

# The Pediatric Primary-Specialty Care Interface

## How Pediatricians Refer Children and Adolescents to Specialty Care

Christopher B. Forrest, MD, PhD; Gordon B. Glade, MD; Alison E. Baker, MS; Alison B. Bocian, MS; Myungsa Kang, MHS; Barbara Starfield, MD, MPH

**Objective:** To describe how pediatricians refer patients to specialists, including frequency of referral decisions, reasons for referral, and types of referrals.

**Design:** We conducted a prospective study of visits (N = 58 771) made to 142 pediatricians in a national primary care practice-based research network. During 20 consecutive practice days, physicians and parents completed questionnaires for referred patients, and office staff kept logs of all visits. Physicians used medical records to complete questionnaires 3 months after referrals were made.

**Results:** Pediatricians referred patients to specialists during 2.3% of office visits. Referrals made during telephone conversations with parents accounted for 27.5% of all referrals. The most common reason for referral was advice on diagnosis or treatment (74.3%). Referrals were made most commonly to surgical subspecialists (52.3%),

followed by medical subspecialists (27.9%), nonphysicians (11.4%), and mental health practitioners (8.4%). Physicians requested a consultation or a referral with shared management in 75% of cases. Otitis media was the condition referred most often (9.2%). Fifty other conditions accounted for 84.3% of all referrals.

**Conclusions:** About 1 in 40 pediatric visits result in referral. Getting advice from a specialist is the most common reason for referral. Pediatricians desire a collaborative relationship with specialists for most of their referred patients. Physician training to increase clinical competence may be most useful for the 50 most commonly referred conditions. Education concerning the referral process should focus on the respective roles of the referring physician and specialist, particularly as they pertain to successful approaches for comanaging referred patients.

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**Editor's Note:** Read this and know why so many of us are so pro PROS. I do hope the authors will continue data analyses to include physician characteristics, practice type, patient characteristics, etc.

Catherine D. DeAngelis, MD

From the Department of Health Policy and Management, Johns Hopkins School of Public Health, Baltimore, Md (Drs Forrest and Starfield and Ms Kang); Pediatric Research in Office Settings, American Academy of Pediatrics, Elk Grove Village, Ill (Dr Glade and Mss Baker and Bocian); and the Department of Pediatrics, University of Utah School of Medicine, Salt Lake City (Dr Glade).

**M**OST PEOPLE who perceive a health need will receive services in primary care settings, and a small minority will be referred to other medical resources for consultation.<sup>1</sup> This organization of the health care system has come under intense scrutiny because of cost-containment pressures that restrict entry into specialty care. Utilization review, referral authorization procedures, and referral guidelines are making visible the once transparent boundaries of primary and specialty care.

Substantial variations in practice patterns have been demonstrated for pediatric hospitalization rates<sup>2</sup> and invasive procedures.<sup>3</sup> In the United States, indi-

vidual physicians refer at rates that vary in magnitude from 2-fold to 5-fold.<sup>4-6</sup> This variability has raised concerns about the effects of physician decision making on the costs, quality, and outcomes of care.<sup>7,8</sup>

Primary care physicians refer patients to specialists for advice on diagnostic or therapeutic dilemmas, to obtain a specialized skill outside their range of expertise, or because of patient or third-party request. Among the most common specific reasons for referral cited in the literature are advice on diagnosis or treatment for a health problem, surgery, ongoing medical treatment, a nonsurgical technical procedure, and patient request.<sup>9-20</sup> More information is needed on why physicians refer children and adolescents, whose patterns of morbidity and health care needs are qualitatively and quantitatively different from those of adults.<sup>21</sup>

Despite the heightened attention that managed health systems have brought to the nature and amount of specialist involvement in patient care, there is remarkably

## POPULATION AND METHODS

### PHYSICIAN STUDY POPULATION AND SETTING

This study was coordinated through Pediatric Research in Office Settings (PROS), a national, practice-based research network established by the American Academy of Pediatrics (AAP), Elk Grove Village, Ill. Physician recruitment was from April 1996 to March 1997. We advertised the study at semiannual meetings of the PROS network and in the PROS and AAP newsletters. We mailed physicians in the PROS network an overview of the study protocol, sample questionnaires, and a postcard questionnaire that asked them to indicate their willingness to participate. Physicians not responding to our mailed inquiries were contacted directly by their regional AAP chapter coordinator and, in some cases, research team investigators.

Of the 715 physicians contacted, 163 agreed to participate, 153 declined, and 399 did not respond to our inquiries. The 142 physicians who completed data collection were distributed throughout 94 practices in 36 states. Pediatric residents were excluded from the physician sample.

See the box on page 712 for a complete list of participating clinics by American Academy of Pediatrics Chapter.

### PROCEDURES AND PATIENT POPULATIONS

The AAP Institutional Review Board approved the study protocol. Study protocols and questionnaires were reviewed on 3 occasions by physicians at PROS semiannual national meetings. After each of the first 2 reviews, we conducted a pilot test at 5 practices. Materials and methods were revised to incorporate physician feedback after each review and pilot test. Data collection and patient enrollment ran continuously from July 1996 to September 1997.

Data were collected during regularly scheduled office hours over 20 consecutive practice days. A practice day could be either a full (1.0 practice day) or half (0.5 practice day) day of work. Referrals occurring during either office visits or telephone conversations with parents were included in the study. A referral was defined as a physician's decision that a patient should make a visit with a physician specialist or a nonphysician with a specialized skill. To be included in the study, the referral had to involve verbal communication between the physician and patient. We excluded staff administrative authorizations or renewals of

ongoing referrals that did not involve direct physician-patient verbal communication, referrals made to laboratory or radiographic facilities, emergency department referrals, patients sent directly to hospitals for inpatient admission, and "curbside" consultations in which the primary care physician obtained advice from a specialist but did not send the patient for a visit.

Practices collected detailed information about all office visits during the first 10 days of data collection. For each office visit, the following information was recorded: patient age (0, 1-4, 5-10, or 11+ years); sex; whether the principal diagnosis was otitis media, asthma, acne, fracture, or attention-deficit/hyperactivity disorder; and whether the patient was referred. To reduce the burden of the study on practices, only a tally of the number of patients seen each day was recorded during days 11 through 20 of data collection. A principal diagnosis could indicate a new or an ongoing health problem.

