HEALTH CARE REFORM

Trends in Physician Referrals in the United States, 1999-2009

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Background: Physician referrals play a central role in ambulatory care in the United States; however, little is known about national trends in physician referrals over time. The objective of this study was to assess changes in the annual rate of referrals to other physicians from physician office visits in the United States from 1999 to 2009.

Methods: We analyzed nationally representative cross-sections of ambulatory patient visits in the United States, using a sample of 845 243 visits from the National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey from 1993 to 2009, focusing on the decade from 1999 to 2009. The main outcome measures were survey-weighted estimates of the total number and percentage of visits resulting in a referral to another physician across several patient and physician characteristics.

Results: From 1999 to 2009, the probability that an ambulatory visit to a physician resulted in a referral to another physician increased from 4.8% to 9.3% ($P<.001$), a 94% increase. The absolute number of visits resulting in a physician referral increased 159% nationally during this time, from 41 million to 105 million. This trend was consistent across all subgroups examined, except for slower growth among physicians with ownership stakes in their practice ($P=.02$) or those with the majority of income from managed care contracts ($P=.007$). Changes in referral rates varied according to the principal symptoms accounting for patients' visits, with significant increases noted for visits to primary care physicians from patients with cardiovascular, gastrointestinal, orthopedic, dermatologic, and ear/nose/throat symptoms.

Conclusions: The percentage and absolute number of ambulatory visits resulting in a referral in the United States grew substantially from 1999 to 2009. More research is necessary to understand the contribution of rising referral rates to costs of care.

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THE DECISION OF WHETHER to refer a patient to another physician is an important determinant of health care quality and spending.[1-5] Patients who are referred to specialists tend to incur greater health care spending compared with those who remain within primary care, even after adjusting for health status.[5] Although appropriate specialist referrals improve

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quality, overuse of referrals could increase use of health care services without benefit.[4] Referrals and the associated coordination of care for referred patients are also important components of primary care.[6]

Despite the central role of referrals in health care systems, relatively little research has examined the epidemiologic characteristics of physician referrals nationally. The existing literature[7-10] (comprehensively reviewed by Mehrotra et al[10]) suggests that referral rates across physicians vary substantially. Although clear benchmarks are lacking, it is likely that both overuse and underuse are prevalent.[10] National trends of physician referral rates in the United States have not been characterized since the late 1990s.[11] Given the importance of physician referrals and changes in medical practice and knowledge during the ensuing period, it is important to understand how referral patterns have changed nationally since that time. In addition, with the adoption of budgeted payment arrangements as envisioned with accountable care organizations, referrals will likely become a more important focus of both policymakers and managers in their attempts to control health care spending and maintain referrals within organizations.

In this study, we examined ambulatory physician referrals from 1993 to 2009 with a focus on the 10-year period from 1999 to 2009, using representative data from the National Ambulatory Medical Care Survey

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Table 1. Number of Ambulatory Visits, Referrals, and Referral Rates in the United States by Patient and Practice Characteristics, 1999-2009

