Primary Care and Emergency Department Decision Making

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Objective: To determine the effect of primary care status on decision making in the pediatric emergency department (ED).

Setting: Urban tertiary care children's hospital.

Design: Examining physicians prospectively completed questionnaires describing the presence of and their familiarity with patients' primary care providers (PCPs), as well as several relevant clinical factors.

Patients: We prospectively surveyed care for patients with triage temperature of 38.5°C or higher or symptoms of gastroenteritis between August 1, 1999, and February 15, 2000.

Outcome Measures: Intravenous fluid use, hospital admission status, rates of diagnostic testing and interventions, mean total costs, and length of ED stay.

Results: Among 1166 nonreferred patients, no PCP was identified for 164 patients and PCPs for 1002. The groups did not differ on ethnicity, mean age-adjusted vital signs, triage category, initial appearance, patient care setting (main ED or urgent care clinic), time of day, day of week, certainty of diagnosis, or perceived importance of follow-up. Mean unadjusted direct hospital costs for diagnostic testing were significantly higher for the group without PCPs, \$23 vs \$16. In regression models controlling for age, ethnicity, insurance status, patient care setting, ED attending physician, temperature, and initial appearance, the absence of a PCP was associated with an increased likelihood of diagnostic testing. Compared with a subset of the cohort with PCPs who were familiar to the treating physicians, the group without PCPs also had a significantly higher rate of intravenous fluid administration.

Conclusion: In this patient population, ED physicians may vary their assessment and management decisions based on primary care status.

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LACK OF a primary care provider (PCP) is a well established problem in the United States.[1] Numerous studies[2-11] have described the adverse effects of episodic and discontinuous care on the health of underinsured children from low-income families. Although the magnitude of the effect is unknown, it is often argued that inadequate access to a PCP also increases health care costs by directing the care of low-acuity concerns away from a low-cost office setting to a less efficient emergency department (ED).[12-14] Also unknown are the ways in which the absence of a reliable provider of follow-up care may affect medical decision making during an ED visit. Still, numerous studies[15-22] have noted that physicians' decisions are based on many nonmedical factors. It is conceivable that patients of comparable acuity are managed differently if they have no PCP, further contributing to ultimate societal costs.

Identification of such an effect would have public policy implications. In the absence of gatekeeping or triage mechanisms, attachment to a PCP may decrease unnecessary ED resource use. Conversely, independent of traditional measures of acuity, EDs caring for a large proportion of underserved children could justifiably demand a higher level of reimbursement for such visits.

By prospectively analyzing the care of patients in our ED, we sought to determine the effect of perceptions of reliable follow-up on physicians' decision making. Our hypothesis was that the presence of and familiarity with a PCP were associated with variations in ED assessment and management.

RESULTS

During the study, 1284 data forms were completed for eligible patients. One hundred eighteen patients had been directly

PATIENTS AND METHODS

This study took place in an urban, university-affiliated pediatric ED. The annual patient volume approximated 40 000 visits. Patients presenting to the ED were triaged and placed in either the main ED or the urgent care clinic per usual protocol. A data collection sheet was attached to every medical chart. During the study, August 1, 1999, through February 15, 2000, physicians providing care in the ED and urgent care clinic were pediatric, family practice, and emergency medicine residents and board-certified pediatricians. Attending physicians and fellows also completed portions of the data collection forms and supervised the resident physicians. All physicians were blinded to the specific goals of the study.

Inclusion criteria were age younger than 18 years, absence of chronic illness, and either triage temperature of 38.5°C or higher or symptoms of gastroenteritis. Chronic illness was defined as the presence of a tracheostomy, developmental delay, seizures, sickle cell anemia, cancer, a transplant, metabolic disease, human immunodeficiency virus, or a ventriculoperitoneal shunt. Physicians then provided data regarding the patient's clinical appearance, whether the caregiver could identify a PCP for the patient, and the name of that PCP or clinic site, if applicable. If a PCP was identified, the physicians (attendings and residents) also recorded whether they considered this PCP or clinic "familiar" to them; if so, they noted their opinion of the accessibility and quality of that PCP. Definitions of each of these variables were based on each provider's own interpretation of the variable (eg, "familiar" PCP). Physicians also indicated whether the PCP had seen the patient in the last week or had telephoned in a referral, and if contact with the PCP had changed the patient's ED workup or management.

The primary investigator (J.E.M.) then reviewed the medical records and further screened the charts for inclusion criteria. Several patients who had chronic illnesses other than those defined in the previous paragraph were excluded from the study. Information extracted from the medical records detailed the patients' age, ethnicity, insurance status, vital signs, and triage category. Details of the clinical course also extracted from the medical record included diagnostic tests ordered, intravenous (IV) fluid and parenteral medication administration, hospital admission and discharge times, final disposition, and which attending and resident physicians saw the patient. Total diagnostic test costs were calculated using a table of direct costs from the hospital's laboratory and radiological cost centers.

