

HEALTH CARE REFORM

Physician Wages Across Specialties

Informing the Physician Reimbursement Debate

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Background: Disparities in remuneration between primary care and other physician specialties may impede health care reform by undermining the sustainability of a primary care workforce. Previous studies have compared annual incomes across specialties unadjusted for work hours. Wage (earnings-per-hour) comparisons could better inform the physician payment debate.

Methods: In a cross-sectional analysis of data from 6381 physicians providing patient care in the 2004-2005 Community Tracking Study (adjusted response rate, 53%), we compared wages across broad and narrow categories of physician specialties. Tobit and linear regressions were run. Four broad specialty categories (primary care, surgery, internal medicine and pediatric subspecialties, and other) and 41 specific specialties were analyzed together with demographic, geographic, and market variables.

Results: In adjusted analyses on broad categories, wages for surgery, internal medicine and pediatric subspecialties, and other specialties were 48%, 36%, and 45% higher,

respectively, than for primary care specialties. In adjusted analyses for 41 specific specialties, wages were significantly lower for the following than for the reference group of general surgery (wage near median, \$85.98): internal medicine and pediatrics combined (-\$24.36), internal medicine (-\$24.27), family medicine (-\$23.70), and other pediatric subspecialties (-\$23.44). Wage rankings were largely impervious to adjustment for control variables, including age, race, sex, and region.

Conclusions: Wages varied substantially across physician specialties and were lowest for primary care specialties. The primary care wage gap was likely conservative owing to exclusion of radiologists, anesthesiologists, and pathologists. In light of low and declining medical student interest in primary care, these findings suggest the need for payment reform aimed at increasing incomes or reducing work hours for primary care physicians.

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NUMEROUS STUDIES^{1,2} HAVE documented substantial income disparities between primary care and other physician specialties. Such disparities may impede health care reform by undermining the sustainability of a vigorous primary care workforce. The need to address the generalist-specialist income gap is based on several

ratios of generalists to specialists.^{3,6} Third, a critical shortfall in the number of US medical students entering generalist careers is looming.⁷ Although the causes of this shortfall are multifactorial, reimbursement of generalists relative to subspecialists has contributed to recent rapid declines in medical student interest in generalist careers.⁸⁻¹² Thus, many policymakers believe that reforming the payment system to include greater incentives for generalists might increase the overall value of medical care to patients and, ultimately, society as a whole.¹³⁻¹⁵

Arising implicitly from these issues is the need for information regarding the relative value placed by society on services provided by generalist and subspecialist physicians. Considerable data are available that rank physician specialties by annual income, which is one potential indicator of relative valuation.^{1,16-23} However, some data in these studies were collected from physicians employed in medical schools^{16,17,22} and from nonrepresentative community prac-

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lines of research and debate. First, generalist physicians may provide more cost-effective care than subspecialists.^{3,4} Reducing costs is critical to solving the health care crisis.⁵ Second, health seems to be better and more equitably distributed among groups in geographic regions with higher

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itioner samples,¹⁸ limiting the ability to generalize their findings. In addition, many of the data in these studies were collected a decade or more ago,^{1,17,19} before the ascendancy of managed care, and most separately ranked only a handful of different specialties. Furthermore, most previous studies (with 1 exception²⁰) adjusted for either few or none of the covariates associated with physician income, such as age and sex.

Perhaps most important, annual income may not be the most useful indicator of physician value because it does not account for significant variations in the number of work hours among specialties.²¹⁻²³ Physician wages (earnings per hour) may offer a more useful and intuitive metric for relative valuation of specialties. In addition, lower income and more hours worked per week have been linked with physician job dissatisfaction,²⁴ which, in turn, has been linked with undesirable patient outcomes,²⁵ strikes,²⁶ medical problems for physicians themselves,²⁷ and leaving the practice of medicine.²⁸

To better inform the physician reimbursement debate, we examined differences in wages across physician specialty categories using recent (2004-2005) data from the nationally representative Community Tracking Study (CTS) physician survey²⁹ after controlling for known sociodemographic, community, and practice correlates of physician remuneration. We compared wages among 4 aggregated generalist and subspecialist physician categories (primary care, surgery, internal medicine and pediatric subspecialties, and all others) and across 41 disaggregated specialties.