Characteristic	Mean (SE)						*P* Value[a]
	Ambulatory Visits, Millions		Ambulatory Visits Resulting in Referral, %		Ambulatory Visits Resulting in Referral, Millions		
	1999	2009	1999	2009	1999	2009	
All	841 (65.6)	1130 (94.7)	4.8 (0.3)	9.3 (0.5)	40.6 (3.8)	105 (10.1)	<.001
Age, y							
0-3	52.1 (5.4)	69.4 (8.1)	3.7 (0.8)	4.9 (0.7)	1.95 (0.5)	3.42 (0.6)	.12
>3-18	105 (9.6)	137 (12.9)	4.7 (0.5)	7.6 (0.8)	4.93 (0.7)	10.5 (1.5)	<.001
>18-45	257 (22.0)	287 (25.1)	5.0 (0.4)	10.0 (0.7)	12.9 (1.4)	28.7 (3.3)	<.001
>45-65	223 (18.2)	345 (31.1)	5.4 (0.5)	9.8 (0.6)	12.1 (1.5)	33.7 (3.5)	<.001
>65	205 (16.7)	295 (25.6)	4.3 (0.5)	9.9 (0.7)	8.79 (1.2)	29.1 (3.2)	.004
Sex							
Male	497 (40.1)	669 (55.3)	4.6 (0.2)	9.3 (0.5)	22.6 (2.3)	62.2 (6.0)	<.001
Female	345 (26.3)	465 (40.1)	5.2 (0.4)	9.3 (0.5)	18.0 (1.8)	43.1 (4.4)	<.001
Race							
White	718 (57.8)	947 (80.7)	4.9 (0.3)	9.0 (0.5)	35.3 (3.5)	85.3 (8.3)	<.001
Black	91.8 (10.2)	135 (17.4)	4.6 (0.6)	11.2 (1.0)	4.22 (0.6)	15.1 (2.4)	.01
Other	31.3 (7.2)	51.7 (6.4)	3.5 (0.8)	9.4 (1.2)	1.11 (0.2)	4.88 (0.8)	.11
Insurance type							
Private	451 (37.9)	594 (50.1)	4.9 (0.3)	9.0 (0.6)	22.1 (2.4)	53.1 (5.1)	<.001
Medicare	169 (15.2)	281 (25.8)	4.2 (0.4)	9.7 (0.7)	7.02 (0.9)	27.3 (3.3)	.003
Medicaid	76.7 (8.9)	144 (15.7)	5.0 (0.5)	9.2 (1.0)	3.80 (0.6)	13.3 (1.9)	<.001
Other/uninsured	145 (12.5)	116 (12.0)	5.3 (0.7)	1.0 (1.0)	7.72 (1.3)	11.5 (1.8)	.01
Region							
Northeast	193 (28.8)	196 (38.5)	4.5 (0.6)	9.5 (1.3)	8.70 (1.7)	18.6 (4.1)	.13
Midwest	177 (27.8)	259 (40.1)	5.1 (0.6)	10.0 (0.8)	9.04 (1.7)	25.8 (4.4)	.001
South	278 (42.4)	449 (65.8)	4.6 (0.4)	8.9 (0.7)	12.9 (2.4)	40.1 (7.1)	.02
West	193 (30.1)	230 (39.3)	5.2 (0.6)	9.1 (1.1)	9.97 (1.8)	20.9 (4.1)	<.001
Practice setting							
Office based	757 (59.5)	1040 (87.7)	4.4 (0.3)	8.6 (0.5)	33.0 (3.4)	89.4 (8.8)	.001
Outpatient department	84.6 (9.7)	96.1 (12.1)	9.0 (1.0)	16.6 (1.8)	7.61 (1.0)	16.0 (2.6)	.002

[a] *P* values were calculated using logistic regression for trend from 1999 to 2009 in each subgroup.

(NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS).[12,13] We also examined referral rates for specific subgroups of patients and physicians, including an analysis of referrals from primary care physicians (PCPs) and specialists according to the category of patients' primary reason for the visit.

METHODS

DATA SOURCES

We used data from the NAMCS and the outpatient department portion of the NHAMCS from 1993 to 2009. We included all years that recorded referral to another physician from an ambulatory visit and that contained survey design variables to account for their multistage sampling design, which included 1999-2009 for both surveys plus 1993-1994 for NAMCS and 1993-1996 for NHAMCS. We focused on the period of continuous data from 1999 to 2009. Taken together, NAMCS and NHAMCS are representative of outpatient physician visits nationally. Documentation of survey methods are available at the National Center for Health Statistics (NCHS) Web site.[14] The Harvard Medical School Committee on Human Studies determined that this study was exempt from review.

DATA COLLECTION PROCEDURES

Both NAMCS and NHAMCS use a multistage probability sample design to obtain nationally representative samples of ambulatory patient visits in the United States.[15,16] In the first stage of sampling, 112 primary sampling units were selected among those used in the National Health Interview Survey. For the second stage, physician practices or hospitals were chosen within these primary sampling units. Finally, physicians or clinics sampled a subset of visits in their practices during a predefined period. In NAMCS, individual physicians sampled a percentage of visits during a 1-week period; in NHAMCS, outpatient clinics sampled visits during a 4-week period.

This design enables calculation of national-level estimates and associated standard errors using survey weights provided by the NCHS. From 1993 to 2009, the physician response rate for NAMCS ranged from 58.9% to 73.0%, and the clinic response rate to NHAMCS ranged from 72.5% to 95.0%. The number of visits sampled annually ranged from 20 760 to 35 586 for a total of 845 243 between 1993 and 2009 (excluding 1995-1998 for NAMCS and 1997-1998 for NHAMCS).

