# Gatekeeping and Referral of Children and Adolescents to Specialty Care

Christopher B. Forrest, MD, PhD*; Gordon B. Glade, MD‡§; Barbara Starfield, MD, MPH*; Alison E. Baker, MS‡; Myungsa Kang, MHS*; and Robert J. Reid, MD, PhD*

**ABSTRACT.** *Objective.* **In this study we examined how gatekeeping arrangements influence referrals to specialty care for children and adolescents in private and Medicaid insurance plans.**

*Design/Participants.* **We conducted a prospective study of office visits ($n$ = 27 104) made to 142 pediatricians in 94 practices distributed throughout 36 states in a national primary care practice-based research network. During 10 practice-days, physicians and patients completed questionnaires on referred patients, while office staff kept logs of all visits. Physicians used medical records to complete questionnaires for a subset of patients 3 months after their referral was made.**

*Results.* **Gatekeeping arrangements were common among children and adolescents with private (57.8%) and Medicaid (43.3%) insurance. Patients in gatekeeping plans were more likely to be referred with private (3.16% vs 1.85% visits referred) and Medicaid (5.39% vs 3.73%) financing. Increased parental requests for specialty care among gatekeeping patients did not explain the increased referral rate. Physicians' reasons for making the referral were similar between the two groups. Physicians were less likely to schedule an appointment or communicate with the specialist for referred patients in gatekeeping plans. However, rates of physician awareness that a specialist visit occurred and specialist communication back to pediatricians did not differ between the two groups 3 months after the referrals were made.**

*Conclusions.* **Gatekeeping arrangements are common among insured children and adolescents in the United States. Our study suggests that gatekeeping arrangements increase referrals from pediatricians' offices to specialty care and compromise some aspects of coordination.** ***Pediatrics*** **1999;104:28–34;** ***referral-consultation, managed health care, gatekeeping arrangements, primary care, coordination.***

Gatekeeping arrangements that limit patients' ability to access specialists directly are common in the US health system.[1] Many managed care organizations use primary care physicians as gatekeepers to reduce costs by restricting referrals for presumably inappropriate specialty care. Limiting use of unnecessary specialty care can improve quality by protecting patients from potentially harmful technology.[2] Gatekeeping also holds the promise of improved continuity and coordination of health care, two of the cornerstones of primary care,[3,4] by requiring a single provider to deliver or integrate all services a patient receives.

The fiduciary aspects of gatekeeping pit the traditional primary care physician role as clinical advocate for patients with the managerial role as cost controller. This conflict holds the potential for eroding interpersonal trust between doctors and patients.[5] As a consequence, empirical information on the effects of gatekeeping on medical practice is urgently needed. Compared with traditional care arrangements, physicians identify both positive aspects (eg, better cost control and preventive care) and negative consequences (eg, more burdensome administrative tasks and limited autonomy in clinical decision making) of gatekeeping.[6] There are few studies that directly assess how gatekeeping influences health care delivery.

In a 1997 report to the President of the United States, the advisory commission on consumer protection and quality in the health care industry recommended that consumers with complex or serious medical conditions who require frequent specialty care should have direct access to a qualified specialist of their choice within a plan's network of providers.[7] Most referrals, however, do not require frequent specialist visits or long-term specialty care. Even if the commission's recommendation finds widespread implementation, more information will be needed on how gatekeeping influences the majority of referrals pediatricians make to specialists.

The literature suggests that gatekeeping arrangements may increase primary care physician referrals to specialty care. Recent nationally representative studies have shown that patients in health maintenance organizations compared with indemnity plans are more likely to be referred during office visits with primary care physicians.[8,9] Neither of these studies focused on child and adolescent referrals to specialty care. Szilagyi et al[10] conducted a study in a single pediatric practice and found that children with private insurance who switched to a newly offered gatekeeping-model plan had an increased number of referrals to specialists compared with those who remained in the indemnity plan. No previous study has examined how gatekeeping affects the referral process in terms of the types of referrals made, how

From the *Department of Health Policy and Management, Johns Hopkins School of Public Health, Baltimore, Maryland; ‡Pediatric Research in Office Settings (PROS), American Academy of Pediatrics, Elk Grove Village, Illinois; and the §Department of Pediatrics, University of Utah School of Medicine, Salt Lake City, Utah.

