjust for age, sex, race or ethnic background, education, smoking status, alcohol-related problems, and use of illicit drugs during the previous year. **RESULTS.** After additional adjustment for lack of health insurance, severe, uncontrolled hypertension was found to be more common among patients who had no primary care physician (adjusted odds ratio, 3.5; 95% confidence interval, 1.6 to 7.7) and among those who did not comply with treatment for their hypertension (adjusted odds ratio, 1.9; 95% confidence interval, 1.4 to 2.5). Lack of health insurance was marginally associated with severe, uncontrolled hypertension (adjusted odds ratio, 1.9; 95% confidence interval, 0.8 to 4.6) after adjustment for lack of a primary care physician and noncompliance with antihypertensive treatment. Patients without a primary care physician and without health insurance were more likely to have their blood pressure checked and receive prescriptions for blood-pressure medications in emergency rooms than in physicians' offices or clinics. **CONCLUSIONS.** Characteristics of both the health care system and patients' behavior are associated with severe, uncontrolled hypertension. Improving access to primary care physicians, through health insurance or other means, may be an effective strategy for improving control of hypertension in disadvantaged minority populations.

69. **Safran DG, Taira DA, Rogers WH, Kosinski M, Ware JE, Tarlov AR.** Linking primary care performance to outcomes of care. *J Fam Pract.* 1998 Sep;47(3):213-20

BACKGROUND: Substantial research links many of the defining characteristics of primary care to important outcomes; yet little is known about the relative importance of each characteristic, and several characteristics have not been examined. These analyses evaluate the relationship between seven defining elements of primary care (accessibility, continuity, comprehensiveness, integration, clinical interaction, interpersonal treatment, and trust) and three outcomes (adherence to physician's advice, patient satisfaction, and improved health status). **METHODS:** Data were derived from a cross-sectional observational study of adults employed by the Commonwealth of Massachusetts (N = 7204). All patients completed a validated questionnaire, the Primary Care Assessment Survey. Regression methods were used to examine the association between each primary care characteristic (11 summary scales measuring 7 elements of care) and each outcome. **RESULTS:** Physicians' comprehensive ("whole person") knowledge of patients and patients' trust in their physician were the variables most strongly associated with adherence, and trust was the variable most strongly associated with patients' satisfaction with their physician. With other factors equal, adherence rates were 2.6 times higher among patients with whole-person knowledge scores in the 95th%ile compared with the 5th%ile (44.0% adherence vs 16.8% adherence, $P < .001$). The likelihood of complete satisfaction was 87.5% for those with 95th%ile trust scores compared with 0.4% for patients with 5th%ile trust scores ($P < .001$). The leading correlates of self-reported health improvements were integration of care, thoroughness of physical examinations, communication, comprehensive knowledge of patients, and trust ($P < .001$). **CONCLUSIONS:** Patients' trust in their physician and physicians' knowledge of patients are leading correlates of three important outcomes of care. The results are noteworthy in the context of pervasive changes in our nation's health care system that are widely viewed as threatening to the quality of physician-patient relationships.

70. **O'Malley AS, Forrest CB, Politzer RM, Wulu JT, Shi L.** Health center trends, 1994-2001: what do they portend for the federal growth initiative? *Health Aff (Millwood)*. 2005 Mar-Apr;24(2):465-72

The Federal Health Center Growth Initiative aims to increase community health centers' (CHCs') capacity by 60% from 2002 to 2006. This study investigates how primary care delivery changed and sustained its growth during 1994-2001. Findings reveal a rise in the number of patients and maintenance of their visit rate. People ages 41-64 accounted for the highest percentage of visits in 2001, and continuity of care improved. There were no disparities in visit-based preventive services delivery by race/ethnicity or insurance status. Continued growth under the initiative is likely to help reduce health disparities and improve care for the underserved.

71. **Regan J, Schempf AH, Yoon J, Politzer RM.** The role of federally funded health centers in serving the rural population. *J Rural Health*. 2003 Spring;19(2):117-24; discussion 115-6.

CONTEXT: Federally funded health centers attempt to improve rural health by reducing and eliminating access barriers to primary care services. PURPOSE: This study compares rural health center patients with people in the general rural population for indicators of access to preventive services and health outcomes. METHODS: Data from the annual reporting system for federally funded health centers, the 1999 Uniform Data System, and published national census data were used to provide sociodemographic comparisons. Selected health status indicators, preventive services utilization, and health outcomes were obtained from a survey of health center patients, and the results were compared with the National Health Interview Survey and National Vital Statistics. FINDINGS: Unlike the nation's rural population, the majority of rural health center patients are of minority race/ethnicity, live at or below poverty, and are either uninsured or on Medicaid. Despite having higher prevalence of traditional access barriers than the general rural population, rural health center patients are significantly more likely to receive certain preventive services and also to experience lower rates of low birthweight, particularly for African American infants. However, rural health center patients are not more likely to have received influenza vaccination or up-to-date mammogram screening. CONCLUSIONS: Health centers provide access to essential preventive care for many of the most vulnerable rural residents. A national strategy to expand the rural health center network will likely help to ensure improved health for the considerable proportion of rural residents who still lack access to appropriate services.

72. **Forrest CB, Starfield B.** Entry into primary care and continuity: the effects of access. *Am J Public Health*. 1998 Sep; 88(9):1330-6.

OBJECTIVES: This study examined the relationship between access and use of primary care physicians as sources of first contact and continuity with the medical system. METHODS: Data from the 1987 National Medical expenditure Survey were used to examine the effects of access on use of primary care physicians as sources of first contact for new episodes of care (by logistic regression) and as sources of continuity for all ambulatory visits (by multivariate linear regression). RESULTS: No after-hours care, longer office waits, and longer travel times reduced the chances of a first-contact visit with a primary care physician for acute health problems. Longer appointment waits, no insurance, and no after-hours care were associated with lower levels of continuity. Generalists provided more first-contact care than specialists acting as primary care physicians, largely because of their more accessible practices. CONCLUSIONS: These data provide support for the linkage between access and care seeking with primary care physicians.

73. **Sox CM, Swartz K, Burstin HR, Brennan TA.** Insurance or a regular physician: which is the most powerful predictor of health care? *Am J Public Health.* 1998 Mar; 88(3):364-70
- OBJECTIVES:** This study compared the relative effects on access to health care of relationship with a regular physician and insurance status. **METHODS:** The subjects were 1952 nonretired, non-Medicare patients aged 18 to 64 years who presented with 1 of 6 chief complaints to 5 academic hospital emergency departments in Boston and Cambridge, Mass, during a 1-month study period in 1995. Access to care was evaluated by 3 measures: delay in seeking care for the current complaint, no physician visit in the previous year, and no emergency department visit in the previous year. **RESULTS:** After clinical and socioeconomic characteristics were controlled, lacking a regular physician was a stronger, more consistent predictor than insurance status of delay in seeking care (odds ratio [OR] = 1.6, 95% confidence interval [CI] = 1.2, 2.1), no physician visit [OR] = 4.5%, 95% CI = 3.3, 6.1), and no emergency department visit (OR = 1.8, 95% CI = 1.4, 2.4). For patients with a regular physician, access was no different between the uninsured and the privately insured. For privately insured patients, those with no regular physician had worse access than those with a regular physician. **CONCLUSIONS:** Among patients presenting to emergency departments, relationship with a regular physician is a stronger predictor than insurance status of access to care.
74. **Saultz JW, Lochner J.** Interpersonal continuity of care and care outcomes: a critical review. *Ann Fam Med.* 2005 Mar-Apr;3(2):159-66
- PURPOSE:** We wanted to undertake a critical review of the medical literature regarding the relationships between interpersonal continuity of care and the outcomes and cost of health care. **METHODS:** A search of the MEDLINE database from 1966 through April 2002 was conducted by the primary author to find original English language articles focusing on interpersonal continuity of patient care. The articles were then screened to select those articles focusing on the relationship between interpersonal continuity and the outcome or cost of care. These articles were systematically reviewed and analyzed by both authors for study method, measurement technique, and quality of evidence. **RESULTS:** Forty-one research articles reporting the results of 40 studies were identified that addressed the relationship between interpersonal continuity and care outcome. A total of 81 separate care outcomes were reported in these articles. Fifty-one outcomes were significantly improved and only 2 were significantly worse in association with interpersonal continuity. Twenty-two articles reported the results of 20 studies of the relationship between interpersonal continuity and cost. These studies reported significantly lower cost or utilization for 35 of 41 cost variables in association with interpersonal continuity. **CONCLUSIONS:** Although the available literature reflects persistent methodologic problems, it is likely that a significant association exists between interpersonal continuity and improved preventive care and reduced hospitalization. Future research in this area should address more specific and measurable outcomes and more direct costs and should seek to define and measure interpersonal continuity more explicitly