METHODS

DATA

Respondents were a representative sample of physicians who participated in round 4 (2004-2005, the latest years available) of the CTS physician survey.²⁹ Physicians responding to the CTS resided in the continental United States, practiced patient care, and were not employed by the federal government. The survey followed a complex sampling design of 60 communities selected with weights proportional to population size from strata defined by geographic region, community size, and whether the community was metropolitan or nonmetropolitan. Some hospital-based specialists, such as radiologists, anesthesiologists, and pathologists, and all residents and fellows were excluded, whereas primary care physicians and responders to previous survey rounds were oversampled.²⁹ The overall response rate was 53% in 2004-2005.²⁹

The CTS data set included information on 6628 physicians in 2004-2005. We required valid (nonmissing) answers for income, hours, and annual weeks worked and for all control variables. We restricted the analysis to physicians who reported at least 20 hours but not more than 100 hours per week and who reported at least 26 weeks worked per year. We reasoned that these restrictions would enhance the interpretability and robustness of the results by limiting outliers. These restrictions reduced the analysis sample to 6381.

DEPENDENT VARIABLES

Annual income from medical practice was measured as pretax income, net of all practice expenses, to include malpractice insurance. Because income was measured before taxes, it was not

take-home pay. The CTS physician survey contained an upper limit of \$400 000 (n=378; weighted percentage=7.5%) and a lower limit of \$0 (n=28; weighted percentage=0.5%). Work hours were measured per week via self-report of the number of hours worked in the week before the survey. Work hours included what the CTS referred to as "all medically related activities," which included what the CTS denoted as "direct patient care, administrative tasks, and professional duties." Weeks worked measured the number of weeks worked per year. We created "wages per hour" using the methods described in the "Statistical Methods" subsection.

SPECIALTY VARIABLES

Specialty codes classified physicians according to the specialty or subspecialty in which they reported spending the most time weekly. To enhance the integrity of findings, we combined specialty classifications with fewer than 20 respondents into related specialty classifications to achieve a minimum of 20 respondents in each of the resulting 41 specialty classifications.

We created 4 broad specialty categories: primary care, surgery, internal medicine and pediatric subspecialties, and all other specialties. Primary care included pediatrics, geriatrics, family practice, internal medicine, general practice, and internal medicine and pediatrics (combined). Surgery contained neurologic, plastic, orthopedic, otolaryngologic, thoracic, urologic, general, and vascular surgery; obstetrics/gynecology; and other surgical. Internal medicine and pediatric subspecialties included allergy and immunology, hematology and oncology, gastrointestinal, cardiovascular, nephrology, rheumatology, pulmonary critical care, pulmonary, endocrinology, infectious diseases, critical care internal medicine, hospitalists, medical oncology, neonatal and perinatal, and other pediatric subspecialties. The final category, other medical, included radiation oncology, physical medicine and rehabilitation, occupational medicine, emergency medicine, adult and child psychiatry, pediatric emergency, neurology, ophthalmology, and dermatology.

CONTROL VARIABLES

We selected control variables based on a review of the medical and economic literature and classified variables as physician characteristics, community factors, and practice factors.³⁰ Physician characteristics included age, sex, race, whether board certified, and whether graduated from a foreign medical school. Community factors included residence in areas with less than 200 000 population (approximately 9% of the sample) and residence in 9 regions of the country (previously defined).²⁴ Practice factors included practice ownership, whether employed by a medical school, and experience with managed care. The 3-level CTS practice ownership variable was parameterized with 2 dummy variables, full owner (sole proprietor) and part owner (partner), using nonowners as the reference category. The physician's experience with managed care was captured by the variable "percentage of revenue from managed care," which we expressed in 20 percentage point units.