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Reprint requests to (C.B.F.) Health Services Research and Development Center, Johns Hopkins School of Public Health, 624 N Broadway, Room 689, Baltimore, MD 21205. E-mail: cforrest@jhsph.edu

the referral episode is coordinated, or outcomes of the referral.

To address these knowledge gaps, we conducted a study on the referral practices of 142 office-based pediatricians in a national practice-based research network. The purpose of this study was to examine how gatekeeping arrangements influence rates and patterns of child and adolescent referrals from primary to specialty care. The research questions were as follows: How are gatekeeping arrangements associated with 1) the rates at which physicians refer patients during office encounters, 2) the type of referral made and the reasons for making the referral, 3) the coordination of the referral episode, and 4) the outcomes of the referral from the physician's perspective?

## METHODS

### Study Populations and Data Collection Procedures

This study occurred in Pediatric Research in Office Settings, a national practice-based research network established by the American Academy of Pediatrics to conduct primary care research. Data were collected from July 1996 to September 1997 for a practitioner sample of 142 pediatricians in 94 practices distributed throughout 36 states. Pediatric residents were not recruited into the physician sample. One or more physicians in a practice were permitted to participate. All physicians volunteered for the study.

The Institutional Review Board of the American Academy of Pediatrics approved the study protocol. Physicians in the Pediatric Research in Office Settings network reviewed data collection protocols and questionnaires on three occasions at semiannual meetings. The content validity of the measures and the feasibility of procedures were examined during two pretests occurring in five practices each time. Item wording was reviewed further during focus groups and during feedback sessions with pilot study practice personnel.

Within each practice, the study occurred in three phases. In the first, a practice selected a coordinator who learned the study protocols, trained office staff and physicians, monitored data quality, and communicated with research staff at Pediatric Research in Office Settings. Physicians completed a background questionnaire.

In the second phase, data were collected during 10 consecutive practice-days on all office visits and referrals occurring during regularly scheduled office hours. Practice coordinators kept a log of office visits in which they recorded whether the practitioner worked a full or half day and, for each visit, patient age, sex, payment source (Medicaid, no insurance, or private), presence of a gatekeeping arrangement defined as an insurance requirement that the physician must approve referrals to specialists, referral (yes/no), and whether the principal diagnosis was otitis media, asthma, acne, fracture, attention deficit disorder, or other. We did not collect information on physician payment.

Practice coordinators kept a log of all referrals made during the study period. This log was used to track study instrument completion, record parent participation, and match patient identifiers with names and addresses in the follow-up phase of the study.

After each referral, physicians completed a 16-item questionnaire (response rate, 99%). The physician questionnaire had items relating to the health problem leading to the referral, specialist to whom the patient was referred, the reason(s) for making the referral, the coordination of the referral, and patient characteristics. Parents of referred children and adolescents completed a 27-item questionnaire (response rate = 89%). Informed consent was obtained from parents and verbal assent from older children and adolescents. The parent referral questionnaire had items on patient characteristics, the health problem leading to the referral, and the physician-patient interaction.

A referral was defined as a physician-parent decision that the patient required a face-to-face visit with a specialist physician, a nonphysician with a specialized skill, or a specialized treatment program. We required that referral decisions involve verbal communication between the physician and the parent, and therefore excluded staff administrative renewals of ongoing referrals not involving direct physician-parent verbal communication. We also excluded referrals made to laboratory or radiographic facilities, emergency departments, hospitals for inpatient admission, and curb-side consults in which the primary care physician obtains advice from a specialist but does not send the patient for a visit.

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 the health problem leading to the referral, awareness that the patient saw the specialist, whether the specialist communicated with the primary care physician, their satisfaction with the referral episode, perceived educational value of the referral, perceived benefit on patient management of the referral, and whether the referral had been completed or was ongoing.

At the conclusion of the study, practitioners received a report that compared their patterns and rates of referral with those of the entire sample. Each practice was given $100 to defray costs associated with data collection.