75. **Higashi T, Wenger NS, Adams JL, Fung C, Roland M, McGlynn EA, Reeves D, Asch SM, Kerr EA, Shekelle PG.** Relationship between number of medical conditions and quality of care. *N Engl J Med.* 2007 Jun 14;356(24):2496-504

BACKGROUND: There is emerging concern that the methods used to measure the quality of care unfairly penalize providers caring for patients with multiple chronic conditions. We therefore sought to study the relationship between the quality of care and the number of medical conditions a patient has. **METHODS:** We assessed measurements of the quality of medical care received in three cohorts of community-dwelling adult patients in the Community Quality Index study, the Assessing Care of Vulnerable Elders study, and the Veterans Health Administration project (7680 patients in total). We analyzed the relationship between the quality of care that patients received, defined as the percentage of quality indicators satisfied among those for which patients were eligible, and the number of chronic medical conditions each patient had. We further explored the roles of characteristics of patients, use of health care (number of office visits and hospitalizations), and care provided by specialists as explanations for the observed relationship. **RESULTS:** The quality of care increased as the number of medical conditions increased. Each additional condition was associated with an increase in the quality score of 2.2% (95% confidence interval [CI], 1.7 to 2.7) in the Community Quality Index cohort, of 1.7% (95% CI, 1.1 to 2.4) in the Assessing Care of Vulnerable Elders cohort, and of 1.7% (95% CI, 0.7 to 2.8) in the Veterans Health Administration cohort. The relationship between the quality of care and the number of conditions was little affected by adjustment for the difficulty of delivering the care recommended in a quality indicator and for the fact that, because of multiple conditions requiring the same care, a patient could be eligible to receive the same care process more than once. Adjustment for characteristics of patients, use of health care, and care provided by specialists diminished the relationship, but it remained positive. **CONCLUSIONS:** The quality of care, measured according to whether patients were offered recommended services, increases as a patient's number of chronic conditions increases.

76. **Raddish M, Horn SD, Sharkey PD.** Continuity of care: is it cost effective? *Am J Manag Care.* 1999 Jun;5(6):727-34.

OBJECTIVE: To examine the association between the degree of healthcare provider continuity and healthcare utilization and costs. **STUDY DESIGN:** A longitudinal, prospective, observational study. **PATIENTS AND METHODS:** Data on patients with arthritis, asthma, epigastric pain/peptic ulcer disease, hypertension, and otitis media were collected at each of 6 health maintenance organizations (HMOs). Outcome variables included the number of prescriptions for the target disease and the cost, total number of prescriptions and the cost, the number of outpatient visits, and the number of hospital admissions. Disease-specific severity of illness, type of visit, and provider information were obtained at each encounter. HMO profit status, visit copay, gatekeeper strictness, formulary limitations, use of multisource (generic) drugs, gender, number of months in the study, age, and severity of illness were controlled in the analyses. **RESULTS:** There were 12,997 patients followed for more than 99,000 outpatient visits, 1000 hospitalizations, and more than 240,000 prescriptions. Increasing the number of primary or specialty care providers a patient encountered during the study generally was associated with increased utilization and costs when HMO and patient characteristics were controlled. The number of specialty care providers also increased as the number of primary care providers increased. The incremental increase in pharmacy costs per patient per year with each additional provider ranged between \$19 in subjects with otitis media to \$58 in subjects with hypertension. **CONCLUSIONS:** Continuity of care was associated with a reduction in resource utilization and costs. As healthcare delivery systems are designed, care continuity should be promoted.

77. **O'Malley AS, Forrest CB.** Continuity of care and delivery of ambulatory services to children in community health clinics. *J Community Health.* 1996 Jun;21(3):159-73

This study assesses how continuity of care influences receipt of preventive care and overall levels of ambulatory care among children and adolescents in community health clinics (CHCs). It is a secondary data analysis of the 1988 Child Health Supplement to the National Health Interview Survey. Of 17,110 children in the sample population, the 1465 who identified CHCs as their routine source of care formed the study population. Continuity of site was defined as identification of a CHC as a source of both routine and sick care, and continuity with a clinician was defined as identification of a specific clinician for sick visits. In bivariate analyses both continuity with the CHC and with a specific clinician were associated with increased levels of preventive care and overall ambulatory care. In logistic regression models, continuity of care was associated with nearly a two-fold increase in the odds of receiving age-appropriate preventive care. Alternatively, insurance status was a better predictor of receipt of overall levels of ambulatory care. We conclude that expanding financial access alone is unlikely to sufficiently improve low-income children's access to Community Health Clinics. Additional emphasis on localizing the delivery of both routine and sick care services in a single site or with a specific clinician may be needed to achieve higher levels of both preventive care and overall ambulatory care.

78. **Ryan S, Riley A, Kang M, Starfield B.** The effects of regular source of care and health need on medical care use among rural adolescents. *Arch Pediatr Adolesc Med.* 2001 Feb;155(2):184-90.

OBJECTIVE: To examine those factors associated with the use of different types of ambulatory health services in a rural adolescent population. **METHODS:** The student bodies of 2 middle schools and 2 high schools in rural areas in a mid Atlantic state (N = 1615) were surveyed using a self-administered health status and health services use instrument. Logistic regression was used to assess factors predicting receipt of (1) preventive services, (2) problem-focused services, and (3) emergency services. **RESULTS:** One third of the rural youth reported having received preventive services within the previous 3 months; 41% received problem-focused care, and 18% received emergency services. Having the same provider for both preventive and illness care was the most consistent and significant predictor of receipt for all types of ambulatory services. Of special note is the greater use of emergency services when subjects did not have a consistent provider for both preventive and illness care. Health need variables, measured across a wide range of domains, were additionally predictive, and their significance varied according to the type of services received. **CONCLUSIONS:** This study provides compelling evidence that for rural adolescents, having a regular source of care and medical need are the most important predictors of use across a variety of types of ambulatory care.

79. **Bartman BA, Moy E, D'Angelo LJ.** Access to ambulatory care for adolescents: the role of a usual source of care. *J Health Care Poor Underserved.* 1997 May;8(2):214-26

Using data from the 1987 National Medical Expenditure Survey, characteristics of ambulatory service utilization for adolescents aged 11 through 17 were examined. Access to health care was further explored by identifying adolescents at risk of not receiving an ambulatory service in the event of symptomatology. Approximately two-thirds of an estimated 25 million adolescents experienced an outpatient visit. African American race, Hispanic ethnicity, middle income, and lack of insurance and a usual source of care placed adolescents at risk for not receiving an ambulatory service. Sixteen million adolescents experienced symptomatology, but only one-third saw a physician. Those lacking a usual source of care were at greater odds of not receiving care. For symptom-based care, inequities were related more to lack of usual source of care rather than socioeconomic characteristics. Health care reform efforts may benefit from ensuring that adolescents have an identified usual source of care to ensure equity of access to care.