STATISTICAL METHODS

Stata 11³¹ was used for statistical analyses. Survey design effects arising from unequal probability sampling, stratification, and clustering were accounted for by using weighting and survey data analysis procedures in Stata. In the multivariable analysis, control variables were accounted for in Tobit and least squares regressions.³²

Table 1. Characteristics of Physician Respondents to the 2004-2005 Community Tracking Study

Variable	Unweighted Frequency, No.	Unweighted % ^a
Entire sample	6381	100
Dependent variables		
Income, \$		
<50 000	434	6.80
50 000-99 000	745	11.68
100 000-149 000	1617	25.34
150 000-199 000	1362	21.34
200 000-249 000	874	13.70
250 000-299 000	512	8.02
≥300 000	837	13.12
Work hours, No.		
≤50	3496	54.79
51-60	1666	26.11
≥61	1219	19.10
Control variables		
Age <35 y	342	5.36
Age 35-44 y	1963	30.76
Age 45-54 y	2214	34.70
Age 55-64 y	1323	20.73
Age 65-74 y	432	6.77
Age ≥75 y	107	1.68
White non-Hispanic	4728	74.09
Black non-Hispanic	259	4.06
Hispanic, all races	328	5.14
Asian, Pacific Islander, other, non-Hispanic	817	12.80
Missing race	249	3.90
Male sex	4617	72.36
Female sex	1764	27.64
New England	515	8.07
Middle Atlantic	983	15.41
East North Central	1061	16.63
West North Central	211	3.31
South Atlantic	1362	21.34
East South Central	234	3.67
West South Central	679	10.64
Mountain	397	6.22
Pacific	939	14.72
Rural/town	793	12.43
Board certified	5834	91.43
Foreign medical school graduate	1288	20.18
Full owner, sole proprietor	1924	30.15
Part owner, partner	1419	22.24
Not an owner or partner	3038	47.61
Employed by a medical school	597	9.36
0%-20% of revenue from managed care	1841	28.85
21%-40% of revenue from managed care	1622	25.42
41%-60% of revenue from managed care	1240	19.43
>60% of revenue from managed care	1678	26.30

^aDue to rounding, percentages do not total 100.

The CTS questionnaire did not allow physicians to report income values lower than \$0 or greater than \$400 000. However, in reality, some might have had negative income in a given year (perhaps owing to business expenses), and others may have had incomes greater than \$400 000. The Tobit regression was designed for just such “limited” or “censored” variables.³² Tobit regression can be used to generate predicted values below and above the limits based on covari-

ates in the model. We, therefore, (1) ran Tobit regressions for incomes, with all specialty variables and control variables as covariates; (2) obtained individual conditional expectations of income given the maximum likelihood estimates of regression coefficients and the residual standard deviation, the individual’s covariate values, and knowledge of the censored response value; and (3) used these adjusted conditional expected values in place of censored response values at \$0 and \$400 000. To construct wages, we divided annual income by the product of number of weekly work hours and number of reported weeks worked per year.

General surgery was chosen as the reference category for specialty comparisons because its sample size was reasonably large (n=202) and was near the middle of specialties when ranked by mean wages. Linear regressions were used when wage was the dependent variable. The Tobit income regression model was used to impute incomes for values left censored at \$0 (n=23) or right censored at \$400 000 (n=369) and included all the covariates in the wage regression and covariates for work hours and annual weeks worked.

RESULTS

Table 1 provides frequencies and percentages for binary variables. We also obtained estimates on continuous variables. Tobit-adjusted mean annual income was \$187 857 (2004-2005 dollars), mean number of weekly work hours was 53.1 (median=50; mode=60), and mean number of weeks worked was 47.3 (median=48; mode=48).

Table 2 provides frequencies for specialties and ranks them based on population-weighted wages without adjustment for control variables. From highest to lowest wages, the ordering of the broad categories was as follows: surgery, other medical, internal medicine and pediatrics subspecialties, and primary care. Wages for surgery were 52% higher, for internal medicine and pediatric subspecialties were 40% higher, and for other specialties were 46% higher than for primary care specialties.