### Variables

The unit of observation for this study was the physician-patient encounter. Referral rate was measured as the percentage of office visits referred. One of the pediatricians of our team (C.F.) reviewed all referral diagnoses recorded by physician participants and characterized each as either a sign/symptom or definitive diagnosis. Physicians rated their level of diagnostic certainty from a low of 1 (completely uncertain) to a high of 7 (completely certain) and indicated the number of visits during the past 3 months that the patient made to any clinician for management of the health problem.

Parents rated from 1 (none) to 5 (a great deal) how much they worried about the health problem, how much discomfort the health problem caused their child or teen, and how much the problem restricted their child or teen's usual activities. They also indicated whether they agreed or disagreed on a 5-point scale with the physician concerning the need for referral of their child or adolescent to specialty care. Both physicians and parents rated on a scale from 1 (none) to 5 (a great deal) how much the parent urged the physician to make the referral.

For each referral decision, physicians could select up to 14 reasons why they referred the patient (mean number of reasons endorsed per referral was 2.1). Reasons for referral included advice on diagnosis, advice on treatment, a nonsurgical technical procedure, surgery, mental health counseling, patient/parent request, medical treatment, specialist request, insurance guidelines mandate referral, insufficient time to manage the health problem, medicolegal reasons, failed conventional therapy, need for multidisciplinary care, and administrative renewal of ongoing referral.

We assessed coordination of the referral episode from the perspective of the primary care physician at the time the referral was made and 3 months later. Baseline assessments included whether the physician or practice staff made the appointment with the specialist and the type of communication sent to the specialist. Follow-up assessments were made concerning physician awareness that a specialist visit occurred and the type of communication from the specialist back to the primary care physician.

By using information from a background questionnaire completed during the first phase of the study, each physician's practice was characterized as solo practitioner, single-specialty group practice, multispecialty group practice, or hospital-based (practice organization variable). Practice intensity was determined for each physician by dividing the total number of patient visits by the number of full practice-days worked.

### Data Analysis

For each physician, we estimated proportions of office visits for patients in gatekeeping plans overall and for private or Medicaid insurance. We also determined the proportion of each physician's patients who had private insurance with a gatekeeping requirement, Medicaid insurance with gatekeeping, and those with no gatekeeping requirement. Bivariate analyses assessed how characteristics of patients, their families, and the encounter differed between gatekeeping and nongatekeeping patient visits.

The association of gatekeeping with the probability of referral was determined in several ways. The percentage of office visits

referred was calculated overall and stratified by patient age, sex, and insurance type. Because the unit of analysis in this study was the physician-patient encounter, the validity of inferences concerning the effects of gatekeeping arrangements on referral rate could be biased, because patients visiting the same physician may have similar referral experiences. Intraphysician clustering of visits and referrals violates the statistical assumption of independence of observations. The key consequences of ignoring such correlation in statistical modeling are invalid standard error estimates and incorrect inferences. To account for this potential limitation, we developed logistic regression models by using the SAS computer software, version 6.12, and the generalized estimating equation macro.[11] These multilevel regression analyses treated each physician-patient encounter as nested within a physician. Adjusted odds ratios in which the dependent variable was the probability of referral were estimated by using this method. Regression models controlled for patient age, sex, principal diagnosis, insurance type, practice organization, practice intensity, and the correlation of physician-patient encounters.

To examine whether reduced self-referral in gatekeeping plans led to an increased demand for physician referral during office visits and, hence, was an explanation for any effect of gatekeeping on referral rate, we performed two sensitivity analyses. In the first, we removed all referrals for which the physician indicated that at least one reason for the referral was parent request. The second analysis removed referrals for which parents indicated that they urged the physician at least a little to refer. Both served to remove referrals in which a self-referral was most likely to have occurred in the absence of a gatekeeping requirement.