80. **Christakis DA, Feudtner C, Pihoker C, Connell FA.** Continuity and quality of care for children with diabetes who are covered by Medicaid. *Ambul Pediatr.* 2001 Mar-Apr;1(2):99-103
BACKGROUND: Poor and minority children with Type 1 diabetes mellitus are at increased risk of severe adverse outcomes as a result of their disease. However, little is known about the quality of care that these children receive and which factors are associated with better quality of care. **OBJECTIVES:** Our objectives were as follows: 1) to describe the utilization of services associated with quality of care for children with Type 1 diabetes mellitus who are covered by Medicaid and 2) to test the hypothesis that increased continuity of primary care is associated with better care for these children. **DESIGN:** Retrospective cohort study. **METHODS:** Washington State Medicaid claims data for 1997 were used to determine what proportion of children with diabetes had 1) an inpatient or outpatient diagnosis of diabetic ketoacidosis (DKA), 2) a glycosylated hemoglobin (H_gA_{1c}) level that had been checked, 3) a retinal examination, and 4) thyroid function studies. Continuity of care was quantified using a pre-established index. **RESULTS:** Two hundred fifty-two eligible patients were identified. During the observation year, 20% had an outpatient diagnosis of DKA, 6% were admitted with DKA, 43% visited an ophthalmologist, 54% had their H_gA_{1c} checked, and 21% had their thyroid function assessed. Children with high continuity of care were less likely to have DKA as an outpatient (0.30 [0.13-0.71]). Children with medium continuity of care and high continuity of care were less likely to be hospitalized for DKA (0.22 [0.05-0.87] and 0.14 [0.03-0.67], respectively). For preventive services utilization, high continuity of care was associated only with an increased likelihood of visiting an ophthalmologist (2.80 [1.08-3.88]). **CONCLUSIONS:** The quality of care for Medicaid children with diabetes can be substantially improved. Low continuity of primary care is an identifiable risk factor for DKA.
81. **Weinberger M, Oddone EZ, Henderson WG.** Does increased access to primary care reduce hospital readmissions? Veterans Affairs Cooperative Study Group on Primary Care and Hospital Readmission. *N Engl J Med.* 1996 May 30;334(22):1441-7.
BACKGROUND. For chronically ill patients, readmission to the hospital can be frequent and costly. We studied the effect of an intervention designed to increase access to primary care after discharge from the hospital, with the goals of reducing readmissions and emergency department visits and increasing patients' quality of life and satisfaction with care. **METHODS.** In a multi-center randomized, controlled trial at nine Veterans Affairs Medical Centers, we randomly assigned 1396 veterans hospitalized with diabetes, chronic obstructive pulmonary disease, or congestive heart failure to receive either usual care or an intensive primary care intervention. The intervention involved close follow-up by a nurse and a primary care physician, beginning before discharge and continuing for the next six months. **RESULTS.** The patients were severely ill. Half of those with congestive heart failure (504 patients) had disease in New York Heart Association class III or IV; 30% of those with diabetes (751 patients) had end-organ damage; and a quarter of those with chronic obstructive pulmonary disease (583 patients) required home oxygen treatment or oral corticosteroids. The patients had extremely poor quality-of-life scores. Although they received more intensive primary care than the controls, the patients in the intervention group had significantly higher rates of readmission (0.19 vs 0.14 per month, $P = 0.005$) and more days of rehospitalization (10.2 vs 8.8, $P = 0.041$). The patients in the intervention group were more satisfied with their care ($P = 0.001$), but there was no difference between the study groups in quality-of-life scores, which remained very low ($P = 0.53$). **CONCLUSIONS.** For veterans discharged from Veterans Affairs hospitals, the primary care intervention we studied increased rather than decreased the rate of rehospitalization, although patients in the intervention group were more satisfied with their care.

82. **Kravet SJ, Shore AD, Miller R, Green GB, Kolodner K, Wright SM.** Health care utilization and the proportion of primary care physicians. *Am J Med.* 2008 Feb;121(2):142-8.

BACKGROUND: The impact of primary care physicians on health care utilization remains controversial. Some have hypothesized that primary care physicians decrease health care utilization through enhanced coordination of care and a preventive care focus. **METHODS:** Using data from the Area Resource File (a Health Resources and Services Administration US county-level database) for the years 1990, 1995, and 1999, we performed a retrospective cross-sectional analysis with generalized estimating equations to determine if measures of health care utilization (inpatient admissions, outpatient visits, emergency department visits, and surgeries) were associated with the proportion of primary care physicians to total physicians within metropolitan statistical areas. **RESULTS:** The average proportion of primary care physicians in each metropolitan statistical area was 0.34 (SD 0.46, range 0.20-0.54). Higher proportions of primary care physicians were associated with significantly decreased utilization, with each 1% increase in proportion of primary care physicians associated with decreased yearly utilization for an average-sized metropolitan statistical area of 503 admissions, 2968 emergency department visits, and 512 surgeries (all $P < .03$). These relationships were consistent each year studied. **CONCLUSIONS:** Increased proportions of primary care physicians appear to be associated with significant decreases in measures of health care utilization across the 1990s. National efforts aimed at limiting health care utilization may benefit from focusing on the proportion of primary care physicians relative to specialists in this country.

83. **Shekelle PG, Markovich M, Louie R.** Comparing the costs between provider types of episodes of back pain care. *Spine.* 1995 Jan 15;20(2):221-6; discussion 227.

STUDY DESIGN. This study was a prospective, community-based, observational design. **OBJECTIVES.** The authors compared the costs of episodes of back pain care between different provider types in a population representative of the U.S. **SUMMARY OF BACKGROUND DATA.** Previous comparisons between provider types of the costs for back pain care have been restricted to the worker's compensation population or have used something other than the episode as the unit of analysis. **METHODS.** Data from the RAND Health Insurance Experiment (HIE) were analyzed. Insurance claims forms were examined for all visits specified by the patient as occurring for back pain. Visits were grouped into episodes using decision rules and clinical judgment. The primary provider was defined as the provider who delivered most of the care. Comparisons of costs between provider types were made. **RESULTS.** There were 1020 episodes of back pain care made by 686 different persons and encompassing 8825 visits. Chiropractors and general practitioners were the primary providers for 40% and 26% of episodes, respectively. Chiropractors had a significantly greater mean number of visits per episode (10.4) than did other practitioners. Orthopedic physicians and "other" physicians were significantly more costly on a per visit basis. Orthopedists had the highest mean total cost per episode, and general practitioners the lowest. Chiropractors had the highest, and general practitioners the lowest mean outpatient cost per episode. **CONCLUSIONS.** These are economically significant differences in the costs of back pain care of persons seeing chiropractors, general practitioners, internists, and orthopedists.

84. **Ozcan YA, Jiang HJ, Pai CW.** Do primary care physicians or specialists provide more efficient care? *Health Serv Manage Res.* 2000 May;13(2):90-6.

Sinusitis is a common health complaint and expenditures for its treatment are high; thus, it is necessary to promote efficient practice behaviours in managing patient care. This study compares resource utilization between primary care physicians and specialists in the treatment of Medicaid sinusitis patients in Virginia. Physician-level data from Virginia Medicaid claim files for 1993 were analysed. The efficiency frontier, representing the best achievable performance in the use of resources for treating sinusitis, is identified using Data Envelopment Analysis. Resource utilization (primary care physician visits, specialist visits, emergency room usage, prescriptions and laboratory tests) and corresponding costs are compared between generalists and otolaryngologists. It was concluded from this study that there are no discernible differences in technical efficiency between generalists and specialists in the treatment of sinusitis. Nevertheless, otolaryngologists are found to be more costly than generalists in treating sinusitis. Variation in both caseload and patient mix might explain variation in use of resources.