After referrals made during both office visits and telephone conversations with parents, physicians completed a 16-item questionnaire (response rate, 99%). Physicians were asked to indicate the type of specialist to whom they referred the patient, the health problem leading to the referral, specialist referred to, reasons for making the referral, number of prior visits to any clinician for management of the health problem, expectations for the specialist's involvement in patient management, and patient characteristics. The expectations for specialist involvement item was used to identify the type of referral: consultation (no transfer of responsibility for patient management to the specialist), referral with shared management (primary care physician and specialist comanage patient's health problem), or referral with transferred management (primary care physician transfers responsibility for management of the health problem to the specialist).

The third phase of the study occurred 3 months after the index referral visits. Physicians used the patient's medical record to complete an 11-item follow-up questionnaire (response rate, 85.3%). The physician follow-up questionnaire had items on whether the referral had been completed or was ongoing. Completed referrals were considered short-term and ongoing referrals long-term.

At the conclusion of the study, physicians received a feedback report that compared their patterns and rates of referral with those of the entire sample. Each practice was

little research on this topic. For example, under what circumstances do primary care physicians request a consultation, which involves no transfer of responsibility for patient management, or a referral for ongoing patient management? In the latter case, the referral may involve shared management of the patient's health problem or transfer of management to a specialist. Consultations and referrals can be associated with either short-term or long-term specialist involvement. How specialists interact with primary care physicians during a referral depends on both the degree to which they assume responsibility for patient management and the duration of their involvement. Patterns of consultation and referral have important implications for how the linkages between primary and specialty care are formed, sustained, and integrated.

To provide a better understanding of how primary care pediatricians refer children and adolescents to spe-

cialty care, we undertook a primary care practice-based research study in a national collaborative research network. The aims of this investigation were to quantify variability in referral rates among physicians, to analyze the reasons underpinning decisions to refer children and adolescents to specialists, to describe which specialists and health problems receive referrals, and to compare rates of referral of the study population with those obtained from a national probability sample of pediatricians.

## RESULTS

During 2457 practice days, physicians made 1854 referrals and had 58 771 office visits. Infants accounted for 21.5% of all office visits; children aged 1 to 4 years, 34.4%; 5 to 10 years, 25.4%; and 11+ years, 18.8%. Boys had pro-

given a \$100 stipend to defray costs associated with data collection.

### REFERRAL RATES

The unit of observation of this study was the physician-patient encounter. We calculated the percentage of office visits leading to referral as the main measure of physician referral rate. Telephone referrals were included in a second measure of the frequency of referrals: mean number of referrals made per practice day. We did not obtain information on the total number of physician-patient telephone encounters, and thus could not calculate the proportion of telephone calls leading to referral.

We adjusted the physician referral rate for age and sex using the direct method of adjustment.<sup>22</sup> The reference population for direct adjustment was the combined patient visit sample of all 142 physicians. Variation in referral rates was presented in 2 ways. To reduce the effect of outlier physicians, we examined variation using the ratio of referral rates for the physicians at the 80th percentile and the 20th percentile. In addition, we plotted the frequency distribution of unadjusted physician referral rates.

### REASONS FOR REFERRAL

We developed a list of reasons for referral based on reviews of the literature\* and focus groups with primary care physicians convened twice during PROS meetings. This list was refined based on results from the 2 pilot studies. The final list included 14 categories: advice on diagnosis, advice on treatment, non-surgical technical procedures, surgery, mental health counseling, patient/parent request, medical treatment, specialist request, insurance guidelines that require referral, insufficient time to manage problem in primary care setting, medicolegal reasons, failed conventional therapy, need for multidisciplinary care, and administrative renewal of ongoing referral.

To develop a parsimonious categorization of reasons for referral, we assigned each reason for referral to 1 of 3 categories: (1) advice (advice on diagnosis, advice on treatment, or medicolegal reasons), (2) to obtain a specialized skill (nonsurgical technical procedure, surgery, mental health counseling, medical treatment, failed conventional

\*References 7, 9, 10, 14, 15, 17, 18, 20, 23-26.

therapy, multidisciplinary care, or insufficient time), or (3) parent/third-party request (patient/parent requests, specialist request, or insurance guidelines).

### REFERRED HEALTH PROBLEMS

Physicians recorded in open-ended format the diagnosis leading to the referral. To code these diagnostic descriptions for specific conditions, we developed a set of pediatric diagnosis clusters. Our research team, which included experts in pediatric clinical care, modified and expanded previously developed diagnosis clusters.<sup>27</sup> A diagnosis cluster is a group of diagnosis codes that are clinically homogeneous. For example, all types of acute lower respiratory tract infections were grouped into a single diagnosis cluster. Diagnoses for health problems leading to a referral were assigned by a pediatric clinician (C.B.F.) to 1 of 145 pediatric diagnosis clusters. Furthermore, the diagnostic description for each referral diagnosis was reviewed by the same pediatric clinician (C.B.F.) and characterized as either a sign/symptom or a diagnosis.

### GENERALIZABILITY ANALYSIS

We compared referral rates of the study population with those of a nationally representative sample of office visits. The data source for the nationally representative sample of referrals was the National Ambulatory Medical Care Survey (NAMCS) of office-based patient care physicians in the United States. In the NAMCS, a multistage probability sample of nonfederally funded US physicians who are engaged in patient care activities (excluding radiologists, anesthesiologists, and pathologists) is selected from the master files of the American Medical Association, Chicago, Ill, and the American Osteopathic Association, Chicago. For 1 week, each physician completes a questionnaire for a 20% to 100% systematic sample of patient visits. Details of survey methods are presented elsewhere.<sup>28,29</sup> We pooled 6 years of data by combining the 1989 through 1994 surveys. Most items in the survey instruments remained unchanged throughout the surveys. Office visits to pediatricians were selected from the total NAMCS sample. We compared the overall age-specific, sex-specific, and diagnosis-specific referral rates between the study sample and the national sample. We used  $\chi^2$  analysis to detect statistically significant differences between the 2 groups.

portionately more office visits than girls (53.7% vs 46.3%). On average, pediatricians saw 23.9 patients per day (SD, 8.1; range, 10.1-54.9 patients per day) and made 13.0 referrals during 17.2 practice days. Referrals made during telephone conversations with parents accounted for 27.5% of all referrals. During a typical practice day, pediatricians referred 0.76 patients.