Characteristics of referrals were contrasted between the two groups in terms of reasons for making the referral, characteristics of the health problem leading to the referral, and the proportion of referrals made to surgical subspecialists. Baseline and follow-up measures of coordination of the referral episode were compared between the two groups. Logistic regression techniques, using the SAS computer software, version 6.12, and the generalized estimating equation macro were used to obtain estimates of the proportions of referrals for patients with gatekeeping versus nongatekeeping plans, adjusted for potential confounding variables. These adjusted parameter estimates were determined for analyses of characteristics of the referral and coordination of care for patients in gatekeeping versus nongatekeeping plans. Each dependent variable was regressed on gatekeeping and the two factors significantly associated with participation in a gatekeeping plan—age and type of insurance financing. We transformed parameter estimates from the regression equation to yield proportions adjusted for the effects of age and type of insurance. The *P* values for the difference in the adjusted proportions were the *t* tests for the null hypothesis that the gatekeeping coefficient from the respective logistic regression model was equal to zero.

## RESULTS

During the study period, patients made 27 104 visits to 142 pediatricians during 1228 practice-days. Most visits (55.6%) were for patients in plans with gatekeeping arrangements. A larger proportion of patients with private insurance (57.8%) were in gatekeeping plans than those with Medicaid insurance (43.3%). Only 8 (5.6%) physicians did not see any patient in a gatekeeping plan. Thirteen physicians (9.2%) did not see any patient in a private gatekeeping plan, and 47 (33.1%) did not see any patient in a Medicaid gatekeeping plan.

Physicians ($n = 40$) who saw ≥75% of their patients in gatekeeping plans had higher practice intensity than those ($n = 36$) with ≤25% in gatekeeping plans (26.1 vs 22.0 patients seen per practice-day, $P = .026$). There was no significant difference between these two groups of physicians in the percentage of office visits referred.

Although there are statistically significant differences in the distribution of patient age between the gatekeeping and nongatekeeping patients, the size of the difference between the two groups was minimal (Table 1). For referred patients, those in gatekeeping plans were more likely to have private rather than Medicaid insurance; otherwise, the two groups did not differ in sociodemographic and health status characteristics.

Patients in gatekeeping plans were significantly more likely to be referred during an office visit (Table 2). The size of the gatekeeping effect increased with age and was similar for children and adolescents with private and Medicaid insurance. Because patients in gatekeeping plans have limited ability to self-refer to specialists, the increased referral rate associated with patients in gatekeeping plans may be a result of more parental requests for referral. We performed two sensitivity analyses to address this hypothesis. First, when we removed from the analysis all referrals for which patient/parent request was reported as at least one reason for referral, the size and statistical significance of the adjusted odds ratio remained essentially unchanged compared with the overall effect of gatekeeping. Second, when

**TABLE 1.** Study Populations

| | Gatekeeping Arrangement | | *P* |
|---|---|---|---|
| | Yes (%) | No (%) | |
| Patients seen during office visits | | | |
| Sample size | 15 117 | 11 987 | |
| Age (y) | | | |
| 0 | 20.9 | 22.5 | .001 |
| 1–4 | 35.2 | 33.8 | |
| 5–10 | 25.2 | 26.0 | |
| 11+ | 18.7 | 17.7 | |
| Sex | | | |
| Male | 53.0 | 52.5 | .362 |
| Female | 47.0 | 47.5 | |
| Insurance financing | | | |
| Private | 88.7 | 81.7 | .001 |
| Medicaid | 11.3 | 18.3 | |
| Referred patients | | | |
| Sample size | 516 | 263 | |
| Age (y) | | | |
| 0 | 11.8 | 16.7 | .093 |
| 1–4 | 27.7 | 30.4 | |
| 5–10 | 28.9 | 28.1 | |
| 11+ | 31.6 | 24.7 | |
| Sex | | | |
| Male | 56.2 | 58.6 | .530 |
| Female | 43.8 | 41.4 | |
| Insurance financing | | | |
| Private | 82.2 | 68.8 | .001 |
| Medicaid | 17.8 | 31.2 | |
| Maternal education | | | |
| <12th grade | 8.7 | 10.3 | .851 |
| High school graduate/GED | 18.9 | 19.2 | |
| Some college | 39.9 | 40.9 | |
| College graduate | 32.5 | 29.6 | |
| Global rating of health: fair/poor | 6.4 | 4.4 | .305 |
| Health problem leading to referral | | | |
| Restricted child's/teen's activity | 49.6 | 50.2 | .885 |
| Caused a great deal of parental worry | 29.2 | 30.9 | .656 |
| Led to any child/teen discomfort | 71.9 | 67.6 | .280 |
| Number of previous visits with any physician for health problem leading to referral | | | |
| 0, index visit only | 62.5 | 60.7 | .467 |
| 1 | 16.5 | 14.0 | |
| 2+ | 21.0 | 25.3 | |