In the ranking results for 41 specific specialties in **Table 2**, the top 2 specialties (significantly different from general surgery) were neurologic surgery (wage=\$132, $P<.05$) and radiation oncology (wage=\$126, $P<.01$). The bottom 2 specialties were internal medicine and pediatrics (combined) (wage=\$50, $P>.01$) and other pediatric subspecialties (wage=\$52, $P<.01$). Data on mean weekly hours are also provided, with general surgery again used as the reference category.

Table 3 provides the results of a linear regression of wages on the broad categories together with control variables. Coefficients on broad categories indicate how much more the mean wage is in that category compared with primary care, adjusted for control variables. In general, results on broad categories were similar to those that did not account for control variables: surgery (\$29.00 more than primary care, $P<.01$), other medical (\$27.13, $P<.01$), and internal medicine and pediatrics subspecialties (\$21.59, $P<.01$).

Table 3 also reports results on control variables. We found that age groups younger than 45 to 54 years reported statistically significantly lower wages than did those 45 to 54 years. No race category was statistically significant from non-Hispanic whites except for the combined group for “other” and “missing.” Wages for women were

Table 2. Broad Categories and Specialties Ranked by Wages, Unadjusted for Control Variables

Broad Category and Specialty	Frequency	Mean Hourly Wage, \$	Mean Hours, No.
Broad categories			
Surgery	1064	92.10 ^a	59.0 ^a
Other medical	1302	88.08 ^a	47.4 ^a
Internal medicine and pediatric subspecialties	836	84.85 ^a	57.9 ^a
Primary care [Reference]	3179	60.48	51.2
Specialties			
Neurologic surgery	22	132.33 ^b	58.0
Radiation oncology	42	126.32 ^a	52.9 ^a
Medical oncology	47	114.21	60.2
Plastic surgery	51	113.78	54.3 ^b
Allergy and immunology	54	111.71 ^c	48.7 ^a
Thoracic surgery	20	110.45 ^b	64.9
Orthopedic surgery	167	107.93 ^a	60.6
Ophthalmology	180	103.63 ^b	51.7 ^a
Dermatology	97	102.68 ^c	44.9 ^a
Hematology and oncology	21	100.17	55.0 ^b
Other surgical subspecialties	32	99.77	62.2
Cardiovascular diseases	145	93.74	59.7
Gastroenterology	113	93.27	56.8 ^c
Otolaryngology	81	93.00	54.6 ^b
Neurology	91	92.52	51.5 ^a
Physical medicine and rehabilitation	68	91.69	46.4 ^a
Emergency medicine	391	87.47	47.4 ^a
Nephrology	49	86.61	58.2
General surgery [Reference]	202	85.98	60.6
Urology	91	85.62	58.2
Occupational medicine	52	84.71	44.0 ^a
Obstetrics and gynecology	365	83.40	57.1 ^c
Vascular surgery	33	80.47	68.0 ^b
Rheumatology	34	78.28	52.6 ^a
Pulmonary critical care medicine	29	76.32	61.5
Neonatal and perinatal medicine	62	75.86	64.8
Psychiatry	294	72.24 ^b	44.7 ^a
Hospitalists	36	71.84 ^c	60.3
Pulmonary diseases	55	71.67 ^c	63.0
Endocrinology	37	71.65	47.7 ^a
Pediatrics	729	69.24 ^b	45.1 ^a
Critical care internal medicine	23	68.84 ^b	67.5 ^b
Child and adolescent psychiatry	58	67.36 ^b	46.3 ^a
Infectious diseases	36	66.26 ^b	52.1
Pediatric emergency medicine	29	65.76	41.1 ^a
Family practice	1309	58.25 ^a	52.2 ^a
Internal medicine	974	58.18 ^a	54.3 ^a
General practice	88	57.55 ^a	47.8 ^a
Geriatric medicine	31	56.84 ^a	52.8 ^a
Other pediatric subspecialties	95	51.62 ^a	55.7 ^b
Internal medicine and pediatrics	48	49.90 ^a	57.0

^a $P \leq .01$ compared with primary care (for broad category comparisons) or with general surgery (for specialty comparisons).