85. **Parekh V, Saint S, Furney S, Kaufman S, McMahon L.** What effect does inpatient physician specialty and experience have on clinical outcomes and resource utilization on a general medical service? *J Gen Intern Med.* 2004 May;19(5 Pt 1):395-401.

OBJECTIVE: To examine the effects of internal medicine specialty and physician experience on inpatient resource use and clinical outcomes on an academic general medicine service. **DESIGN:** A 1-year retrospective cohort study. **SETTING:** The University of Michigan Hospitals, Ann Arbor, Michigan. **PATIENTS:** Two thousand six hundred seventeen admissions to the general medicine service from July 2001 to June 2002, excluding those for whom data were incomplete (n = 18). **MEASUREMENTS AND MAIN RESULTS:** Length of stay (LOS) and total hospital costs were used to measure resource utilization. Hospital mortality and 14-day and 30-day readmission rates were used to measure clinical outcomes. Adjusted mean LOS was significantly greater for rheumatologists (0.56 days greater; P = .002) and endocrinologists (0.38 days greater; P = .03) compared to general internists. Total costs were lower for general internists compared to endocrinologists (\$1100 lower; P = .01) and rheumatologists (\$431 lower; P = .07). Hospitalists showed a trend toward reduced LOS compared to all other physicians (0.31 days lower; P = .06). The top two deciles of physicians stratified by recent inpatient general medical experience showed significantly reduced LOS compared to all other physicians (0.35 days lower; P = .04). No significant differences were seen in readmission rates or in-hospital mortality among the various physician groups. **CONCLUSIONS:** General internists had lower lengths of stay and costs compared to endocrinologists and rheumatologists. Hospitalists showed a trend toward reduced LOS compared to all other physicians. Recent inpatient general medicine experience appears to be a determinant of reduced inpatient resource use.

86. **Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL.** The implications of regional variations in Medicare spending. Part 1: the content, quality, and accessibility of care. *Ann Intern Med.* 2003 Feb 18;138(4):273-87.

BACKGROUND: The health implications of regional differences in Medicare spending are unknown. **OBJECTIVE:** To determine whether regions with higher Medicare spending provide better care. **DESIGN:** Cohort study. **SETTING:** National study of Medicare beneficiaries. **PATIENTS:** Patients hospitalized between 1993 and 1995 for hip fracture (n = 614,503), colorectal cancer (n = 195,429), or acute myocardial infarction (n = 159,393) and a representative sample (n = 18,190) drawn from the Medicare Current Beneficiary Survey (1992-1995). **EXPOSURE MEASUREMENT:** End-of-life spending reflects the component of regional variation in Medicare spending that is unrelated to regional differences in illness. Each cohort member's exposure to different levels of spending was therefore defined by the level of end-of-life spending in his or her hospital referral region of residence (n = 306). **OUTCOME MEASUREMENTS:** Content of care (for example, frequency and type of services received), quality of care (for example, use of aspirin after acute myocardial infarction, influenza immunization), and access to care (for example, having a usual source of care). **RESULTS:** Average baseline health status of cohort members was similar across regions of differing spending levels, but patients in higher-spending regions received approximately 60% more care. The increased utilization was explained by more frequent physician visits, especially in the inpatient setting (rate ratios in the highest vs. the lowest quintile of hospital referral regions were 2.13 [95% CI, 2.12 to 2.14] for inpatient visits and 2.36 [CI, 2.33 to 2.39] for new inpatient consultations), more frequent tests and minor (but not major) procedures, and increased use of specialists and hospitals (rate ratio in the highest vs. the lowest quintile was 1.52 [CI, 1.50 to 1.54] for inpatient days and 1.55 [CI, 1.50 to 1.60] for intensive care unit days). Quality of care in higher-spending regions was no better on most measures and was worse for several preventive care measures. Access to care in higher-spending regions was also no better or worse. **CONCLUSIONS:** Regional differences in Medicare spending are largely explained by the more inpatient-based and specialist-oriented pattern of practice observed in high-spending regions. Neither quality of care nor access to care appear to be better for Medicare enrollees in higher-spending regions.

87. **Mark DH, Gottlieb MS, Zellner BB, Chetty VK, Midtling JE.** Medicare costs in urban areas and the supply of primary care physicians. *J Fam Pract.* 1996 Jul;43(1):33-9

BACKGROUND: The supply of primary care physicians may be important determinants of health care costs. We examined the association between primary care physician supply and geographic location with respect to variation in Medicare Supplementary Medical Insurance (Part B) reimbursement. **METHODS:** We performed an analysis of data from all US metropolitan counties. Physician supply data were derived from the American Medical Association Masterfile. Medicare Part B reimbursements and enrollment data came from the Health Care Financing Administration. Physician supply was calculated for family practice, general internal medicine, and nonprimary care specialties. Linear regression was used to test the association of physician supply and Medicare costs and to adjust for potential confounding variables. **RESULTS:** The average Medicare Part B reimbursement per enrollee was \$1283. After adjusting for local price differences and county characteristics, a greater supply of family physicians and general internists was significantly associated with lower Medicare Part B reimbursements. The reduction in reimbursements between counties in the highest quintile of family physician supply and the lowest quintile was \$261 per enrollee. In contrast, a greater supply of general practitioners and nonprimary care physicians was associated with higher reimbursements per enrollee. **CONCLUSIONS:** These results add to the evidence that an increased supply of primary care physicians is associated with lower health care costs. If this association is causal, it supports the theory that increasing the number of primary care physicians may lower health care costs.

88. **Franks P, Fiscella K.** Primary care physicians and specialists as personal physicians. Health care expenditures and mortality experience. *J Fam Pract.* 1998 Aug;47(2):105-9

BACKGROUND: The advent of managed care has resulted in considerable debate regarding the relative effects of specialist and primary care on patient outcomes and costs. Studies on these subjects have been limited to a disease-focused orientation rather than a patient-focused orientation inherent in primary care management. We examined whether persons using a primary care physician have lower expenditures and mortality than those using a specialist as their personal physician. **METHODS:** Using data on a nationally representative sample of 13,270 adult respondents from the 1987 National Medical Expenditure Survey reporting as their personal physician either a primary care physician (general practitioner, family physician, internist, or obstetrician-gynecologist) or a specialist, we examined total annual health care expenditures and 5-year mortality experience. **RESULTS:** Respondents with a primary care physician, rather than a specialist, as a personal physician were more likely to be women, white, live in rural areas, report fewer medical diagnoses and higher health perceptions and have lower annual healthcare expenditures (mean: \$2029 vs \$3100) and lower mortality (hazard ratio = 0.76, 95% confidence interval [CI], 0.64-0.90). After adjustment for demographics, health insurance status, reported diagnoses, health perceptions, and smoking status, respondents reporting using a primary care physician compared with those using a specialist had 33% lower annual adjusted health care expenditures and lower adjusted mortality (hazard ratio = 0.81; 95% CI, 0.66-0.98). **CONCLUSIONS:** These findings provide evidence for the cost-effective role of primary care physicians in the health care system. More research is needed on how to optimally integrate primary and specialty care.