### REFERRAL RATES

The overall proportion of referrals made during office visits for pediatricians in this study did not significantly differ from the proportion calculated for visits to pediatricians in the NAMCS for years 1989 to 1994 combined (**Table 1**). We also compared age-specific, sex-specific, and diagnosis-specific office visit referral rates between the study population and pediatricians in the

NAMCS sample. Rates of referral were similar between the 2 groups, although pediatricians in the study population were significantly more likely to refer infants and less likely to refer patients with otitis media.

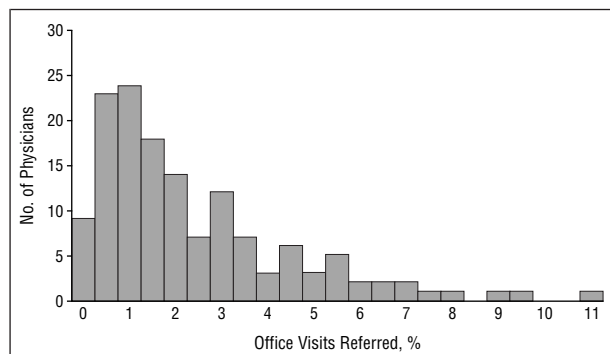
**Figure 1** shows the distribution of the 20-day referral rates for pediatricians in the study sample. Seventy-five percent of physicians had a referral rate less than or equal to 3.46% (range, 0-11.0%). There was a 4.1-fold variation, calculated by taking the rate at the 80th percentile divided by the rate at the 20th percentile. We compared variation in unadjusted referral rates with age- and sex-adjusted referral rates using data from the first 10 days of data collection only. For the unadjusted rates, there was 4.9-fold variation, whereas for age- and sex-adjusted rates, there was 4.4-fold variation, a 10% reduction attributable to the age and sex distribution of physicians' patient populations.

**Table 1. Referral Rates for Visits to Pediatricians in the Study Population and Visits to Pediatricians in the 1989 Through 1994 National Ambulatory Medical Care Surveys (NAMCS)**

Type of Referral Rate	Visits Referred, %		P†
	Study Population (29 012 Visits)*	NAMCS (16 525 Visits)	
Overall	2.29	2.39	.44
Age, y			
0	1.70	1.02	.004
1-4	2.26	2.19	...
5-10	3.12	2.86	...
≥11	4.52	4.39	...
Sex			
Male	3.07	2.64	...
Female	2.54	2.12	...
Principal diagnosis			
Otitis media	1.91	2.68	.04
Asthma	3.18	2.19	...
Fracture	22.84	29.09	...
Acne	6.82	6.38	...
Attention-deficit/hyperactivity disorder	2.98	2.27	...
Other	2.32	2.03	...

\*Visits are from days 1 through 10 of data collection, when detailed information on both referred and nonreferred visits was recorded.

†Ellipses indicate that the value was not statistically significant ( $\alpha > .05$ ).



**Figure 1.** Frequency distribution of physicians' referral rates over 20 days. The sample included 142 pediatricians in 94 practices distributed across 36 states.

## REASONS FOR REFERRAL

Physicians referred children and adolescents for a wide variety of reasons (**Table 2**). On average, physicians endorsed an average of 2.1 different reasons for making the referral. The most common single reason for referral was to get advice on treatment. Physicians indicated that advice on either treatment or diagnosis was at least 1 reason in 74.3% of cases. Referral for medicolegal reasons was uncommon, as was referral because of insufficient time to manage the patient's health problem. Physicians indicated that surgery was a consideration for 21.6% of referrals, and either surgery or a nonsurgical technical procedure was a reason for referral in 36.4% of cases.

Parents requested to see a specialist in 15.7% of referrals. Of these parent-requested referrals, physicians reported that 7.7% were made at the parent's request only, while 31.2%

**Table 2. Reasons for Referral\***

Reason for Referral	No. of Referrals (%) (N = 1854)
Advice	
Advice on treatment	1161 (62.6)
Advice on diagnosis	865 (46.7)
Medicolegal reasons	17 (0.9)
Specialized skill	
Surgery	402 (21.7)
Medical treatment	271 (14.6)
Nonsurgical technical procedure	280 (15.1)
Mental health counseling	125 (6.7)
Failed conventional therapy	145 (7.8)
Multidisciplinary care	140 (7.6)
Time constraints	15 (0.8)
Parent/third-party request	
Parent request	290 (15.6)
Insurance guidelines	66 (3.6)
Administrative renewal	64 (3.5)
Specialist request	37 (2.0)

\*Reasons for referral were not mutually exclusive. Physicians endorsed an average of 2.1 different reasons for making the referral.

were also for advice from the specialist, 33.2% for a specialized skill, and 27.9% for both advice and a specialized skill.

Most referrals (52.7%) were made for new health problems—defined as the patient not seeing any clinician for management of the health problem in the 3 months prior to the referral visit. The reasons for physician referral decisions depended on whether the health problem was new or ongoing. Referrals for advice on diagnosis (55.2% vs 44.8%,  $P = .045$ ) and mental health treatment (62.8% vs 37.2%,  $P = .02$ ) were more commonly made for new health problems than for ongoing problems. By contrast, referrals made for advice on treatment (52.1% vs 47.9%,  $P < .001$ ) and surgery (58.8% vs 41.2%,  $P < .001$ ) were more commonly made for ongoing health problems. Parents were equally likely to request a referral for new and ongoing problems.