^b $P = .01$ to $.05$ compared with general surgery.

^c $P = .05$ to $.10$ compared with general surgery.

approximately \$9 less than those for men ($P < .01$). Being a partner in private practice was positively associated with wages (\$14; $P < .01$), whereas current employment in a medical school was negatively associated with wages (-\$18; $P < .001$). The **Figure** summarizes the wages for the 4 broad categories before and after adjustment for control variables and indicates that adjustment did not appreciably alter estimated wages.

Table 3. Linear Regression Results for Broad Categories and for Control Variables, With Wage as the Dependent Variable^a

Covariate	Regression Coefficient (95% CI)
Broad categories	
Primary care	Reference
Surgery	29.00 (23.78 to 34.21) ^b
Internal medicine and pediatric subspecialties	21.59 (15.05 to 28.14) ^b
Other medical	27.13 (22.64 to 31.62) ^b
Control variables	
Age <35 y	-10.55 (-16.03 to -5.07) ^b
Age 35-44 y	-7.02 (-11.99 to -2.04) ^b
Age 45-54 y	Reference
Age 55-64 y	0.91 (-4.41 to 6.23)
Age 65-74 y	0.58 (-8.15 to 9.31)
Age ≥75 y	2.69 (-15.65 to 21.02)
Race	
White, non-Hispanic	Reference
Black, non-Hispanic	-2.70 (-13.01 to 7.61)
Hispanic, all races	4.04 (-4.89 to 12.96)
Asian, Pacific Island, other, non-Hispanic	2.96 (-3.60 to 9.53)
Missing race	-10.80 (-20.98 to -0.62) ^c
Sex	
Female sex	-9.45 (-13.26 to -5.64) ^b
Region	
New England	0.30 (-7.04 to 7.64)
Middle Atlantic	-1.64 (-5.97 to 2.68)
East North Central	2.27 (-2.56 to 7.09)
West North Central	5.71 (-4.78 to 16.19)
South Atlantic	Reference
East South Central	3.54 (-5.75 to 12.83)
West South Central	4.38 (-0.86 to 9.62)
Mountain	3.12 (-5.04 to 11.28)
Pacific	1.22 (-4.79 to 7.23)
Rural/town	-7.23 (-12.66 to -1.79) ^b
Board certified	12.52 (5.19 to 19.85) ^b
Foreign medical school graduate	0.62 (-4.21 to 5.44)
Full owner, sole proprietor	-1.86 (-6.93 to 3.21)
Part owner, partner	14.42 (8.81 to 20.02) ^b
Not an owner or partner	Reference
Employed by a medical school	-17.97 (-23.39 to -12.56) ^b
Percentage of revenue from managed care, 20 percentage point units	-0.12 (-1.55 to 1.31)
Intercept	53.19 (44.41 to 61.97) ^b

Abbreviation: CI, confidence interval.

^a The F test for the entire regression was significant ($P < .01$).

^b $P \leq .01$.

^c $P = .01$ to $.05$.

Table 4 ranks 41 specific specialties. The highest statistically significant coefficients indicate that the wages for physicians in neurologic surgery, radiation and medical oncology, dermatology, orthopedic surgery, and ophthalmology reported \$17 to \$50 more per hour than physicians in general surgery. The specialties with the lowest wages included internal medicine and pediatrics (combined), internal medicine, family medicine, general practice, other pediatric subspecialties, general practice, geriatric medicine, and clinical care internal medicine (-\$18 to -\$24).

A rank correlation coefficient was calculated that compared rankings before and after control variables were added to the regressions, that is, Table 2 vs Table 3 rankings of the 41 specialties. The coefficient was 0.98 ($P < .001$), suggesting few differences in rankings.