89. **Welch WP, Miller ME, Welch HG, Fisher ES, Wennberg JE.** Geographic variation in expenditures for physicians' services in the United States. *N Engl J Med.* 1993 Mar 4;328(9):621-7. **BACKGROUND.** The national volume-performance standard recently implemented by Medicare does not account for geographic variation in expenditures for physicians' services. To study this variation, we examined expenditures for physicians' services in all metropolitan areas in the United States. **METHODS.** We used Medicare claims data for 1989 to measure rates of service use for beneficiaries living in the 317 U.S. metropolitan statistical areas (MSAs). The variables investigated were rates of admission to the hospital, payments to physicians for inpatient care per admission and per beneficiary, payments to physicians for outpatient care per beneficiary, and overall payments to physicians per beneficiary. Expenditures were measured in terms of allowed charges as adjusted to reflect prevailing charges in each MSA. Rates of use were adjusted for age and sex, with the exception of the variable for payments to physicians for inpatient care per admission, which was adjusted for case mix. **RESULTS.** Expenditures for the delivery of physicians' services to Medicare beneficiaries varied markedly among MSAs, with those for the areas with the lowest and the highest rates differing at least twofold on each measure. The measures for specific areas varied in parallel: areas with high rates of admission tended to have high levels of payment to physicians for inpatient care per admission, and areas with high payments for inpatient services tended to have high payments for outpatient services. Expenditures were not related to the number of physicians per capita but were lower in MSAs with a high proportion of primary care practitioners. The variation persisted when the 25 largest MSAs were examined; for total payments to physicians per beneficiary, there was a twofold difference between the area with the lowest rate and that with the highest, San Francisco (\$872) and Miami (\$1,874). The states with the highest overall payments to physicians per beneficiary were Florida, Louisiana, and Michigan. **CONCLUSIONS.** The marked variation among metropolitan areas in payments to physicians underscores the lack of consensus among physicians about which services are required. Moreover, the practice style in a given community appears to be influenced not by the aggregate supply of physicians but rather by the mixture of primary care physicians and specialists.
90. **Forrest CB, Starfield B.** The effect of first-contact care with primary care clinicians on ambulatory health care expenditures. *J Fam Pract.* 1996 Jul;43(1):40-8. **BACKGROUND:** A study was undertaken to examine the relationship between first-contact care, an essential feature of primary care, and expenditures for frequent ambulatory episodes of care in a nationally representative sample. **METHODS:** A nonconcurrent cohort study was conducted using data from the 1987 National Medical Expenditure Survey. Ambulatory claims data of respondents with an identified primary care source were used to develop 20,282 episodes of care for 24 preventive and acute illness conditions. The study examined the relationship of first-contact care, defined as the use of an identified primary care source for the first visit in an episode, and ambulatory episode-of-care expenditures. **RESULTS:** Episodes that began with visits to an individual's primary care clinician, as opposed to other sources of care, were associated with reductions in expenditures of 53% overall (\$63 vs 134, $P < .001$), 62% for acute illnesses (\$62 vs \$164, $P < .001$), and 20 for preventive care (\$64 vs \$80, $P < .001$). For 23 of the 24 health problems studied, first-contact care was associated with reductions in expenditures. Multivariate regression analyses that controlled for sociodemographic characteristics, health status, case-mix, length of the episode, and number of visits to the emergency room did not substantively alter these results. **CONCLUSIONS:** First-contact care was associated with reductions in ambulatory episode-of-care expenditures of over 50% in a nationally representative sample. These findings suggest that systems of care may reduce ambulatory expenditures.

91. **Rubenstein LV, Yano EM, Fink A, Lanto AB, Simon B, Graham M, Robbins AS.** Evaluation of the VA's Pilot Program in Institutional Reorganization toward Primary and Ambulatory Care: Part I, Changes in process and outcomes of care. *Acad Med.* 1996 Jul;71(7):772-83

PURPOSE: To evaluate the impact of the reorganization of an academic Veterans Affairs medical center toward primary and ambulatory care--including the implementation of a medical-center-wide interdisciplinary firm system and ambulatory care training program--on the quality of primary ambulatory care. **METHOD:** Randomly selected male veterans visiting the Veterans Affairs Medical Center in Sepulveda, California, were surveyed in 1992, early in the implementation of the program, and in 1993, after the program had been fully implemented. Two surveys were used: one before the veterans saw their primary care providers (practice-based survey) and the other immediately after patient visits (visit-based survey). Survey-participant data were then linked to computerized utilization and mortality data. Survey topics were mapped to the medical center's strategic plan and goals for ambulatory care, and focused on patients' reports about the care they had received in terms of continuity, access, preventive care, and other aspects of the bio-psychosocial model of care. Administrative computer data were then used to evaluate effects on medical center workload. Statistical analyses included analysis of variance, analysis of covariance, chi-square, and logistic regression. **RESULTS:** For practice-based comparisons, complete data were available for 1,262 veterans in 1992 and 1,373 in 1993. For visit-based comparisons, complete data were available for 1,407 veterans in 1992 and 643 in 1993. Results included statistically significant improvements in continuity of care and detection of depression as well as increased rates of preventive care counseling (smoking and exercise). The proportion of veterans reporting being seen by physicians increased, as did the proportion of patients seen for check-ups rather than for acute problems. Fewer patients were seen in subspecialty clinics than in general medicine clinics. Patient satisfaction increased, hospitalizations decreased, and death rates decreased. Alcohol counseling and access to care for acute symptoms declined. Workload shifted from subspecialists to generalists and from inpatient care to outpatient care. **CONCLUSION:** The institutional reorganization toward primary and ambulatory care succeeded in substantially improving the quality of ambulatory care, reflecting improvements in the system of care and of health care provider training in ambulatory care.

92. **Gulliford MC.** Availability of primary care doctors and population health in England: is there an association? *J Public Health Med.* 2002 Dec;24(4):252-4

BACKGROUND: In the United States, an association has been proposed between better access to primary care and lower mortality. This paper reports an ecological analysis that evaluated whether population health was associated with general practitioner (GP) supply in England. **METHODS:** Data were analysed for 99 health authorities in England in 1999. Health outcomes included standardized mortality ratios, infant mortality rate (per 1,000), hospital admissions with acute and chronic conditions (per 100,000), and teenage conception rates (per 1,000). The number of GPs per 10,000 population was included as explanatory variable. Confounders included the Townsend deprivation score, proportion of ethnic minorities, proportion in social classes IV and V, and proportion with limiting long-term illness. Analyses were by linear regression weighted for population size. **RESULTS:** Higher GP supply was associated with lower mortality in univariate analyses. After adjusting for deprivation score, ethnic group and social class, the standardized mortality ratio for all-cause mortality at 15-64 years decreased by -5.2 (95 per cent confidence interval -8.3 to -2.0, $p = 0.002$) per unit increase in GP supply. After additional adjustment for limiting long-term illness, the decrease was -3.3 (-6.7 to 0.1, $p = 0.060$). In the fully adjusted model, each unit increase in GP supply was associated with a decrease in hospital admission rates for acute conditions (-14.4, -21.4 to -7.4 per 100,000, $p < 0.001$) and chronic conditions (-10.6, -17.2 to -4.0, $p = 0.002$). **CONCLUSIONS:** In England, lower supply of GPs was associated with increased hospital utilization, but a strong univariate association with mortality might be explained by confounding.

93. **Burge F, Lawson B, Johnston G.** Family physician continuity of care and emergency department use in end-of-life cancer care. *Med Care.* 2003 Aug;41(8):992-1001.

BACKGROUND: Despite cancer patients preferring to spend their last days out-of-hospital, many make difficult visits to the emergency department (ED). Family physician continuity of care has been shown in some clinical situations to reduce ED utilization. **OBJECTIVE:** To determine if greater family physician continuity of care for cancer patients during the end-of-life is associated with less ED utilization. **METHOD:** This retrospective, population-based study involved secondary analysis of linked administrative data files for 1992 to 1997. Sources included the Nova Scotia Cancer Registry, Vital Statistics, the Queen Elizabeth II Health Sciences Center Oncology Patient Information System and Palliative Care Program (PCP), Hospital Admissions/Separation data, and Physician Services information. Subjects included adults with a recorded date of cancer diagnosis who died of cancer and who had made at least three visits to a family physician during their last 6 months of life. The relationship between total ED visits and family physician continuity of care, developed using the Modified Modified Continuity Index (MMCI), was examined using negative binomial regression with adjustments for survival, year of death, sex, age, cancer type, region, PCP admission, specialty visits, hospital days, death location, income quintile, and total ambulatory visits. **RESULTS:** In total, 8702 subjects made 11,551 ED visits (median = 1.0); median MMCI was 0.83. Adjusted results indicate those experiencing low continuity (MMCI < 0.5) made 3.9 times more ED visits (rate ratio [RR] = 3.93; 95% CI [CI] = 3.57-4.34) than those experiencing high continuity (MMCI < or = 0.8) and patients experiencing moderate continuity (MMCI = 0.5-0.8) made twice as many ED visits (RR = 2.28; CI = 2.15-2.42). **CONCLUSION:** Given this significant association between family physician continuity of care and ED visits during the end-of-life, and given international trends to reform primary care, active planning of strategies to facilitate such continuity should be encouraged.