## SUBSPECIALIST REFERRALS

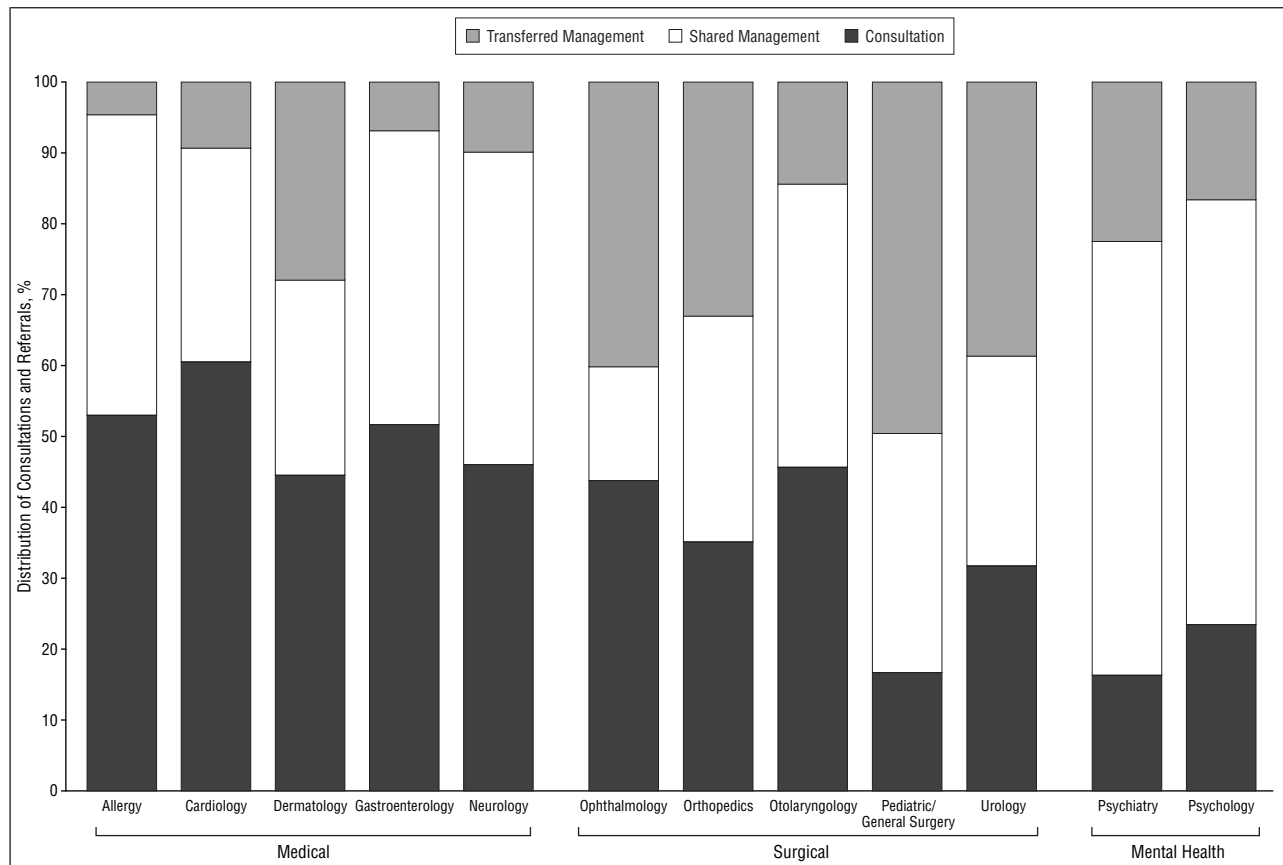
Referrals were most commonly made to surgical subspecialists (52.3%), followed by medical subspecialists (27.9%), nonphysicians (11.4%), and mental health practitioners (8.4%). The 5 most common surgical subspecialties were otolaryngology (30%), orthopedic surgery (27%), ophthalmology (19%), general/pediatric surgery (11%), and urology (7%). The 5 most common medical subspecialties were dermatology (35%), allergy (16%), cardiology (12%), neurology (11%), and gastroenterology (8%).

Mental health referrals were made predominantly to psychologists (61%), followed by psychiatrists (28%), social workers (6%), and developmental pediatricians (5%). The nonphysicians referred to most often were audiologists (26%), physical therapists (19%), optometrists (18%), speech therapists (12%), and podiatrists (10%).

## CONSULTATIONS VS REFERRALS

Overall, 40% of referrals were for consultation, 35% for referral with shared management, and 25% for referral





**Figure 2.** Distribution of consultations, referrals with shared management, and referrals with transferred management for selected medical subspecialties, surgical subspecialties, and mental health practitioners.

with transferred management. The distributions of consultations and referrals for selected medical subspecialists, surgical subspecialists, and mental health practitioners are shown in **Figure 2**. Most patients referred to allergists, cardiologists, and gastroenterologists were sent for a consultation. Among medical subspecialties, dermatologists stand out in the amount of referrals with transferred management. Large proportions of surgical subspecialty referrals were to treat health problems for which the primary care physician desired to transfer management. However, pediatricians requested consultations from otolaryngologists and ophthalmologists for more than 40% of patients referred. Most referrals to mental health specialists were for shared referral care.

Referrals with shared management led to long-term (>3 months) specialist involvement more commonly than either consultations or referrals with transferred management (70.8%, 57.6%, and 54.2%, respectively).

#### TYPE OF HEALTH PROBLEM REFERRED

Three health problems accounted for more than 50% of referrals for 23 of 24 specialties and more than 75% for 12 of 24 specialties (**Table 3**). Medical subspecialists were significantly more likely than surgeons to be referred a patient whose health problem was a sign or symptom rather than a diagnosis (35.3% vs 26.5%,  $P < .001$ ). Medical subspecialties with high proportions of re-

ferred health problems characterized as a sign or symptom were cardiologists (68.8%), gastroenterologists (65.0%), neurologists (40.7%), and orthopedic surgeons (38.2%). On the other hand, certain subspecialists received referrals for few patients with signs or symptoms, including allergists (11.1%), dermatologists (24.2%), otolaryngologists (17.2%), ophthalmologists (26.9%), and pediatric/general surgeons (20.4%).

Otitis media was substantially more common than any other condition referred to specialty care (**Table 4**). The 51 most common health problems referred to specialty care accounted for 84.3% of all referrals. Psychosocial and developmental conditions were among the most commonly referred health problems. Behavior problems ranked as the fifth most commonly referred condition, developmental delay as the eighth, depression as the 13th, speech disorder as the 16th, and attention-deficit/hyperactivity disorder as the 18th. Of the 51 most common conditions referred, 31 were sent to a single type of specialist for at least 75% of referrals. There were just 6 conditions—heart murmur, acne, congenital heart disease, noninfectious disorders of the eyelid or lacrimal duct, congenital hip disease, and seizures—with referrals to only 1 type of specialist.