DATA COLLECTION INSTRUMENTS

Data for each visit were collected using a standardized form completed during each visit. Variables included patient demographic information (age, sex, insurance type, and race), as well as clinical details, such as the patient's reason for the visit, physician diagnosis, and visit disposition. The primary outcome in this study was any visit disposition of a referral to another physician. This measure was shown in one study[12] to correlate with independent observation of physician visits with high specificity and moderate sensitivity and thus most likely underestimates the number of referrals. We also defined a *self-referral*

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as any visit to a provider that was marked as being *not referred* (which is distinct from referral as the *outcome* of a visit) and was also a new patient visit. Item-level nonresponse was generally less than 5% across all survey items.

STATISTICAL ANALYSES

We analyzed referral rates by patient characteristics, physician characteristics, and visit setting. Variables analyzed included age (0-3, >3-18, >18-45, >45-65, and >65 years), sex, race (white, black, and other by patient report), insurance (private, Medicare, Medicaid, and other/uninsured [included worker's compensation, self-pay, charity, other, and unknown insurance]), and US region (Northeast, Midwest, South, and West). In 2005, the survey item for patient insurance type changed from a "mark one" form of payment to "mark all that apply," potentially affecting any analysis of trends that rely on patient insurance type during this period. In addition, in the NHAMCS data, the referral disposition survey item (our main outcome) changed from "referred to other physician/clinic" to "referred to other physician" in 2001. Physician characteristics included whether physicians practiced in a solo setting, owned their practice in part or in full, made consults with patients by e-mail or telephone (first collected in 2001), had any form of electronic medical record, and received more than 50% of their income from managed care contracts or Medicaid (first collected in 2003).

To analyze referral rates by physician specialty, we restricted our analyses to survey data from NAMCS because physician specialty is not available in NHAMCS. We grouped specialties into 2 broad categories: *primary care*, which included physicians in general and family practice, internal medicine, and pediatrics without subspecialty, and *specialist*, which included all other physicians (including obstetrics and gynecology, which is grouped as primary care in NAMCS).

To explore the possibility that changes in referral rates were disproportionately due to patients with particular diseases or symptoms, we examined how often PCPs or specialists referred patients with particular symptoms in the first 4 years (1999-2002) or final 4 years (2006-2009) of the continuous period covered in our sample, using the first listed, or most important, reason for visit given by patients. We limited these analyses to the 46.5% of visits for which the primary reason for visit involved a symptom (eg, chest pain, but not general medical examination or coronary atherosclerosis). Using the reason for visit coding system developed by the NCHS,[17] we categorized all coded symptoms into 12 organ-based categories (details in the eAppendix; http://www.archinternmed.com).

We calculated weighted numbers of visits, referral rates, and their standard errors, taking account of the multistage probability design as suggested by NCHS using the survey (version 3.22) package in the programming language R (version 2.11).[18,19] We used US Census data provided in the NAMCS documentation to calculate visits per 1000 persons. As NCHS recommends, we did not include estimates with a relative standard error (defined as the standard error divided by the estimate) of greater than or equal to 30% or sample sizes of 30 or fewer visits, as these values are considered unreliable by NCHS standards.

We tested for trends across time using survey-weighted logistic regression by estimating the *P* value of the coefficient for year as an explanatory variable for the outcome of physician referral disposition across the relevant subgroup. Trend tests were evaluated across the interval from 1999 to 2009. We evaluated for the difference between trends for physician characteristics using analysis of covariance, including an interaction term with year. We evaluated the difference in referral rates by symptom category across the 1999-2002 and 2006-2009 periods with a survey-weighted χ^2 test. All statistical tests were 2-tailed, with $P < .05$ considered significant.