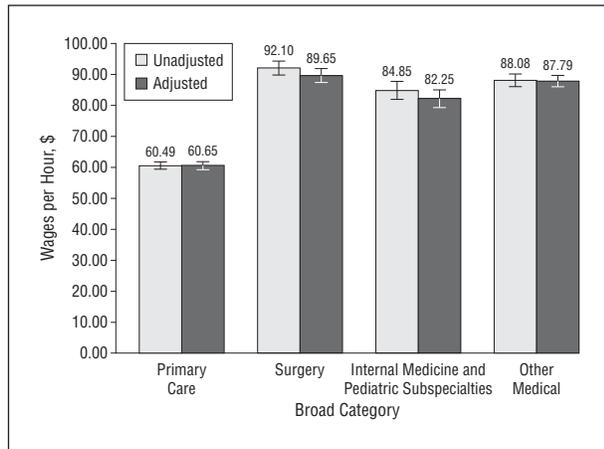


Figure. Wages for the 4 broad specialty categories before and after adjustment for control variables. Error bars represent 95% confidence intervals.

COMMENT

Considerable debate surrounds the disparity in pay among different physician specialties, particularly between primary care physicians and specialists.^{14,15,33,34} Annual income and resource-based relative value units have been used as indicators of physician remuneration; however, neither directly accounts for work hours and weeks worked. Thus, these wage rankings may provide a more complete picture than previously available of the value society currently places on physician specialties.

In the analyses of the 4 broad groups of specialties, and after adjusting for confounders, we found that the wages of physician specialists were approximately 36% to 48% higher than were those of primary care physicians. In the disaggregated adjusted analyses of 41 specialties, we found that specialties with statistically higher-than-average wages perform surgery (neurologic, orthopedic, or ophthalmologic), deploy sophisticated technologies (radiation oncology), or administer expensive drugs in office settings (oncology). Lower-paid specialties are largely nonprocedural (ie, cognitive) as they rely on talking to and examining patients. The major exception is critical care internal medicine.

This study's data and design can be compared with those of other studies. Until 2003, the American Medical Association published its annual *Physician Socioeconomic Statistics* bulletin, which contained information on income across specialties.²¹ Using these American Medical Association data from 1993-1998 for income, Dorsey et al¹⁹ found the following income ranking for some broadly defined specialties for which we have definitional matches: orthopedic surgery (\$323 000), urology (\$245 000), otolaryngology (\$242 000), general surgery (\$238 000), ophthalmology (\$225 000), obstetrics and gynecology (\$224 000), dermatology (\$221 000), emergency medicine (\$183 000), neurology (\$172 000), internal medicine (\$158 000), pediatrics (\$138 000), psychiatry (\$134 000), and family practice (\$132 000). For these same specialties, we found urology to be much lower and dermatology to be somewhat higher.

Table 4. Linear Regression Results for Specialties Adjusted for Covariates, With Wage as the Dependent Variable^a