#### COMMENT

This study provides a comprehensive picture of the primary-specialty care interface for children and adoles-

**Table 3. The 3 Most Common Health Problems Referred to Selected Specialties\***

Type of Specialist	Referred Health Problem	No. (Cumulative %)
<b>Medical Subspecialists</b>		
Allergist	Allergies	34 (42.0)
	Allergic rhinitis	24 (71.6)
	Asthma	10 (83.9)
Cardiologist	Heart murmur	30 (49.2)
	Congenital heart disease	13 (70.5)
	Cardiovascular signs/symptoms	7 (82.0)
Dermatologist	Benign skin lesions	67 (37.2)
	Viral warts/molluscum contagiosum	40 (59.4)
	Acne, disorders of sweat/sebaceous glands	20 (70.5)
Endocrinologist	Short stature	7 (35.0)
	Diabetes mellitus	6 (65.0)
	Thyroid disease	2 (75.0)
Gastroenterologist	Abdominal pain	12 (29.3)
	Rectal bleeding	10 (53.7)
	Constipation	5 (65.9)
Multidisciplinary team	Developmental delay	4 (33.3)
	Speech disorder	3 (58.3)
	Chromosomal abnormality	2 (75.0)
Nephrologist	Urologic signs/symptoms	5 (41.7)
	Hypertension	2 (58.4)
	Other renal conditions	2 (75.1)
Neurologist	Headaches	14 (23.7)
	Developmental delay	10 (40.6)
	Neurologic signs/symptoms	9 (55.9)
Pulmonologist	Acute lower respiratory infection	4 (25.0)
	Asthma	4 (50.0)
	Apnea syndromes	2 (62.5)
<b>Surgical Subspecialists</b>		
Obstetrics/gynecology	Menstrual disorders	4 (18.2)
	Ovarian cyst	4 (36.4)
	Abdominal pain	2 (45.5)
Ophthalmologist	Refractive errors	69 (37.1)
	Strabismus/amblyopia	45 (61.3)
	Ophthalmic signs/symptoms	20 (72.1)
Orthopedic surgeon	Orthopedic signs/symptoms	66 (25.0)
	Fractures, excluding digits/hips	49 (43.6)
	Joint disorders, trauma related	43 (59.9)

**Table 3. The 3 Most Common Health Problems Referred to Selected Specialties (cont)\***

Type of Specialist	Referred Health Problem	No. (Cumulative %)
Otolaryngologist	Otitis media	162 (56.6)
	Chronic pharyngitis/tonsillitis	35 (68.8)
	Other respiratory symptoms	17 (74.7)
Pediatric/general surgeon	External abdominal hernia/hydrocele	39 (37.9)
	Mass of unknown etiology	7 (44.7)
Plastic surgeon	Abdominal pain	6 (50.5)
	Benign skin lesions	9 (31.0)
	Lacerations	5 (48.2)
Urologist	Benign neoplasms	3 (58.5)
	Urologic signs/symptoms	24 (34.8)
	Undescended testes	10 (49.3)
	Vesicoureteral reflux	8 (60.9)
<b>Mental Health Specialists</b>		
Psychiatrist	Depression/anxiety/neuroses	22 (50.0)
	Behavioral problems	12 (77.3)
	Attention-deficit/hyperactivity disorder	4 (86.4)
Psychologist	Behavioral problems	38 (40.0)
	Attention-deficit/hyperactivity disorder	19 (60.0)
Social worker	Depression/anxiety/neuroses	17 (77.9)
	Behavioral problems	3 (30.0)
	Child abuse/neglect	2 (50.0)
	Depression/anxiety/neuroses	2 (70.0)
<b>Nonphysicians</b>		
Audiologist	Hearing loss	33 (60.0)
	Speech disorder	12 (81.8)
	Otitis media	6 (92.7)
Optometrist	Refractive errors	34 (89.5)
	Developmental delay	1 (92.1)
	Ophthalmic signs/symptoms	1 (94.7)
Physical therapist	Orthopedic signs/symptoms	11 (27.5)
	Developmental delay	6 (42.5)
	Joint disorders, trauma related	6 (67.5)
Podiatrist	Diseases of nail (excluding infections)	7 (31.8)
	Orthopedic signs/symptoms	7 (63.6)
	Acquired foot deformities	4 (81.8)
Speech therapist	Speech disorder	19 (76.0)
	Behavioral problems	2 (84.0)
	Developmental delay	2 (92.0)

\*Specialties with fewer than 10 referrals were excluded.

cents. It is, to our knowledge, the largest study ever conducted in the United States on pediatricians' referral patterns. Our results indicate that referral is an uncommon event during primary care office visits. Pediatricians manage 97% to 98% of all office visits without referral to specialists. Based on this study's estimates, a pediatrician who works 220 days a year will refer an average of 167 patients annually. More than 1 in 4 of those referrals will be made during telephone conversations with parents.

#### VARIATION IN REFERRAL RATE

We found that the probability of referral during an office visit increased with patient age. The age effect on referral rates may be a result of greater morbidity among older children and teens. An alternative explanation is

that because of greater primary care utilization among young children, the probability of referral during any specific office visit is lower. A study design that uses the patient as the unit of analysis rather than the physician-patient encounter could test this explanation.

Boys were more commonly referred than girls. A Dutch study of referral practices of general practitioners found that boys had more referrals per 1000 children than girls.<sup>30</sup> Possible explanations for the sex effect are greater morbidity among boys, greater parental care seeking for boys compared with girls, or increased physician problem recognition. Further research is needed to elucidate which of these mechanisms may be responsible, either singly or in combination, for the effect of sex on referral.

Our study's estimate of 4.1-fold variation in pediatricians' 20-day referral rate is identical to the estimate made