**TABLE 2.** Referral Rates

| Type of Referral Rate | Gatekeeping Arrangement (% of Office Visits Referred) | | Gatekeeping Arrangement (Adjusted Odds Ratios*) | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| All referrals | 3.41‖ | 2.19 | 1.81‖ | 1.00 |
| Excluding referrals made at parent request† | 2.93‖ | 2.01 | 1.75‖ | 1.00 |
| Age (y) | | | | |
| 0 | 1.93 | 1.63 | 1.36 | 1.00 |
| 1–4 | 2.69‡ | 1.97 | 1.62§ | 1.00 |
| 5–10 | 3.91‖ | 2.38 | 2.06‖ | 1.00 |
| 11+ | 5.76‖ | 3.05 | 2.03‖ | 1.00 |
| Sex | | | | |
| Male | 3.65‖ | 2.47 | 1.73‖ | 1.00 |
| Female | 3.21‖ | 1.93 | 1.98‖ | 1.00 |
| Insurance financing | | | | |
| Private | 3.16‖ | 1.85 | 1.86‖ | 1.00 |
| Medicaid | 5.39‖ | 3.73 | 1.76§ | 1.00 |

* Regression models were adjusted for patient age, sex, principal diagnosis, insurance type, mean number of patients seen per practice-day (practice intensity), practice organization, and intraphysician clustering of observations by using the generalized estimating equation statistical model.
† All referrals for which the physician reported that one of the reasons for making the referral was patient or parent request were removed from the analysis.
‡ $.01 \leq P < .05$; § $.001 \leq P < .01$; ‖ $P < .001$.

referrals for which parents reported that they urged the physician at least a little to refer their child or adolescent were removed from the analysis, 2.46% of gatekeeping patient visits versus 1.64% of nongatekeeping visits were referred to specialty care ($P = .008$).

For referred patients, pediatricians reported more parental pressure to make the referral for children and adolescents in gatekeeping plans compared with those in nongatekeeping plans (mean ratings, 1.97 vs 1.62; $P < .001$). However, parents in gatekeeping and nongatekeeping plans did not significantly differ in their ratings of how much they urged pediatricians to refer (1.79 vs 1.78, respectively; $P = .90$). Parents in gatekeeping and nongatekeeping plans were equally likely to strongly agree with physicians about the need for referral (54.4% and 50.0%, respectively; $P = .308$).

Children and adolescents with Medicaid insurance were more likely to be referred than those with private insurance (4.46% vs 2.61% of office visits were referred; $P < .001$). In logistic regression analyses that controlled for patient age, sex, principal diagnosis, gatekeeping arrangements, practice intensity and practice organization, the odds of referral for Medicaid patients were 1.44 times higher than the odds of referral for privately insured patients ($P < .001$).

Table 3 shows that there were minimal differences in the types of referrals pediatricians made for gatekeeping versus nongatekeeping patients. The most common reasons for referral were to obtain advice on diagnosis or treatment of the patient's health problem. Although physicians reported that the reasons for referral in 73.4% of all instances included advice on diagnosis or treatment, patients in gatekeeping plans were significantly less likely to be referred for these reasons (70.7% vs 78.7%, $P = .017$). There was no significant difference in the frequency of referrals made at parental request. Referrals made for signs/symptoms versus definitive diagnoses or for health problems with a high versus low level of diagnostic certainty did not significantly differ by presence of gatekeeping arrangements.