Covariate	Regression Coefficient (95% CI)
Neurologic surgery	50.39 (14.69 to 86.08) ^b
Radiation oncology	42.65 (17.92 to 67.38) ^b
Medical oncology	31.66 (-4.69 to 68.01) ^c
Plastic surgery	29.26 (-2.72 to 61.25) ^c
Allergy and immunology	23.15 (-4.06 to 50.37) ^c
Thoracic surgery	22.70 (4.09 to 41.32) ^d
Dermatology	21.54 (5.95 to 37.12) ^b
Orthopedic surgery	20.42 (5.31 to 35.53) ^b
Ophthalmology	17.02 (1.69 to 32.35) ^d
Hematology and oncology	15.28 (-16.52 to 47.07)
Other surgical subspecialties	13.41 (-10.95 to 37.76)
Physical medicine and rehabilitation	11.18 (-22.15 to 44.51)
Neurology	8.73 (-12.60 to 30.07)
Gastroenterology	7.68 (-7.36 to 22.72)
Otolaryngology	7.17 (-13.49 to 27.83)
Cardiovascular diseases	6.37 (-8.60 to 21.34)
Emergency medicine	5.35 (-7.58 to 18.28)
Vascular surgery	3.37 (-19.31 to 26.06)
Obstetrics and gynecology	2.96 (-9.19 to 15.11)
Occupational medicine	2.23 (-11.38 to 15.84)
General surgery	Reference
Urology	-0.19 (-17.59 to 17.21)
Nephrology	-2.00 (-18.28 to 14.28)
Neonatal and perinatal medicine	-6.01 (-19.88 to 7.87)
Hospitalists	-7.14 (-20.50 to 6.23)
Rheumatology	-7.64 (-26.80 to 11.52)
Endocrinology	-7.82 (-26.19 to 10.55)
Psychiatry	-8.54 (-20.69 to 3.62)
Pulmonary critical care medicine	-8.89 (-35.22 to 17.44)
Child and adolescent psychiatry	-12.05 (-27.03 to 2.92)
Pediatric emergency medicine	-12.81 (-43.26 to 17.64)
Pediatrics	-12.96 (-26.96 to 1.05) ^c
Pulmonary diseases	-14.01 (-28.81 to 0.79) ^c
Critical care internal medicine	-18.14 (-33.81 to -2.47) ^{b,d}
Infectious diseases	-19.51 (-34.45 to -4.57) ^{b,d}
Geriatric medicine	-19.55 (-35.15 to -3.95) ^{b,d}
General practice	-21.94 (-38.89 to -4.99) ^{b,d}
Other pediatric subspecialties	-23.44 (-38.24 to -8.64) ^b
Family practice	-23.70 (-33.87 to -13.53) ^b
Internal medicine	-24.27 (-35.30 to -13.25) ^b
Internal medicine and pediatrics	-24.36 (-38.34 to -10.38) ^b

Abbreviation: CI, confidence interval.

^aThe *F* test for the entire regression was significant ($P < .01$). All the control variables in Table 3—age through revenue from managed care—are also included in this regression but are omitted from this table in the interest of brevity.

^b $P \leq .01$.

^c $P = .05$ to $.10$.

^d $P = .01$ to $.05$.

Bodenheimer et al¹ used data from the Medical Group Management Association to rank numerous specialties, a broadly defined primary care group (family practice, internal medicine, and pediatrics), and a specialties group (14 specialties, including obstetrics/gynecology). In 2004, the specialties group income was 83.5% higher than the primary care group income.

The Bureau of Labor Statistics (BLS) used large data sets to estimate income for a handful of specialties.²³ The BLS ranking for 2005 was general surgery (\$282 504), obstetrics/gynecology (\$247 348), psychiatry (\$180 000), internal medicine (\$166 420), pediatrics (\$161 331), and

family practice (\$156 010). The present ranking is similar but places obstetrics/gynecology ahead of the others on this short BLS list.

The present findings are broadly consistent with those of these previous studies and surveys. However, each of these studies and surveys has limitations. The most recent American Medical Association data are from 2001.²¹ The Dorsey et al¹⁹ data are from the 1990s. Medical school salaries (from the Medical Group Management Association) are unlikely to represent most physicians not employed in medical schools. The BLS produces estimates only for a handful of specialties. Physician salary surveys that do not contain a larger scientific purpose may not be representative of the nation.¹⁸ In addition, few studies and rankings adjust for more than a few of the covariates that are well-known predictors of income, such as age and sex; most do not control for any covariates. Most important, we are not aware of any studies that directly account for work hours and annual weeks of work that simultaneously rank more than 10 specialties.

The low relative remuneration of generalist physicians has been observed in several previous studies^{1,16-20} ranking specialties by annual income, each of which used data from different sources. Although the relative positions among specialties were similar in the present ranking to those in rankings based on annual income, the magnitude of the differences between generalist and other specialties was somewhat smaller in the present study. In addition, the wage (earnings-per-hour) analyses resulted in a substantially lower remuneration ranking for general internal medicine than have previous annual income-focused analyses. Given the central role of general internists in caring for the growing population of older patients with complex chronic illnesses,^{7,35} these findings may be a harbinger of future problems in caring for America's aged. These findings underscore the importance of accounting for hours worked in considering the relative valuation of physician specialties by society.