**Table 4. The 51 Health Problems Most Commonly Referred to Specialty Care**

Health Problem	No. of Referrals (%)	Specialists	
		2 Most Common	No. (%)
Otitis media	170 (9.2)	Otolaryngologist	162 (95.3)
		Audiologist	6 (3.5)
Refractive errors	104 (5.6)	Ophthalmologist	70 (67.3)
		Optometrist	34 (32.7)
Orthopedic signs/symptoms	93 (5.0)	Orthopedic surgeon	66 (71.0)
		Physical therapist	11 (11.8)
Benign skin lesions	83 (4.5)	Dermatologist	67 (80.7)
		Plastic surgeon	9 (10.8)
Behavioral problems	65 (3.5)	Psychologist	38 (58.5)
		Psychiatrist	12 (18.5)
Fractures, excluding digits/hips	53 (2.9)	Orthopedic surgeon	49 (92.5)
		Otolaryngologist	4 (7.5)
Joint disorders, trauma related	49 (2.7)	Orthopedic surgeon	43 (87.8)
		Physical therapist	6 (12.2)
Developmental delay	48 (2.6)	Neurologist	10 (20.8)
		Orthopedic surgeon	6 (12.5)
Hearing loss	46 (2.5)	Audiologist	33 (71.7)
		Otolaryngologist	13 (28.3)
Strabismus/amblyopia	46 (2.5)	Ophthalmologist	45 (97.8)
		Optometrist	1 (2.2)
Viral warts/molluscum contagiosum	46 (2.5)	Dermatologist	40 (87.0)
		Podiatrist	4 (8.7)
External abdominal hernia/hydrocele	43 (2.3)	Pediatric/general surgeon	39 (90.7)
		Urologist	4 (9.3)
Depression/anxiety/neuroses	42 (2.3)	Psychiatrist	22 (52.4)
		Psychologist	17 (40.5)
Allergies	38 (2.1)	Allergist	34 (89.5)
		Ophthalmologist	2 (5.3)
Chronic pharyngitis/tonsillitis	37 (2.0)	Otolaryngologist	35 (94.6)
		Speech therapist	1 (2.7)
Speech disorder	36 (2.0)	Speech therapist	19 (52.8)
		Audiologist	12 (33.3)
Urologic signs/symptoms	32 (1.7)	Urologist	24 (75.0)
		Nephrologist	5 (15.6)
Attention-deficit/hyperactivity disorder	31 (1.7)	Psychologist	19 (61.3)
		Neurologist	7 (22.6)
Heart murmur	30 (1.6)	Cardiologist	30 (100.0)
Allergic rhinitis	26 (1.4)	Allergist	24 (92.3)
		Otolaryngologist	2 (7.7)
Congenital anomalies of limbs/hands/feet	24 (1.3)	Orthopedic surgeon	23 (95.8)
		Plastic surgeon	1 (4.2)
Headaches	22 (1.2)	Neurologist	14 (63.6)
		Ophthalmologist	2 (9.1)
Ophthalmic signs/symptoms	22 (1.2)	Ophthalmologist	20 (90.9)
		Dermatologist	1 (4.5)
Abdominal pain	21 (1.1)	Gastroenterologist	12 (57.1)
		Pediatric/general surgeon	6 (28.6)
Acne, disorders of sweat/sebaceous glands	20 (1.1)	Dermatologist	20 (100.0)
Benign neoplasms	18 (1.0)	Orthopedic surgeon	9 (50.0)
		Pediatric/general surgeon	6 (33.3)

**Table 4. The 51 Health Problems Most Commonly Referred to Specialty Care (cont)**

Health Problem	No. of Referrals (%)	Specialists	
		2 Most Common	No. (%)
Kyphoscoliosis	18 (1.0)	Orthopedic surgeon	17 (94.4)
		Physical therapist	1 (5.6)
Other respiratory symptoms	18 (1.0)	Otolaryngologist	17 (94.4)
		Pulmonologist	1 (5.6)
Dermatitis, eczema	17 (0.9)	Dermatologist	16 (94.1)
		Allergist	1 (5.9)
Asthma	16 (0.9)	Allergist	10 (62.5)
		Pulmonologist	4 (25.0)
Mass of unknown etiology	15 (0.8)	Pediatric/general surgeon	7 (46.7)
		Orthopedic surgeon	3 (20.0)
Neurologic signs/symptoms	15 (0.8)	Neurologist	9 (60.0)
		Ophthalmologist	3 (20.0)
Low back pain syndromes	14 (0.8)	Orthopedic surgeon	9 (64.3)
		Physical therapist	4 (28.6)
Congenital heart disease	13 (0.7)	Cardiologist	13 (100.0)
Diseases of nail (excluding infections)	13 (0.7)	Podiatrist	7 (53.8)
		Dermatologist	3 (23.1)
Fractures/dislocations, digits only	13 (0.7)	Orthopedic surgeon	12 (92.3)
		Physical therapist	1 (7.7)
Noninfectious disorders of eyelid/lacrimal duct	13 (0.7)	Ophthalmologist	13 (100.0)
Sinusitis	13 (0.7)	Otolaryngologist	7 (53.8)
		Allergist	6 (46.2)
Undescended testes	13 (0.7)	Urologist	10 (76.9)
		Pediatric/general surgeon	3 (23.1)
Apnea syndromes	12 (0.6)	Otolaryngologist	8 (66.7)
		Pulmonologist	2 (16.7)
Diseases of hair/hair follicles	12 (0.6)	Dermatologist	11 (91.7)
		Pediatric/general surgeon	1 (8.3)
Chromosomal abnormality	11 (0.6)	Geneticist	4 (36.4)
		Multidisciplinary team	2 (18.2)
Rectal bleeding	11 (0.6)	Gastroenterologist	10 (90.9)
		Pediatric/general surgeon	1 (9.1)
Bursitis/synovitis/tenosynovitis	10 (0.5)	Orthopedic surgeon	7 (70.0)
		Physical therapist	3 (30.0)
Congenital hip disease	10 (0.5)	Orthopedic surgeon	10 (100.0)
Lacerations	10 (0.5)	Plastic surgeon	5 (50.0)
		Obstetrician/gynecologist	2 (20.0)
Disorders of teeth	9 (0.5)	Dentist	7 (77.8)
		Oral surgeon	2 (22.2)
Vesicoureteral reflux	9 (0.5)	Urologist	8 (88.9)
		Nephrologist	1 (11.1)
Cardiovascular signs/symptoms	8 (0.4)	Cardiologist	7 (87.5)
		Orthopedic surgeon	1 (12.5)
Diabetes mellitus	8 (0.4)	Endocrinologist	6 (75.0)
		Ophthalmologist	2 (25.0)
Seizure disorder	8 (0.4)	Neurologist	8 (100.0)

by Wilkin and Smith<sup>31</sup> for 201 British general practitioners' 20-day referral rate. The similarity in variation between US pediatricians and British general practitioners is striking, considering the major differences in practice and health system environments between the 2 countries. For example, in Great

Britain, there are fewer subspecialists per capita; specialists work primarily in hospital rather than community settings and are paid a salary rather than fees for service.<sup>32</sup>

We estimate that most of the variation in physician referral rates in our study population can be explained