**TABLE 3.** Characteristics of the Referral

| Characteristic | Gatekeeping Arrangement | | *P* |
|---|---|---|---|
| | Yes (%)* | No (%)* | |
| Reason for referral† | | | |
| Advice on diagnosis | 49.0 | 54.6 | .146 |
| Advice on treatment | 58.4 | 66.0 | .040 |
| Surgery | 17.9 | 17.5 | .890 |
| Nonsurgical technical procedure | 20.8 | 20.4 | .912 |
| Mental health counseling | 7.6 | 5.4 | .298 |
| Medical treatment | 21.2 | 18.9 | .503 |
| Patient/parent/third party request | 17.9 | 13.0 | .092 |
| Failed conventional therapy | 7.9 | 9.0 | .610 |
| Administrative renewal | 1.4 | 0.1 | .015 |
| Time constraints | 1.2 | 0 | .949 |
| Medicolegal reasons | 2.2 | 1.0 | .219 |
| Multidisciplinary care | 6.7 | 6.0 | .697 |
| Health problem leading to referral | | | |
| Health problem leading to referral was a sign or symptom | 30.5 | 35.1 | .215 |
| Physician was very/completely certain of diagnosis | 60.3 | 57.6 | .666 |
| Referred to surgical subspecialty | 48.0 | 53.6 | .148 |
| Duration of referral was <3 mo | 36.4 | 45.2 | .097 |

* Proportions were adjusted for patient age and type of insurance by using multivariate logistic regression techniques. The reference population was children 1–4 years old with private insurance.
† These categories are not mutually exclusive. Physicians could indicate more than one reason for referral.

At the time referrals were made, pediatricians or their staff were less likely to schedule an appointment or communicate with a specialist for patients in gatekeeping plans (Table 4). Despite these differences, pediatrician awareness that a specialist visit occurred and the proportion of referrals in which the specialist communicated back to pediatricians did not differ between the two groups.

There were no differences in the chances that phy-

**TABLE 4.** Coordination of Referral Episodes

| Coordination Indicator | Gatekeeping Arrangement | | *P* |
|---|---|---|---|
| | Yes (%)* | No (%)* | |
| Doctor/staff scheduled appointment with specialist | 31.3 | 44.5 | <.001 |
| Referring physician sent information about patient to specialist | 54.6 | 62.5 | .049 |
| Referring physician aware of a patient visit(s) with specialist | 58.8 | 58.0 | .872 |
| Specialist sent information about patient to referring physician | 86.4 | 86.1 | .937 |

* Proportions were adjusted for patient age and type of insurance by using multivariate logistic regression techniques. The reference population was children 1–4 years old with private insurance.

sicians perceived improved outcomes for patients in plans with and without gatekeeping arrangements. Specifically, there were no significant differences in physician levels of satisfaction with specialty care received during the referral episode, how much the referral helped with patient management, or perceptions of the educational value of the referral.

## DISCUSSION

A rapidly growing number of Americans have health insurance with gatekeeping arrangements that limit their access to specialty care. Estimates from this study indicate that in 1996 to 1997, 55.6% of insured children and adolescents seen by pediatricians (57.8% of those with private insurance and 43.3% of those with Medicaid) were in gatekeeping plans. Moreover, 94% of pediatricians in this study saw at least 1 patient in a gatekeeping plan. During the same time period, the Community Tracking Study reported that 93% of general pediatricians in the United States acted as administrative gatekeepers, and 52% of pediatricians' patients were in gatekeeping plans.[1]

Despite widespread use of gatekeeping arrangements, little is known about the degree to which they achieve their intended effect of reducing use of specialists. Contrary to popular belief, this study demonstrates that gatekeeping is associated with an increased volume of referrals made by physicians during office encounters with children and adolescents who have either private or Medicaid insurance. This finding is in agreement with recent nationally representative studies that have also shown higher office referral rates for patients in health maintenance organizations compared with indemnity plans.[8,9]