Some might interpret these findings as reflecting labor markets responding to supply and demand. However, market forces are constrained in the regulated physician environment.³⁶ In addition, experts have projected substantial shortfalls in numbers of primary care physicians in the near future,⁸⁻¹² a potential threat to the health of the American public.^{3,6} Furthermore, earlier research⁸⁻¹² has repeatedly demonstrated that perceived remuneration is a significant predictor of medical student specialty choice. In this context, the present findings suggest that legislators, health insurance administrators, medical group directors, health care plan managers and executives, residency directors, and health policymakers should consider taking action to increase incomes or reduce work hours for specialties near the bottom of the wage ranking list, particularly generalist specialties.

Regarding findings of interest for control variables, we found that the previously documented sex gap in physician remuneration persists.^{20,37} On the other hand, the lack of significant associations between race and physician wages in the present analyses was encouraging, suggesting that medicine may be achieving wage parity for minorities.³⁸

The present study has some possible limitations. A significant limitation is that the CTS excluded radiologists, anesthesiologists, and pathologists, and the results, thereby, compress the gap between generalists and subspecialists. In addition, the data are self-reported. However, almost all large, nationally representative data sets rely on self-reported income and hours. The data are cross-sectional, precluding confident assertions regarding causal relations. We considered using the longitudinal nature of the CTS but ultimately rejected that strategy, realizing that too few physicians would change specialties to meet the requirement of a minimum of 20 physicians per specialty. Moreover, only 29% of the sample is available for all 3 earlier rounds of data collection. Other concerns are that survey response rates may differ across specialties and that the overall response rate is 53%. However, CTS administrators believe that these data are representative of physicians in the nation,²⁹ and similar rankings based on career satisfaction with many specialties have been published.²⁴

The work hours variable is limited; it captured only total hours per week, not variability across day, swing, or night shifts or for weekends or weekdays; neither did we allow hours on call to be included in work hours. In addition, we could adjust only for hours worked and not for intensity of work (which has numerous components, including patients seen per hour). Moreover, the hours variable included administrative tasks and professional duties. Future researchers may want to limit hours to direct patient care only, but we believe that all medically related activities are relevant. Although the CTS codebook was not explicit, we assumed that "professional duties" included teaching and research.

A few specialties in the sample had few incumbents, including pediatric emergency medicine (n=29), thoracic surgery (n=20), critical care internal medicine (n=23), hematology and oncology (n=21), and neurologic surgery (n=22). Caution should be exercised when interpreting the results of these specialties.

Despite these possible limitations, note that previous researchers^{20,24,30} have found these data to be reliable. In addition, the present specialty rankings are broadly consistent with those in studies of physician income, and the results on many covariates (age, sex, and rural/town) are also consistent with those of other studies inside and outside of medicine.^{20,24,28}

Finally, the question of whether obstetrics/gynecology should be regarded as primary care is controversial. In the primary analysis, we excluded obstetrics/gynecology from the broad category of primary care. However, in sensitivity analyses, we found that moving obstetrics/gynecology to primary care modestly increased the unadjusted disparity between primary care and general surgery and marginally decreased the unadjusted disparity between primary care and the other 2 broad categories. More important, however, we agree with Rosenblatt et al³⁹ and Fink et al⁴⁰ that obstetrics/gynecology does not represent the full spectrum of primary care.

In conclusion, we found that wages varied substantially across physician specialties. The wage rankings were largely impervious to adjustment for control variables,

including age, sex, race, and region. By accounting for differences in number of work hours and number of weeks worked per year, these findings provide a more complete picture of disparities in remuneration in various physician specialties than has previously been available. As such, they will help inform the contentious health and payment reform debate and will also offer much needed guidance to medical students, medical school and residency program faculty, practicing physicians, health plan administrators, and health policymakers, among others.

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