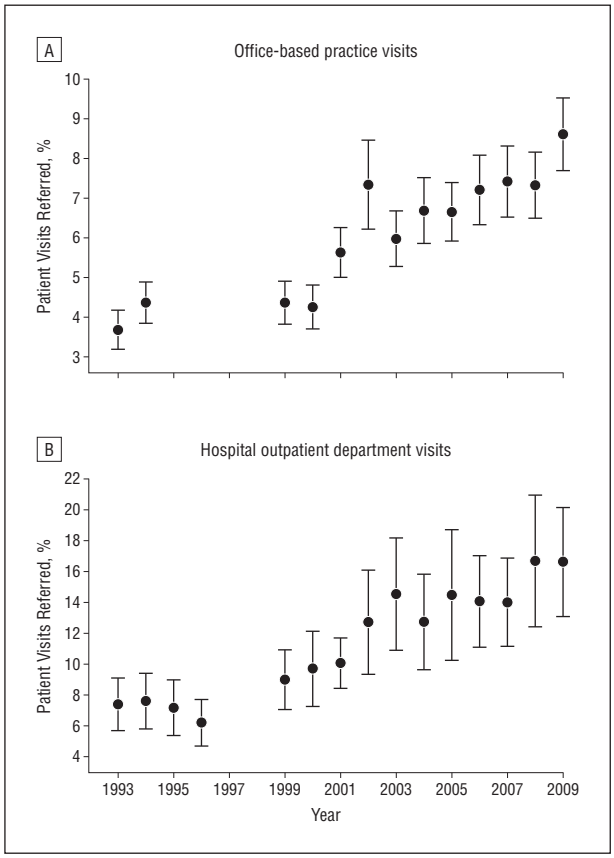

Figure 1. Referral rates in the United States, 1993-2009, by practice setting. A, Referral rates for physicians in office-based practices (National Ambulatory Medical Care Survey). Data on referral rates from 1995 to 1999 were not available. B, Referral rates for physicians in hospital outpatient department–based practices (National Hospital Ambulatory Medical Care Survey). Data on referral rates from 1997 to 1998 were not available. Limit lines indicate 95% CIs.

RESULTS

In the 10-year period from 1999 to 2009, the probability that a physician visit resulted in a referral to another physician (referral rate) increased from 4.8% to 9.3% ($P < .001$), a 94% increase (**Table 1**). In the same period, the total number of ambulatory visits in the United States increased from 841 million to 1130 million per year or 3040 to 3720 visits per 1000 persons annually. Combined with a national trend of increasing numbers of ambulatory visits, this led to a 159% increase in the national absolute number of visits resulting in a physician referral, from 41 million in 1999 to 105 million in 2009. Referral rates for Medicare patients more than doubled (from 4.2% to 9.7%; $P = .003$) and, combined with the increase in the number of visits annually, resulted in an increase of more than 350% in the number of visits resulting in a referral for Medicare beneficiaries.

The increase in referral rates was significant for both office-based physicians and outpatient department–based physician practices. In office-based physician practices, physician referral rates increased 97% from 1999 to 2009 (from 4.4% to 8.6%; $P = .004$; **Figure 1**A). Referral rates in outpatient department–based practices had an 84% increase from 9.0% to 16.6% ($P < .001$) despite

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Table 2. Number of Ambulatory Visits, Referrals, and Referral Rates in the United States by Physician Characteristics, 1999-2009

Characteristic	Mean (SE)						*P* Value for Time Trend[a]	*P* Value for Difference in Trends[b]
	Ambulatory Visits, Millions		Ambulatory Visits Resulting in Referral, %		Ambulatory Visits Resulting in Referral, Millions			
	1999	2009	1999	2009	1999	2009		
Solo practice								
No	494 (42.4)	701 (66.2)	4.9 (0.4)	9.4 (0.6)	24.1 (2.8)	65.7 (7.4)	<.001	.39
Yes	263 (25.7)	336 (33.3)	3.4 (0.4)	7.0 (0.5)	8.95 (1.6)	23.7 (2.9)	<.001	
MD full or part owner								
No	241 (24.5)	315 (34.5)	4.7 (0.5)	11.1 (0.9)	11.2 (1.7)	34.9 (4.8)	<.001	.02
Yes	516 (44.2)	723 (61.0)	4.2 (0.4)	7.5 (0.6)	21.8 (2.8)	54.5 (5.9)	<.001	
	2001[c]	2009	2001[c]	2009	2001[c]	2009		
E-mail patient consultations								
No	816 (66)	962 (83.1)	5.4 (0.3)	8.6 (0.5)	44.3 (4.2)	82.2 (8.4)	<.001	.76
Yes	64.7 (14.0)	76.0 (13.7)	8.2 (1.7)	9.4 (1.6)	5.32 (1.8)	7.16 (1.7)	.43	
Telephone patient consultations								
No	307 (27.9)	501 (48.1)	5.2 (0.5)	8.4 (0.7)	15.9 (2.2)	42.1 (5.3)	.008	.92
Yes	574 (53.1)	537 (54.7)	5.9 (0.5)	8.8 (0.6)	33.7 (3.8)	47.3 (5.6)	<.001	
	2003[c]	2009	2003[c]	2009	2003[c]	2009		
Electronic medical records								
No	758 (65.9)	690 (58.8)	6.0 (0.4)	8.4 (0.6)	45.3 (5.0)	58.3 (6.5)	.001	.70
Yes	148 (22.2)	348 (41.7)	6.0 (0.8)	8.9 (0.8)	8.90 (1.8)	31.1 (4.6)	.03	
>50% Income managed care								
No	608 (56.9)	650 (58.7)	5.5 (0.4)	8.7 (0.6)	33.4 (4.0)	56.6 (6.6)	<.001	.007
Yes	298 (32.7)	388 (41.1)	6.9 (0.6)	8.5 (0.7)	20.7 (3.2)	32.8 (4.4)	.54	
>50% Income Medicaid								
No	872 (72.5)	966 (82.1)	6.0 (0.4)	8.8 (0.5)	52.1 (5.4)	85.2 (8.5)	<.001	.36
Yes	33.7 (7.6)	72.3 (14.1)	6.2 (2.3)	5.8 (1.0)	2.09 (1.0)	4.17 (1.1)	.68	