One important limitation regarding the design of this study is that its focus was on physicians' decisions to refer a patient. We did not measure use of specialist services past 3 months. Health plans with gatekeeping arrangements could have the tandem effects of increasing the number of referrals made from physicians' offices, as shown in this study, while decreasing overall use and costs of specialty care. Research from the 1980s found mixed effects of gatekeeping on resource use associated with specialty care. One study suggested that referral expenditures per enrollee increased over time in a rapidly growing gatekeeper-model plan.[12] However, results from a randomized controlled trial for patients with private insurance[13] and a quasiexperimental study of patients with Medicaid[14] showed that enrollees in gatekeeping plans use less specialty care services than individuals with unrestricted health care plans. In this study, we detected no significant difference by presence of gatekeeping arrangements in the proportion of referrals that lasted >3 months after the index visit. Other work has shown no substantive difference between health maintenance organization and indemnity patients in the proportion of referrals lasting more than one visit.[8] Therefore, the effects of gatekeeping health plans on use and costs of specialty care remain unclear and merit further research.

Gatekeeping arrangements limit patients' ability to directly access specialty care through self-referral. The higher volume of referrals for patients with gatekeeping plans found in this study could be a result of their greater demand for specialty care. Our results indicate that physicians perceived more parental pressure to refer children and adolescents in gatekeeping plans. However, when all referrals for which at least one of the reasons for referral was patient or parent request, or any referral for which parents perceived that they urged the physician to refer, were removed from the analysis, the size of the gatekeeping effect on the probability of referral was unchanged.

Although physicians reported that parents of children and teens in gatekeeping plans pressured them more to refer, presence of gatekeeping arrangements was neither associated with increased parental perceptions of their desire for referral nor increased parental requests for referral. The difference between physicians' and patients' perceptions of parental desire for referral may be a consequence of how physicians interpret parent questions about the possible need for specialty care. Heightened physician sensitivity to parental queries may partially explain physicians' increased willingness to refer gatekeeping patients. Another explanation for this finding could be measurement error associated with the items used to measure parental desire for referral; however, it is likely that this error would be equally distributed between patients in gatekeeping and nongatekeeping health plans.

Because this study did not disentangle other aspects of managed care (eg, financial incentives and utilization review) from gatekeeping arrangements, we cannot conclude that gatekeeping requirements are solely responsible for the effects on the referral process shown in this study. It is possible that the effect of gatekeeping is a result of its correlation with other aspects of managed care constraints, such as capitation payment or aggressive utilization management. Primary care capitation payments in the absence of risk sharing for specialty services may provide incentives to refer patients to specialty care by limiting reimbursement for care delivered in the primary care setting. Further work is needed to clarify how specific managed care arrangements, singly or in combination, designed to influence the referral process, such as restricted provider networks, utili-

zation management, primary care gatekeeping, and patient or provider financial incentives, influence physicians' referral decisions.

Another possible explanation for the higher referral rate among gatekeeping patients is that physicians may be more likely to give a patient in a nongatekeeping plan a conditional referral, that is, asking the patient to see a specialist without another visit to the primary care physician if the health problem persists after a specified interval or if current treatment fails. Data from this study indicate, however, that the number of previous visits for the health problem leading to the referral was no different between the two groups, and physicians endorsed failed conventional treatment at similar rates for patients in both types of plans.

On average, physicians with ≥75% of patients in gatekeeping plans saw 4 more patients per practice-day than those with ≤25% patients in gatekeeping plans. Increased practice intensity could be associated with less time to manage patients in the primary care setting, thereby leading to more referral. However, we found no difference in the percentage of office visits referred for physicians with high and low levels of gatekeeping patients, nor did controlling for practice intensity in regression analysis change the size of the gatekeeping effect.

Although we adjusted for age and sex, unmeasured differences in patient mix, particularly health status and case mix, could explain the gatekeeping effect if sicker patients were more likely to choose plans with gatekeeping arrangements. Unfortunately, there is little information that bears on the extent or magnitude of this type of selection bias for children and adolescents.

One of the intended effects of gatekeeping is to reduce unnecessary referrals. Although our study did not examine appropriateness of referrals, results indicated that referrals for patients in gatekeeping plans versus nongatekeeping plans were similar in terms of the type of specialist referred to and reasons for referral. Further research is necessary to determine if gatekeeping arrangements have any effect on decreasing medically inappropriate referrals.