**Alaska:** Pediatrics (Anchorage); Anchorage Neighborhood Health Center (Anchorage); Anchorage Pediatric Group (Anchorage). **Arizona:** Canyon Pediatrics (Tucson); Mesa Pediatrics Professional Association (Mesa). **California-1:** Palo Alto Medical Foundation (Los Altos); Palo Alto Medical Clinic (Palo Alto). **California-4:** Edinger Medical Group Inc (Fountain Valley). **Colorado:** Cherry Creek Pediatrics (Denver); Family Health Center (Denver). **Connecticut:** Arthur T. Blumer, MD, and Carol L. Rizzolo, RPA-C (Southington). **Florida:** Atlantic Coast Pediatrics (Merritt Island). **Georgia:** The Pediatric Center (Stone Mountain). **Hawaii:** Melinda Ashton, MD (Honolulu). **Iowa:** David Kelly, MD (Marshalltown). **Illinois:** Southwest Pediatrics (Palos Park); Children's Memorial Hospital (Chicago); Kamala Ghaey, MD (Chicago). **Indiana:** Georgetown Medical Care (Indianapolis); Jeffersonville Pediatrics (Jeffersonville); Marshall County Pediatrics (Plymouth). **Kansas:** Ashley Clinic (Chanute); Bethel Pediatrics (Newton). **Louisiana:** Children's Clinic of Southwest Louisiana (Lake Charles). **Massachusetts:** Pediatric Associates of Norwood (Norwood); Burlington Pediatric Associates (Burlington); Framingham Pediatrics (Framingham). **Maryland:** Children's Medical Group (Cumberland); Steven Caplan, MD (Baltimore); Coleman, Coleman, and Sachs (Rockville); Clinical Associates Pediatrics (Towson); Andorsky, Finkelstein, and Cardin (Owings Mills); Christopher Forrest, MD (Baltimore). **Michigan:** IHA Livingston Pediatrics (Howell); Lee and Kim Associates (Warren); Anuradha Sundararajan, MD (St Ignace); Pediatric Associates of Farmington (Farmington); Children's Hospital of Michigan (Detroit). **Missouri:** Children's Clinic (Springfield). **North Carolina:** Hendersonville Pediatrics (Fletcher). **North Dakota:** Altru Clinic (Grand Forks); MeritCare Medical Group-Pediatrics (Fargo). **New Hampshire:** Pediatric and Adolescent Medicine (Exeter); Laconia Clinic (Laconia); Lahey-Hitchcock Clinic (Concord); Exeter Pediatric Associates (Exeter). **New Jersey:** Delaware Valley Pediatric Associates (Lawrenceville); Kids Care Pediatrics (Egg Harbor Township); Lourdes Pediatrics Association (Camden); University Pediatric Associates (East Brunswick). **New Mexico:** Albuquerque Pediatric Associates Ltd (Albuquerque). **New York-1:** Elmwood Pediatric Group (Rochester); Panorama Pediatric Group (Rochester); Brighton Hill Pediatrics (Syracuse); Edward Lewis, MD (Rochester); Park Medical Group (Rochester). **New York-2:** Sonia Vinas, MD (Brooklyn). **Ohio:** Pediatrics (Portsmouth); Oxford Pediatrics and Adolescents (Oxford); Children's Hospital Physicians (Twinsburg); South Dayton Pediatrics Inc (Dayton); North Central Ohio Family Care (Galion). **Oklahoma:** Pediatric and Adolescent Care (Tulsa). **Pennsylvania:** Pennridge Pediatric Associates (Sellersville). **Rhode Island:** Marvin Wasser, MD (Cranston). **South Carolina:** Carolina Primary Care (Columbia). **Texas:** Winnsboro Pediatrics (Winnsboro); The Pediatric Clinic (Greenville). **Utah:** John Weipert, MD (American Fork); Gordon Glade, MD (American Fork); Mountain View Pediatrics (Sandy); Salt Lake Clinic (Sandy). **Virginia:** Stafford Pediatrics (Stafford); Fishing Bay Family Practice (Deltaville); Drs Casey, Goldman, Lischwe, Garrett, and Kim (Arlington); Alexandria Lakeridge Pediatrics (Alexandria). **Vermont:** Rebecca Collman, MD (Colchester); Judy Orton, MD (Bennington); Mousetrap Pediatrics (Milton); University Pediatrics (Burlington); Practitioners of Pediatric Medicine (South Burlington); Newport Pediatrics (Newport); University Pediatrics (Williston). **Washington:** Rockwood Clinic (Spokane); Redmond Pediatrics (Redmond). **Wisconsin:** LaSalle Clinic (Neenah); Beloit Clinic (Beloit); Gunderson Clinic (La Crosse); Gunderson Clinic (Whitehall); Medical Associates North (Ashland); Waukesha Pediatric Associates (Waukesha); Dean Clinic (Stoughton). **West Virginia:** Grant Memorial Pediatrics (Petersburg). **Wyoming:** Jackson Pediatrics (Jackson); Bighorn Pediatric Associates (Gillette).

by systematic variation in patient-related clinical factors and physician referral behavior. We found a 10% reduction in variation attributable to differences in the age and sex distribution of physicians' patients. Salem-Schatz et al,<sup>8</sup> in a study on specialist use among adult patients, who have greater variability in age than a pediatric population, found a 24% drop in variation attributable to age and sex and a 40% drop when differences in case mix were taken into consideration. Future research is needed to identify which nonclinical physician and health system factors have the greatest impact on variation in referral rates and are therefore possible targets for modifying physicians' referral decision-making.

#### WHY PHYSICIANS REFER PATIENTS

A referral is the result of a physician-patient decision about the most appropriate course of action for management of a health problem. Our study examined referral decision-making by asking physicians to record their reasons for referral. These results suggest that the boundaries of the primary-specialty care interface are fluid, shifting in response to physicians' demand for advice or specialized skills and parents' or patients' expectations for specialty care. For nearly 3 in 4 referrals, primary care physicians

requested that specialists provide them with advice on diagnosis or management of the patient's health problem. Other studies have found that seeking advice from specialists is the most common reason for referral.<sup>17,33</sup> Physicians may seek advice from specialists to gain further insight into diagnosis or management, to reassure themselves or patients about the current course of action, or to provide education on current therapeutic modalities or uncommon problems.

Approximately half of all referrals for advice on diagnosis or treatment and nearly two thirds of mental health referrals were made during the first office visit with any clinician for management of the health problem. This is a surprising finding given that the approach primary care physicians generally use in decision-making is to "try out" various diagnostic or therapeutic strategies.<sup>34</sup> Such a large proportion of referrals made during the first office visit for newly presenting health problems suggests that pediatricians may not feel adequately skilled to handle certain problems or may have circumscribed their scope of practice to exclude care for certain types of health problems, such as mental health problems.