[a] *P* values for time trend were calculated using logistic regression for trend from the earliest year available to 2009 in each subgroup.
[b] *P* values for difference in trends within each group were calculated using analysis of covariance.
[c] For the e-mail and telephone consultation characteristics, the earliest year available was 2001; for the electronic medical record, health maintenance organization, and Medicaid variables, 2003 was the earliest year.

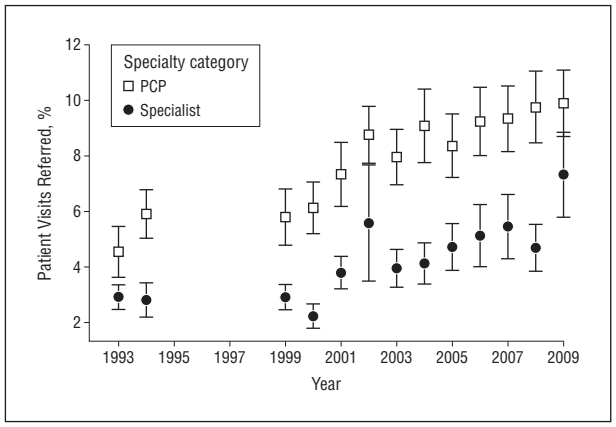

Figure 2. Referral rates in the United States for office-based physicians, 1993-2009, by specialty. Results are from the National Ambulatory Medical Care Survey data set (physician specialty data were not available in the National Hospital Ambulatory Medical Care Survey data set). Data on referral rates from 1995 to 1998 were not available. Limit lines indicate 95% CIs. PCP indicates primary care physician.

a baseline referral rate more than twice as high as that of office-based physicians (Figure 1B). During this period, patient self-referrals to physicians fell from 6.0% to 2.8% of all visits, or a decrease from 51 million to 31 million self-referred visits nationally from 1999 to 2009 ($P<.001$ for trend). In Figure 1, referral rates from 1993-1994 (NAMCS) and 1993-1996 (NHAMCS) are included for historical perspective.

Physicians with an ownership stake in their practice had a significantly smaller increase in referral rates than other physicians, growing only 79% (from 4.2% to 7.5%; $P<.001$) compared with a 136% increase for nonowner physicians (from 4.7% to 11.1%; $P<.001$), showing significantly different trends ($P=.02$, **Table 2**). Physicians who reported that more than 50% of their income came from managed care contracts also had lower growth in referral rates ($P=.007$ for trend difference, Table 2).

Both specialists and PCPs saw large changes in their referral rates from 1999 to 2009 (from 2.9% to 7.3% for specialists and from 5.8% to 9.9% for PCPs; $P<.001$ for both; **Figure 2**). This corresponds to an absolute change from 11 million to 38 million visits to specialists resulting in a referral vs 22 million to 51 million visits to PCPs resulting in a referral. Despite these increases, the proportion of all visits to specialists remained relatively stable, increasing from 49.9% in 1999 to 50.5% in 2009.