This study's results on coordination of care are striking in that they reflect poor integration and interphysician communication for all types of referrals. These findings indicate that regardless of the presence of gatekeeping, primary care physicians can improve the quality of the referral process by enhancing their coordination activities.

Improved coordination of patient care is another potential benefit of gatekeeping, which from a conceptual standpoint, facilitates primary care physician awareness and integration of all services a patient receives. Reduced self-referral among patients in gatekeeping health plans could serve to improve coordination overall by requiring a primary care physician to integrate or manage all services a patient receives. It is noteworthy that our study found that coordination of referrals made during office visits was more problematic among gatekeeping patients at the time the referral was made. We speculate that restricted provider networks associated with gatekeeping plans may explain these obstacles to effective coordination. Primary care physicians unfamiliar with the panel of specialists in a patient's health plan may be less likely to contact that consultant to schedule a referral visit or to provide information about the patient. This breakdown in coordination limits a primary care physician's ability to clarify the referral questions for the consultant and to provide background information on the history, previous evaluation, and management of the patient's health problem. Despite these difficulties in coordinating care when a referral was made, we did not identify differences between gatekeeping and nongatekeeping plans in coordination of referral episodes 3 months after the index visits.

Results from this study indicate that patients with Medicaid financing are more likely to be referred during office visits than those with private insurance. Higher referral rates for patients with Medicaid financing remained after control for patient characteristics, presence of gatekeeping arrangements, and features of the primary care physician's practice. More research is needed to determine if the higher referral rate for Medicaid patients is a result of a greater need for specialty care, because of a greater burden of morbidity.

This study was conducted in a practice-based research network composed of volunteer pediatricians. To examine the generalizability of this provider sample, we have compared our study population to pediatricians in the 1989 to 1994 National Ambulatory Medical Care surveys, a nationally representative sample of visits to pediatricians in the United States.[15] Results from this analysis indicated that patient visits in our study population were referred at similar rates overall and for specific age, sex, and diagnosis groups compared with the national sample of pediatricians.

## CONCLUSIONS

In summary, as market penetration of gatekeeping insurance plans increases, primary care pediatricians can expect to make more referrals during office visits. An important implication of this finding is that primary care practices may need to hire additional administrative staff to assist physicians with coordination of an increasing volume of referrals. Our results call into question whether the current generation of gatekeeping plans in the United States reduces referrals to specialists while improving the coordination of care. Clear evidence that gatekeeping reduces health care costs is currently lacking. Therefore, the policy challenge for designers of the ambulatory care systems of the future will be to optimize the beneficial aspects of gatekeeping, while removing obstacles that hinder primary care physicians' ability to be a cost-effective advocate for their patients.

## APPENDIX

The pediatric practices or individual practitioners who participated in this study are listed here by AAP chapter: 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 LA (Lake Charles); Massachussetts, Pediatric Associates of Norwood (Norwood), Burlington Pediatric Associates (Burlington), Framingham Pediatrics, PC (Framingham); Maryland, Children's Medical Group (Cumberland), Steven Caplan, MD (Baltimore), Coleman, Coleman, & Sachs (Rockville), Clinical Associates Pediatrics (Towson), Andorsky, Finkelstein and Cardin (Owings Mills), Christopher Forrest, MD (Baltimore); Michigan, IHA Livingston Pediatrics (Howell), Lee & Kim Associates (Warren), Anuradha Sundararajan, MD (St Ignace), Pediatric Associates of Farmington, PC (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 & Adolescent Medicine (Exeter), Laconia Clinic (Laconia), Lahey-Hitchcock Clinic (Concord), Exeter Pediatric Associates (Exeter); New Jersey, Delaware Valley Pediatric Assoc, PA (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 & Adolescents (Oxford), Children's Hospital Physicians (Twinsburg), South Dayton Pediatrics, Inc (Dayton), North Central Ohio Family Care (Galion); Oklahoma, Pediatric & 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, PC (Stafford), Fishing Bay Family Practice (Deltaville), Drs Casey, Goldman, Lischwe, Garrett & 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 SC (Beloit), Gundersen Clinic (La Crosse), Gundersen 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).

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