94. **Casanova C, Colomer C, Starfield B.** Pediatric hospitalization due to ambulatory care-sensitive conditions in Valencia (Spain). *Int J Qual Health Care.* 1996 Feb;8(1):51-9

BACKGROUND: Studies in the United States have demonstrated that rates of hospitalization for conditions sensitive to primary care are related to socioeconomic factors. Our objective was to identify those sociodemographic and primary care factors associated with pediatric hospitalization for ambulatory care-sensitive conditions, in a country (Spain) with a health system that provides universal coverage. **METHODS:** Cross-sectional survey of 504 children hospitalized in a District General Hospital in Valencia, Spain. Data were gathered on sociodemographic variables, type of physician providing primary care and ambulatory care use prior to hospitalization. Analysis consisted of bivariate statistical tests and logistic regression techniques. **RESULTS:** Children who were under 2 years old and female were at significantly higher risk for hospitalization due to ambulatory care-sensitive conditions. Socioeconomic variables, type of physician or a previous visit to primary care services were not associated with a different risk of hospitalization due to these conditions. **CONCLUSION:** Characteristics unrelated to difficulties in access, or to type of provider, influence the risk of hospital admissions for conditions that could be prevented or managed without hospitalization. More specific classification of conditions potentially could be useful for determining which factors of structure or process of health services are related to hospitalization.

95. **Rizza P, Bianco A, Pavia M, Angelillo IF.** Preventable hospitalization and access to primary health care in an area of Southern Italy. *BMC Health Serv Res.* 2007 Aug 30;7:134

BACKGROUND: Ambulatory care-sensitive conditions (ACSC), such as hypertension, diabetes, chronic heart failure, chronic obstructive pulmonary disease and asthma, are conditions that can be managed with timely and effective outpatient care reducing the need of hospitalization. Avoidable hospitalizations for ACSC have been used to assess access, quality and performance of the primary care delivery system. The aims of this study were to quantify the proportion of avoidable hospital admissions for ACSCs, to identify the related patient's socio-demographic profile and health conditions, to assess the relationship between the primary care access characteristics and preventable hospitalizations, and the usefulness of avoidable hospitalizations for ACSCs to monitor the effectiveness of primary health care. **METHODS:** A random sample of 520 medical records of patients admitted to medical wards (Cardiology, Internal Medicine, Pneumology, Geriatrics) of a non-teaching acute care 717-bed hospital located in Catanzaro (Italy) were reviewed. **RESULTS:** A total of 31.5% of the hospitalizations in the sample were judged to be preventable. Of these, 40% were for congestive heart failure, 23.2% for chronic obstructive pulmonary disease, 13.5% for angina without procedure, 8.4% for hypertension, and 7.1% for bacterial pneumonia. Preventable hospitalizations were significantly associated to age and sex since they were higher in older patients and in males. The proportion of patients who had a preventable hospitalization significantly increased with regard to the number of hospital admissions in the previous year and to the number of patients for each primary care physician (PCP), with lower number of PCP accesses and PCP medical visits in the previous year, with less satisfaction about PCP health services, and, finally, with worse self-reported health status and shorter length of hospital stay. **CONCLUSION:** The findings from this study add to the evidence and the urgency of developing and implementing effective interventions to improve delivery of health care at the community level and provided support to the usefulness of avoidable hospitalizations for ACSCs to monitor this process.

96. **Gulliford MC, Jack RH, Adams G, Ukoumunne OC.** Availability and structure of primary medical care services and population health and health care indicators in England. *BMC Health Serv Res.* 2004 Jun 11;4(1):12

BACKGROUND: It has been proposed that greater availability of primary medical care practitioners (GPs) contributes to better population health. We evaluated whether measures of the supply and structure of primary medical services are associated with health and health care indicators after adjusting for confounding. **METHODS:** Data for the supply and structure of primary medical services and the characteristics of registered patients were analyzed for 99 health authorities in England in 1999. Health and health care indicators as dependent variables included standardised mortality ratios (SMR), standardized hospital admission rates, and conceptions under the age of 18 years. Linear regression analyses were adjusted for Townsend score, proportion of ethnic minorities and proportion of social class IV/ V. **RESULTS:** Higher proportions of registered rural patients and patients ≥ 75 years were associated with lower Townsend deprivation scores, with larger partnership sizes and with better health outcomes. A unit increase in partnership size was associated with a 4.2 (95% confidence interval 1.7 to 6.7) unit decrease in SMR for all-cause mortality at 15-64 years ($P = 0.001$). A 10% increase in single-handed practices was associated with a 1.5 (0.2 to 2.9) unit increase in SMR ($P = 0.027$). After additional adjustment for % of rural and elderly patients, partnership size and proportion of single-handed practices, GP supply was not associated with SMR (-2.8, -6.9 to 1.3, $P = 0.183$). **CONCLUSIONS:** After adjusting for confounding with health needs of populations, mortality is weakly associated with the degree of organization of practices as represented by the partnership size but not with the supply of GPs.

97. **McAlister FA, Majumdar SR, Eurich DT, Johnson JA.** The effect of specialist care within the first year on subsequent outcomes in 24,232 adults with new-onset diabetes mellitus: population-based cohort study. *Qual Saf Health Care.* 2007 Feb;16(1):6-11

BACKGROUND: Although specialty care has been shown to improve short-term outcomes in patients hospitalized with acute medical conditions, its effect on patients with chronic conditions treated in the ambulatory care setting is less clear. **OBJECTIVE:** To examine whether specialty care (i.e., consultative care provided by an endocrinologist or a general internist in concert with a patient's primary care doctor) within the first year of diagnosis is associated with improved outcomes after the first year for adults with diabetes mellitus treated as outpatients. **DESIGN:** Population-based cohort study using linked administrative data. **SETTING:** The province of Saskatchewan, Canada. **Sample:** 24 232 adults newly diagnosed with diabetes mellitus between 1991 and 2001. **Method:** The primary outcome was all-cause mortality. Analyses used multivariate Cox proportional hazards models with time-dependent covariates, propensity scores and case mix variables (demographic, disease severity and comorbidities). In addition, restriction analyses examined the effect of specialist care in low-risk subgroups. **RESULTS:** The median age of patients was 61 years, and over a mean follow-up of 4.9 years 2932 (12%) died. Patients receiving specialty care were younger, had a greater burden of comorbidities, and visited doctors more often before and after their diabetes diagnosis (all $p < \text{or} = 0.001$). Compared with patients seen by primary care doctors alone, patients seen by specialists and primary care doctors were more likely to receive recommended treatments (all $p < \text{or} = 0.001$), but were more likely to die (13.1% v 11.7%, adjusted hazard ratio (HR) 1.17, 95% confidence interval (CI) 1.08 to 1.27). This association persisted even in patients without comorbidities or target organ damage (adjusted HR 1.16, 95% CI 1.01 to 1.34). **CONCLUSION:** Specialty care was associated with better disease-specific process measures but not improved survival in adults with diabetes cared for in ambulatory care settings.