For PCPs, changes in referral rates varied according to the principal symptom accounting for a patient's visit. Significant increases occurred between the 1999-2002 and 2006-2009 intervals for visits with primary symptoms in the cardiovascular (from 8.5% to 14.9%; $P=.001$), dermatologic (from 10.1% to 15.4%; $P=.03$), ear/nose/throat (from

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Table 3. Referral Rates for Adult Visits to Primary Care Physicians by RFV Symptom, 1999-2002 vs 2006-2009[a]

Symptom Category	Visits Resulting in Referral, % (SE)			Top 3 Most Frequently Referred Symptoms (RFV Code)[c]
	1999-2002	2006-2009	*P* Value[b]	
Cardiovascular	8.5 (1.2)	14.9 (1.8)	.001	Chest pain (1050.1) Edema (1035.1) Abnormal pulsations and palpitations (1260.0)
Dermatologic	10.1 (1.2)	15.4 (1.3)	.03	Skin rash (1860.0) Skin lesion (1865.0) Other growths of skin (1855.0)
Ear/nose/throat	4.5 (0.6)	8.5 (0.8)	<.001	Earache pain (1355.1) Throat soreness (1455.1) Nasal congestion (1400.0)
General/viral	6.1 (1.0)	8.6 (1.2)	.12	Tiredness/exhaustion (1015.0) Head cold, URI (1445.0) General ill feeling (1025.0)
Gastrointestinal	12.3 (1.2)	17.7 (1.6)	.007	Abdominal pain, cramps, spasms NOS (1545.1) Stomach and abdominal pain, cramps (1545.0) Anal-rectal bleeding (1605.2)
Gynecologic/breast	21.7 (2.8)	17.5 (3.0)	.14	Lump or mass of breast (1805.0) Pain or soreness of breast (1800.0) Uterine and vaginal bleeding (1755.0)
Neurologic	9.6 (1.3)	13.7 (1.5)	.08	Headache pain in head (1210.0) Vertigo/dizziness (1225.0) Loss of feeling (anesthesia) (1220.1)
Ocular	18.5 (3.4)	21.0 (3.3)	.54	Diminished vision (1305.2) Other and unspecified eye symptoms (1335.0) Eye pain (1320.1)
Orthopedic	12.4 (0.9)	16.5 (1.0)	.003	Back pain, ache, soreness, discomfort (1905.1) Knee pain, ache, soreness, discomfort (1925.1) Shoulder pain, ache, soreness, discomfort (1940.1)
Psychiatric	8.4 (1.5)	11.1 (1.5)	.054	Depression (1110.0) Anxiety and nervousness (1100.0) Insomnia (1135.1)
Pulmonary	5.0 (0.9)	6.8 (0.9)	.36	Cough (1440.0) Shortness of breath (1415.0) Labored or difficult breathing (dyspnea) (1420.0)
Urologic	11.6 (2.0)	12.0 (1.5)	.78	Urinary tract infection NOS (1675.0) Blood in urine (hematuria) (1640.1) Frequency and urgency of urination (1645.0)

Abbreviations: NOS, not otherwise specified; RFV, reason for visit; URI, upper respiratory infection.

[a] Only visits from patients aged 18 years or older to primary care physicians are included. Results were determined from the National Ambulatory Medical Care Survey data set (physician specialty data not available in the National Hospital Ambulatory Medical Care Survey).

[b] *P* values were calculated with survey-weighted χ^2 test.

[c] Code used in the National Ambulatory Medical Care Survey RFV classification (see eAppendix).

4.5% to 8.5%; $P<.001$), gastrointestinal (from 12.3% to 17.7%; $P=.007$), and orthopedic (from 12.4% to 16.5%; $P=.003$) categories. In contrast, other kinds of visits to PCPs, such as general/viral, gynecologic/breast, and ocular, had modest, statistically nonsignificant changes during the period examined (**Table 3**). Specialist physicians had a significant increase in referral rate for 3 symptom categories in common with PCPs (ear/nose/throat [from 3.8% to 7.4%; $P=.01$], gastrointestinal [from 3.8% to 10.6%; $P<.001$], and orthopedic [from 4.6% to 8.8%; $P<.001$]) in addition to an increase in 2 categories not shared with PCPs (gynecologic/breast [from 3.7% to 5.8%; $P=.04$] and psychiatric [from 1.9% to 3.5%; $P=.005$]) (**Table 4**).