Another important reason for referral was to obtain a specialized skill, such as surgery, nonsurgical technical procedures, specialized medical management, or



mental health counseling. There is little information available to primary care physicians and subspecialists to assist these groups in determining the most appropriate setting for the provision of specific services. In the absence of this information, how physicians define their scope of practice becomes an idiosyncratic exercise that is potentially influenced by health system incentives and organizational restraints that influence use of specialty care.

Parents may request a referral to a specialist because they believe that a specialist alone or in collaboration with their primary care physician is the most appropriate source of care for their children's health problems. Our finding that parents made requests for referral in 15.6% of cases is consistent with other studies.<sup>14,24</sup> It is interesting to note, however, that physicians indicated at least one other reason in addition to parent request for 92.3% of referrals. Thus, parents may raise the concern about need for specialty care, but through the process of negotiating this request, physicians nearly always find other indications for the referral (or alternatively, patients may be influenced to want a referral when their physician suggests one).

#### HOW PEDIATRICIANS USE SUBSPECIALISTS

This study demonstrated that primary care physicians desired to retain full or partial control over management for most of their patients' referred health problems. The frequency of consultations from specialists highlights the importance that pediatricians place on remaining involved in the care of their referred patients. These findings indicate that pediatricians desire to build a collaborative relationship with specialists, rather than transferring their patients to specialty care.

We found substantial variability across subspecialties in the degree to which pediatricians reported they wanted to maintain involvement in referrals. Differences in primary care physician involvement in the ongoing and follow-up management of their patients' health problems further illustrate the variability in the boundaries of the primary-specialty care interface. Medical subspecialties were characterized by high proportions of consultations for which the referring physician retained responsibility for management of the patient's health problem, surgical subspecialties by high proportions of referrals with transferred management, and mental health specialties by high levels of shared management. Two subspecialties are notable exceptions to these generalizations. Dermatologists received referrals for nearly 30% of their patients for transferred management, a level close to that of surgical subspecialties. A small proportion of patients were referred to otolaryngologists for transferred management, suggesting that pediatricians consider ear, nose, and throat problems within their scope of practice. The level of shared management for referrals to mental health specialties points out pediatricians' desire to maintain involvement in the care of their patients' psychosocial problems. More research is needed, however, to understand what the most effective models are for primary care physicians and specialists to co-manage patients' health problems.

For most referred health problems, pediatricians sent patients to different types of specialists. For instance, 62% of referrals for asthma were to allergists, whereas 25% were to pulmonary subspecialists. Little is known about the factors that determine why primary care physicians decide to refer a patient to a particular type of specialist. In some cases, physicians choose from among both medical and surgical subspecialists—eg, urologic signs and symptoms were referred to both urologists and nephrologists. Thus, for the management of certain health problems, there is considerable overlap, not only between primary and specialty care, but also across subspecialties.

#### LIMITATIONS

Inferences from this study are limited by certain aspects of the research design. First, the focus of this study was on physician referral decision-making during encounters with patients. We did not assess rates or patterns of referral per patient or self-referral of patients directly to specialty care. Second, physician referral rates based on 20 days are inherently more unstable—that is, have more random error—than rates based on data collected over longer periods. More work is needed to understand the degree of variation in physician referral rates calculated over longer intervals, such as 1 year or more. Third, our results pertain to new decisions to refer a patient to a physician subspecialist or a nonphysician with a specialized skill. We did not collect information on referrals that had already been made and were ongoing at the time of the physician-patient encounter. Fourth, our focus was on referrals made in the ambulatory setting; we excluded referrals made within hospitals. We were interested in referrals made to a specific clinician or provider group for the purpose of a face-to-face visit with a patient, which excluded referrals to laboratories and radiology facilities. Lastly, this study took place in a collaborative practice-based research network composed of volunteer physicians; this sample may not be generalizable to all US pediatricians. We assessed the representativeness of our physician sample's referral decision-making by comparing overall and age-specific, sex-specific, and diagnosis-specific referral rates with those of a national probability sample of pediatricians who participated in the NAMCS. Our results indicate that there was remarkable consistency of referral rates between the 2 groups.

#### IMPLICATIONS FOR PHYSICIAN TRAINING

Increased attention is being devoted to training primary care physicians in ambulatory rather than inpatient settings. This study has important implications for how physicians should be trained in the skills necessary for effective consultation and referral. For 23 of the 24 most common specialties, 3 diagnoses accounted for more than half of all new referrals; 50 conditions were responsible for 84.3% of all referrals. We suggest that educators ensure that these common conditions are emphasized in primary care training curricula to provide pediatricians with the skills necessary to expand their scope of practice when appropriate, to determine when a patient should

be referred, to identify which type of specialist the patient should be referred to, and to arrange follow-up and reassessment for referred patients.

Our study also has relevance to subspecialist training. The roles and responsibilities of a subspecialist differ depending on the primary care physician's desire for consultation or referral. For most health problems, primary care physicians want to either retain control (that is, seek only advice or results from a specific diagnostic test) or share management responsibility with the specialist. In these cases, the subspecialist is providing support to the primary care physician. More work is needed to determine the most effective ways to communicate and share care across the primary-specialty care interface.

About 1 in 6 referrals involved some degree of parent request for specialty care. We believe that parent or patient request is a valid indication for referral, but when is a parent- or patient-requested referral appropriate? Primary care physicians need to be able to provide advice to patients on the most appropriate level of medical care for their health problem. Physician-patient negotiation of access to specialized technology is a skill that has become critical for primary care physicians, who commonly are called on to act as administrative gatekeepers and restrict patients' use of specialists.

## CONCLUSIONS

About 1 in 40 office visits leads to a referral, and 1 in 4 referrals are made during telephone conversations with parents. Physicians make referral decisions for a multitude of reasons; however, advice seeking tends to predominate. Most referrals are made for consultation or shared management, indicating that pediatricians want to maintain involvement in the care of their patients' referred health problems. How best to communicate and share care across the primary-specialty care interface is a critical area for future inquiry. Physician training in the referral process should focus on the roles and responsibilities of primary care physicians and subspecialists, particularly as they relate to strategies for comanaging patients. Evidence-based guidelines on when to refer patients would be most useful for the 50 most commonly referred conditions reported in this study.

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Corresponding author: Christopher B. Forrest, MD, PhD, Health Services Research and Development Center, Johns Hopkins School of Public Health, Room 689, 624 N Broadway, Baltimore, MD 21205 (e-mail: cforrest@jhsph.edu).

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