98. **Jarman B, Gault S, Alves B, Hider A, Dolan S, Cook A, Hurwitz B, Iezzoni LI.** Explaining differences in English hospital death rates using routinely collected data. *BMJ.* 1999 Jun 5; 318(7197):1515-20

OBJECTIVES: To ascertain hospital inpatient mortality in England and to determine which factors best explain variation in standardised hospital death ratios. **Design:** Weighted linear regression analysis of routinely collected data over four years, with hospital standardised mortality ratios as the dependent variable. **SETTING:** England. **Subjects:** Eight million discharges from NHS hospitals when the primary diagnosis was one of the diagnoses accounting for 80% of inpatient deaths. **Main outcome measures:** Hospital standardised mortality ratios and predictors of variations in these ratios. **RESULTS:** The four year crude death rates varied across hospitals from 3.4% to 13.6% (average for England 8.5%), and standardised hospital mortality ratios ranged from 53 to 137 (average for England 100). The percentage of cases that were emergency admissions (60% of total hospital admissions) was the best predictor of this variation in mortality, with the ratio of hospital doctors to beds and general practitioners to head of population the next best predictors. When analyses were restricted to emergency admissions (which covered 93% of all patient deaths analyzed) number of doctors per bed was the best predictor. **CONCLUSION:** Analysis of hospital episode statistics reveals wide variation in standardized hospital mortality ratios in England. The percentage of total admissions classified as emergencies is the most powerful predictor of variation in mortality. The ratios of doctors to head of population served, both in hospital and in general practice, seem to be critical determinants of standardized hospital death rates; the higher these ratios, the lower the death rates in both cases.

99. **Gravelle H, Morris S, Sutton M.** Are Family Physicians Good for You? Endogenous Doctor Supply and Individual Health. *Health Serv Res.* 2008 Jan 29.
Objective. To investigate the impact of family physician (FP) supply on individual health, adjusting for factors that affect both health and FPs' choice of location. Study Population. A total of 49,541 individuals in 351 English local authorities (LAs). Data Sources. Data on individual health and personal characteristics from three rounds (1998, 1999, and 2000) of the Health Survey for England were linked to LA data on FP supply. Study Design. Three methods for analyzing self-reported health were used. FP supply, instrumented by house prices and by age-weighted capitation payments for patients on FP lists, was included in individual-level health regressions along with individual and LA covariates. Results. When no instruments are used FPs have a positive but statistically insignificant effect on health. When FP supply is instrumented by age-related capitation it has markedly larger and statistically significant effects. A 10% increase in FP supply increases the probability of reporting very good health by 6%. Conclusion. After allowing for endogeneity, an increase in FP supply has a significant positive effect on self-reported individual health.
100. **Hjortdahl P, Laerum E.** Continuity of care in general practice: effect on patient satisfaction. *BMJ.* 1992 May 16;304(6837):1287-90.
OBJECTIVE--To evaluate the influence of continuity of care on patient satisfaction with consultations. DESIGN--Direct and episodic specific evaluation of patient satisfaction with recent consultation. SETTING AND SUBJECTS--A representative sample of 3918 Norwegian primary care patients were asked to evaluate their consultations by filling in a questionnaire. The response rate was 78%. MAIN OUTCOME MEASURES--The patient's overall satisfaction with the consultation was rated on a six point scale. Continuity of care was recorded as the duration and intensity of the present patient-doctor relationship and as patients' perception of the present doctor being their personal doctor or not. RESULTS--The multivariate analysis indicated that an overall personal patient-doctor relationship increased the odds of the patient being satisfied with the consultation sevenfold (95% confidence interval 4.9 to 9.9) as compared with consultations where no such relationships existed. The duration of the patient-doctor relationship had a weak but significant association with patient satisfaction, while the intensity of contacts showed no such association. CONCLUSION--Personal, continuous care is linked with patient satisfaction. If patient satisfaction is accepted as an integral part of quality health care, reinforcing personal care may be one way of increasing this quality.
101. **Gulbrandsen P, Hjortdahl P, Fugelli P.** General practitioners' knowledge of their patients' psychosocial problems: multipractice questionnaire survey. *BMJ.* 1997 Apr 5;314(7086):1014-8
OBJECTIVES: To evaluate general practitioners' knowledge of a range of psychosocial problems among their patients and to explore whether doctors' recognition of psychosocial problems depends on previous general knowledge about the patient or the type of problem or on certain characteristics of the doctor or the patient. DESIGN: Multipractice survey of consecutive adult patients consulting general practitioners. Doctors and patients answered written questions. SETTING: Buskerud County, Norway. SUBJECTS: 1401 adults attending 89 general practitioners during one regular working day in March 1995. MAIN OUTCOME MEASURES: Doctors' knowledge of nine predefined psychosocial problems in patients; these problems were assessed by the patients as affecting their health on the day of consultation; odds ratios for the doctor's recognition of each problem, adjusted for characteristics of patients, doctors, and practices; and the doctor's assessment of previous general knowledge about the patient. RESULTS: Doctors' knowledge of the problems ranged from 53% (108/203) of "stressful working conditions" to 19% (12/63) of a history of "violence or threats." Good previous knowledge of the patient increased the odds for the doctor's recognition of "sorrow," "violence or threats," "substance misuse in close friend or relative," and "difficult conflict with close friend or relative." Age and sex of doctor and patient, patient's educational level and living situation, and location of practice influenced the doctor's awareness. CONCLUSIONS: Variation in the patients' communication abilities, the need for confidence in the doctor-patient relationship before revealing intimate problems, and a tendency for the doctors to be entrapped by their expectations may explain these findings.

102. **De Maeseneer JM, De Prins L, Gosset C, Heyerick J.** Provider continuity in family medicine: does it make a difference for total health care costs? *Ann Fam Med.* 2003 Sep-Oct;1(3):144-8.

BACKGROUND: International comparisons of health care systems have shown a relationship at the macro level between a well-structured primary health care plan and lower total health care costs. The objective of this study was to assess whether provider continuity with a family physician is related to lower health care costs using the individual patient as the unit of analysis. **METHODS:** We undertook a study of a stratified sample of patients (age, sex, region, insurance company) for which 2 cohorts were constructed based on the patients' utilization pattern of family medicine (provider continuity or not). Patient utilization patterns were observed for 2 years. The setting was the Belgian health care system. The participants were 4,134 members of the 2 largest health insurance companies in 2 regions (Aalst and Liège). The main outcome measures were the total health care costs of patients with and without provider continuity with a family physician, controlling for variables known to influence health care utilization (need factors, predisposing factors, enabling factors). **RESULTS:** Bivariate analyses showed that patients who were visiting the same family physician had a lower total cost for medical care. A multivariate linear regression showed that provider continuity with a family physician was one of the most important explanatory variables related to the total health care cost. **CONCLUSIONS:** Provider continuity with a family physician is related to lower total health care costs. This finding brings evidence to the debate on the importance of structured primary health care (with high continuity for family practice) for a cost-effective health policy.

103. **Schoen C, Osborn R, Huynh PT, Doty M, Davis K, Zapert K, Peugh J.** Primary care and health system performance: adults' experiences in five countries. *Health Aff (Millwood).* 2004 Jul-Dec; Suppl. Web Exclusives:W4-487-503

This paper reports on a 2004 survey of primary care experiences among adults in Australia, Canada, New Zealand, the United Kingdom, and the United States. The survey finds shortfalls in delivery of safe, effective, timely, or patient-centered care, with variations among countries. Delays in lab test results and test errors raise safety concerns. Failures to communicate, to engage patients, or to promote health are widespread. Aside from clinical preventive care, the United States performs poorly on most care dimensions in the study, with notable cost-related access concerns and short-term physician relationships. Contrasts across countries point to the potential to improve performance and to learn from international initiatives.