COMMENT

In this study, we found a marked increase in referral rates nationally from 1999 to 2009, with the absolute number of ambulatory visits resulting in a referral more than doubling during this period. These trends are consistent across primary care and specialist physicians as well as office-based and outpatient department–based physicians. The increase in referral rates does not appear to be predominantly driven by a particular patient demographic creating more demand for referrals. This evolution in care patterns may be playing a role in the rising trajectory of health care spending in the United States because referrals to specialists may lead to increased use of higher-cost services.

One potentially contradictory finding is that, despite the marked increase in the referral rate, the proportion of all ambulatory visits to specialists has remained stable at approximately 50%. This can be explained in a few ways: first, because specialists refer to PCPs,[20] referrals do not always imply a new specialist visit; second, self-referral rates decreased by about 19 million, which could explain up

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Table 4. Referral Rates for Adult Visits to Specialists by RFV Symptom, 1999-2002 vs 2006-2009[a]

Symptom Category	Visits Resulting in Referral, Mean (SE), %			Top 3 Most Frequently Referred Symptoms (RFV Code)[c]
	1999-2002	2006-2009	*P* Value[b]	
Cardiovascular	7.4 (1.4)	8.2 (1.6)	.51	Chest pain (1050.1) Chest discomfort/pressure/tightness (1050.2) Abnormal pulsations and palpitations (1260.0)
Dermatologic	2.3 (0.3)	2.4 (0.4)	.84	Skin lesion (1865.0) Skin rash (1860.0) Other growths of skin (1855.0)
Ear/nose/throat	3.8 (0.7)	7.4 (1.7)	.01	Earache pain (1355.1) Diminished hearing (1345.1) Nasal congestion (1400.0)
General/viral	7.9 (1.6)	8.4 (2.1)	.74	Tiredness/exhaustion (1015.0) General weakness (1020.0) General ill feeling (1025.0)
Gastrointestinal	3.8 (0.7)	10.6 (2.1)	<.001	Abdominal pain, cramps, spasms NOS (1545.1) Lower abdominal pain, cramps, spasms (1545.2) Upper abdominal pain, cramps, spasms (1545.3)
Gynecologic/breast	3.7 (0.6)	5.8 (0.8)	.04	Lump or mass of breast (1805.0) Pelvic pain (1775.1) Pain or soreness of breast (1800.0)
Neurologic	6.3 (0.8)	8.4 (0.8)	.08	Headache pain in head (1210.0) Vertigo/dizziness (1225.0) Loss of feeling (anesthesia) (1220.1)
Ocular	4.7 (0.8)	5.4 (0.8)	.52	Diminished vision (1305.2) Extraneous vision (1305.3) Eye pain (1320.1)
Orthopedic	4.6 (0.5)	8.8 (0.8)	<.001	Back pain, ache, soreness, discomfort (1905.1) Low back pain, ache, soreness, discomfort (1910.1) Neck pain, ache, soreness, discomfort (1900.1)
Psychiatric	1.9 (0.4)	3.5 (0.6)	.005	Depression (1110.0) Anxiety and nervousness (1100.0) Other symptoms/problems related to psychological disorders (1165.0)
Pulmonary	5.7 (1.3)	7.3 (1.6)	.61	Shortness of breath (1415.0) Cough (1440.0) Labored or difficult breathing (dyspnea) (1420.0)
Urologic	3.1 (0.6)	4.6 (1.0)	.12	Involuntary urination/cannot hold urination (1655.1) Blood in urine (hematuria) (1640.1) Frequency and urgency of urination (1645.0)

Abbreviations: NOS, not otherwise specified; RFV, reason for visit; URI, upper respiratory infection.

[a] Only visits from patients aged 18 years or older to specialist physicians are included. Results were determined from the National Ambulatory Medical Care Survey data set (physician specialty data not available in the National Hospital Ambulatory Medical Care Survey).

[b] *P* values calculated with survey-weighted χ^2 test.

[c] Code used in the National Ambulatory Medical Care Survey RFV classification.

to 30% of the total increase in referral rate; and last, the number of ambulatory visits per 1000 persons in the United States increased markedly in the 1999-2009 interval. Therefore, a possible consequence of increasing referral rates is a greater number of ambulatory visits for the average person, both in the primary care and specialist settings. Another contributing factor is that only about half of referrals result in a completed appointment.[21,22]

There are several explanations for the increase in rates of referrals. One possibility is that care is becoming increasingly complex, thereby requiring ever more care by specialized physicians.[23,24] We find some evidence to support this hypothesis in Table 3, which shows that PCPs became more likely to refer patients with certain chief concerns but not others across the interval from 1999-2002 to 2006-2009. For instance, we observed significant changes for patients with cardiovascular or dermatologic symptoms but not in areas that are more comfortably within the scope of primary care, such as general/viral symptoms. Specialist physicians saw no significant change in referral rates in these areas. Likewise, chief concerns outside the traditional spectrum of primary care, such as ocular or gynecologic/breast symptoms, had a consistently high likelihood of referral from PCPs but had no significant change in referral rate. This suggests that some areas, such as cardiovascular and ear/nose/throat symptoms, may be increasingly outside the expertise or clinical portfolio of PCPs to manage alone. Other areas, such as gastrointestinal and orthopedic symptoms, had consistently increasing referral rates for PCPs and specialists, which may reflect increasing influence of those specialties in health care markets.

A related hypothesis is that physicians are increasingly faced with more to do during the typical visit despite no meaningful change in appointment duration in 2 decades.[25] Patients require more medications and more

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frequently have 1 or more chronic medical conditions.[26] Moreover, screening and preventive recommendations have grown dramatically during this period. As a result, although visit time has remained stable, physicians, and in particular PCPs, may not have enough time to address each patient issue, resulting in increased rates of referrals. Finally, increasing numbers of specialists and availability of specialist physicians may influence referral rates.[27] This may help explain why hospital-based physicians in closer proximity to specialists in the hospital setting have referral rates close to double those of office-based physicians.

We also found that physicians who had an ownership stake in their practice had lower increases in referral rates compared with their nonowner colleagues, which might reflect a financial incentive for these physicians to keep patients' care within their practice. Supporting the potential influence of economic incentives on referral rates, physicians with more than 50% of their income from managed care contracts also had slower growth in referral rates. Another notable result is that patients in the 3- to 18-year-old age group had a higher referral rate in 1999 compared with those older than 65 years, although this difference disappeared by 2009. Patients older than 65 had a lower referral rate than did younger adults in 1999 and 2009, which may reflect that the former group had generally already developed relationships with providers at an earlier age for their chronic illnesses.

It is unclear whether the trends that we observed reflect a change in the appropriateness of referrals. This is the result, in part, of the fact that little guidance exists on how to optimally define the appropriate use of referrals. A recent review[10] of the literature concluded that appropriateness of referrals has yet to be studied effectively. The complexity of referral appropriateness is compounded by the multiple roles that specialists can play in the care of a patient, ranging from consultative to procedural to comanaging a complex condition.[6]

This study is subject to several limitations. First, we relied on the accuracy of reporting in the NAMCS and NHAMCS instruments to measure referrals, which has been shown in one study[12] to have high specificity but only moderate sensitivity. The survey question for this field also changed in 2001 for NHAMCS, from "referred to physician/clinic" to "referred to physician." We would expect this wording change to narrow the potential range of reasons to check this category and bias our findings toward the null. Thus, the referral rates in this study are, if anything, likely underestimating national rates. Second, we had no information on why a referral was made or to whom it was made. This is particularly relevant for the results in Tables 3 and 4, where we relied on the assumption of a relationship between a patient's primary reason for visit and the reason for referral. We believe that, on average, it is clinically reasonable to assume that a referral has a high likelihood of relating to the primary reason that brought a patient to visit the physician, but this may not always be the case. Another limitation of this study is that the response rate to NAMCS has fluctuated, with a gradual decline between 1999 and 2009. We believe that this is not likely to explain much of the change seen, especially given that the response rate for NHAMCS has been stable from 1999 to 2009. There is also a possibility that our findings were affected by the changing demographic characteristics of the population. Data from the Medical Expenditure Panel Survey from 1999 to 2008, however, show that the demographic composition by insurance status and income of Americans reporting that they had 1 or more office visits to a physician in the past year were stable (authors' analysis, data from http://www.meps.ahrq.gov/). Finally, we relied on the accuracy of the sampling strategy of NAMCS and NHAMCS to produce nationally representative estimates.

In conclusion, we found that referrals in the United States from PCPs to specialists grew rapidly from 1999 to 2009, with potential implications for health care spending. As federal and state policymakers consider policies for reforming the health care system, developing methods to measure referral appropriateness and using these to promote appropriate referrals may be an important strategy for controlling growth in health care spending.

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Yellow-crowned night heron—Galapagos Islands.

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