104. **Bindman AB, Forrest CB, Britt H, Crampton P, Majeed A.** Diagnostic scope of and exposure to primary care physicians in Australia, New Zealand, and the United States: cross sectional analysis of results from three national surveys. *BMJ.* 2007 Jun 16;334(7606):1230-1.

OBJECTIVES: To compare mix of patients, scope of practice, and duration of visit in primary care physicians in Australia, New Zealand, and the United States. **DESIGN:** Comparison of three comparable cross sectional surveys performed in 2001-2. Physicians completed a questionnaire on patients' demographics, diagnoses, and duration of visit. **SETTING:** Primary care practice. **PARTICIPANTS:** 79,790 office visits in Australia, 10,064 in New Zealand, and 25,838 in the US. **MAIN OUTCOME MEASURES:** Diagnostic codes were mapped to the Johns Hopkins expanded diagnostic clusters. Scope of practice was defined as the number of expanded diagnostic clusters accounting for 75% of all managed problems related to morbidity. Exposure to primary care was calculated from duration of visits recorded by the physician, and reports on rates of visits to primary care for each country. **RESULTS:** In each country, primary care physicians managed an average of 1.4 morbidity related problems per visit. In the US, 46 expanded diagnostic clusters accounted for 75% of problems managed compared with 52 in Australia, and 57 in New Zealand. Correlations in the frequencies of managed health problems between countries were high (0.87-0.97 for pairwise comparisons). Though primary care visits were longer in the US than in New Zealand and Australia, the per capita annual exposure to primary care physicians in the US (29.7 minutes) was about half of that in New Zealand (55.5 minutes) and about a third of that in Australia (83.4 minutes) because of higher rates of visits to primary care in these countries. **CONCLUSIONS:** Despite differences in the supply and financing of primary care across countries, many aspects of the clinical practice of primary care physicians are remarkably similar in Australia, New Zealand, and the US.

105. **Macinko J, Starfield B, Shi L.** The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998. *Health Serv Res.* 2003 Jun;38(3):831-65

OBJECTIVE: To assess the contribution of primary care systems to a variety of health outcomes in 18 wealthy Organization for Economic Cooperation and Development (OECD) countries over three decades. **DATA SOURCES/STUDY SETTING:** Data were primarily derived from OECD Health Data 2001 and from published literature. The unit of analysis is each of 18 wealthy OECD countries from 1970 to 1998 (total n = 504). **STUDY DESIGN:** Pooled, cross-sectional, time-series analysis of secondary data using fixed effects regression. **DATA COLLECTION/EXTRACTION METHODS:** Secondary analysis of public-use datasets. Primary care system characteristics were assessed using a common set of indicators derived from secondary datasets, published literature, technical documents, and consultation with in-country experts. **PRINCIPAL FINDINGS:** The strength of a country's primary care system was negatively associated with (a) all-cause mortality, (b) all-cause premature mortality, and (c) cause-specific premature mortality from asthma and bronchitis, emphysema and pneumonia, cardiovascular disease, and heart disease ($p < 0.05$ in fixed effects, multivariate regression analyses). This relationship was significant, albeit reduced in magnitude, even while controlling for macro-level (GDP per capita, total physicians per one thousand population, % of elderly) and micro-level (average number of ambulatory care visits, per capita income, alcohol and tobacco consumption) determinants of population health. **CONCLUSIONS:** (1) Strong primary care system and practice characteristics such as geographic regulation, longitudinality, coordination, and community orientation were associated with improved population health. (2) Despite health reform efforts, few OECD countries have improved essential features of their primary care systems as assessed by the scale used here. (3) The proposed scale can also be used to monitor health reform efforts intended to improve primary care.

106. **Davis K, Schoen C, Schoenbaum SC, Audet AJ, Doty MM, Holmgren AL, et al.** Mirror, mirror on the wall: an update on the quality of American health care through the patient's lens. *The Commonwealth Fund.* April 2006.

Overview: This report is based on two surveys of patients: the first was conducted in 2004 among a nationally representative sample of adults in Australia, Canada, New Zealand, the United Kingdom, and the United States; the second was conducted in 2005 among a sample of adults with health problems in the same five nations and Germany. It ranks patients' ratings of various dimensions of their health care, according to the Institute of Medicine's framework for quality.

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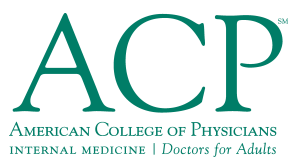
107. **Weingarten SR, Lloyd L, Chiou CF, Braunstein GD.** Do subspecialists working outside of their specialty provide less efficient and lower-quality care to hospitalized patients than do primary care physicians? *Arch Intern Med.* 2002 Mar 11;162(5):527-32

BACKGROUND: Studies show that subspecialists can provide better quality care than primary care physicians when working within their subspecialty for patients with some medical conditions. However, many subspecialists care for patients outside of their chosen subspecialty. The present study compared the quality of care provided by subspecialists practicing outside of their specialty, general internists, and subspecialists practicing within their specialty. **METHODS:** The severity-adjusted mortality rate and the severity-adjusted length of stay were used as indexes of quality of care. Data from 5112 hospital admissions (301 different physicians) for community-acquired pneumonia, acute myocardial infarction, congestive heart failure, or upper gastrointestinal hemorrhage at 6 hospitals in the greater Cleveland, Ohio, area were used in this study. The data were severity adjusted with the CHOICE Severity of Illness System. **RESULTS:** Subspecialists working outside of their subspecialty cared for 25% of hospitalized patients. When comparing patients cared for by subspecialists practicing outside of their subspecialty, severity-adjusted lengths of stay were longer for patients with congestive heart failure (23% longer; 95% confidence interval [CI], 15%-32%), upper gastrointestinal hemorrhage (22% longer; 95% CI, 7%-39%), and community-acquired pneumonia (14% longer; 95% CI, 5%-24%) than for patients cared for by subspecialists practicing within their subspecialty. Patients also had a slightly higher hospital mortality rate when cared for by subspecialists practicing outside of their specialty than by subspecialists practicing within their subspecialty (mortality rate odds ratio, 1.46; $P = .047$). In addition, patients cared for by subspecialists practicing outside of their subspecialty had longer lengths of stay, and prolongations of stay were observed for patients with congestive heart failure (16% longer; 95% CI, 8%-26%), upper gastrointestinal hemorrhage (15% longer; 95% CI, 2%-30%), and community-acquired pneumonia (18% longer; 95% CI, 9%-28%) than patients cared for by general internists. **CONCLUSIONS:** Subspecialists commonly care for patients outside of their subspecialty, despite the fact that their patients may have longer lengths of stay than those cared for by subspecialists practicing within their specialty or by general internists. In addition, such patients may have slightly higher mortality rates than those cared for by subspecialists practicing within their subspecialty.

108. **U.S. Department of Health and Human Services.** "Changing Demographics: Implications for Physicians, Nurses, and Other Health Workers." Health Resources and Services Administration, Rockville, MD, U.S. Department of Health and Human Services. 2003.

109. **Thorpe KE, Howard DH.** The rise in spending among Medicare beneficiaries: the role of chronic disease prevalence and changes in treatment intensity. *Health Aff (Millwood).* 2006 Sep-Oct;25(5):w378-88. Epub 2006 Aug 22

We examine the impact of the rise in treated disease prevalence on the growth in Medicare beneficiaries' health care spending. Virtually all of this spending growth is associated with patients who are under medical management for five or more conditions. This is traced to both a rise in true disease prevalence and changes in clinical treatment thresholds. Using the metabolic syndrome as a case study, we find that the share of patients treated with medications has increased 11.5 percentage points in less than ten years. This raises important questions about the "fit" of how Medicare pays for services for complex medical management.



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