The hospital's institutional review board reviewed and approved the protocol.

Data were input using available software programs (Epi Info version 6.02; Centers for Disease Control and Prevention, Atlanta, Ga; and Microsoft Excel 97; Microsoft Corp, Redmond, Wash). Data were then imported to a statistical software program (SPSS version 10.0.5; SPSS Inc, Chicago, Ill) for analysis. Continuous variables were analyzed using analysis of variance; when the variable was not normally distributed, a Kruskal-Wallis test was performed (age and cost). χ^2 Tests were used for initial analysis of categorical data. Linear regression models were used in analyzing continuous variables, incorporating patients' age, vital signs, initial appearance, ethnicity, language, insurance status, patient care setting, and ED attending physician, to produce adjusted means for patient costs and lengths of ED stay. For categorical variables (any intervention, hospital admission status, and incidence of IV fluid or medication administration), multinomial logistic regression models were constructed using the same variables. In addition, both regression analyses used backward elimination to construct parsimonious models.

referred to the ED by their PCPs. These patients were excluded because their PCPs, in many cases, had dictated specific components of a care plan, influencing medical decision making. This left 1166 patient encounters appropriate for analysis. Nine hundred seventy-two patients (83.4%) were seen in the main ED, and 194 patients (16.6%) were seen in the urgent care clinic. A random surveillance of inappropriately excluded patients was conducted approximately 1 day every 2 weeks during the study; this yielded 60 medical charts. Daily inclusion rates for eligible patients ranged from 60% to 90%. Physicians' failure to complete the forms or failure of the clerical staff to place forms on the medical charts were the main reasons for the failure to enroll potentially eligible subjects.

Data collected from the inappropriately excluded patients' medical records revealed no differences between the included and missed patients in ethnicity, insurance status, patient care setting, or vital signs. The missed group was significantly younger than the included group; median ages were 21 vs 25 months ($P<.01$).

The group without PCPs was compared with the group with PCPs. Demographic and clinical data for the 2 cohorts are presented in **Table 1**. The patients without PCPs were less likely to speak English (65.2% vs 84.5%, $P<.01$). They were also less likely to be insured (18.9% vs 10.1%, $P<.01$). The cohort without PCPs was slightly older (median age, 49 months) than the cohort with PCPs (median age, 38 months). The 2 cohorts did not differ significantly regarding ethnicity, sex, patient care setting (ED vs urgent care clinic), initial clinical appearance, vital signs, certainty of diagnosis, or need for follow-up.

Subsequently, the cohorts were further analyzed in subgroups; 461 patients (39.5%) had a PCP classified as "familiar" to the ED attending physician or fellow and 541 patients (46.4%) had an "unfamiliar" PCP, with 164 patients (14.1%) identifying no PCP.

Emergency department providers contacted 575 (57.4%) PCPs during the patients' ED stays and indicated that direct input from the PCPs altered ED diagnostic assessment or management in 1.2% of visits.

Within the cohort of patients with PCPs, ED providers indicated that they had "good" or "excellent" confidence in the history provided by the family in 82.0% of cases vs only 61.6% within the cohort without PCPs ($P<.01$). Furthermore, in 87.1% of patients with PCPs, the treating physician had "good" or "excellent" confidence in the family's ability to comply with the follow-up instructions, compared with only 72.0% of patients without PCPs ($P<.01$).

Table 1. Demographic and Clinical Data*

	PCP (n = 1002)	No PCP (n = 164)	*P* Value
Ethnicity			.70
White	136 (13.6)	20 (12.2)	
Black	164 (16.4)	33 (20.1)	
Hispanic	509 (50.8)	82 (50.0)	
Other or unknown	193 (19.3)	29 (17.7)	
Family speaks English	847 (84.5)	107 (65.2)	<.01
Insurance			<.01
Commercial	319 (31.8)	37 (22.6)	
Medicaid	582 (58.1)	96 (58.5)	
None	101 (10.1)	31 (18.9)	
Sex			.30
Male	526 (52.5)	79 (48.2)	
Female	476 (47.5)	85 (51.8)	
Initial appearance			.50
Well or mildly ill	961 (95.9)	155 (94.5)	
Moderately ill or toxic	41 (4.1)	9 (5.5)	
Triage category			.83
Well	885 (88.3)	147 (89.6)	
Stable	116 (11.6)	17 (10.4)	
Urgent	1 (0.1)	0	
Patient has clear diagnosis	740 (73.9)	110 (67.1)	.26
Patient requires follow-up	549 (54.8)	89 (54.3)	.77
Clinical characteristics (±SD)			
Median age, mo	38 (±40)	49 (±49)	.01
Mean temperature, °C	38.1 (±1.3)	38.1 (±1.2)	.45
Mean heart rate, age adjusted	138 (±1)	137 (±2)	.48
Setting			.13
ED	842 (84.0)	130 (79.3)	
Urgent care clinic	160 (16.0)	34 (20.7)	
Seen by PCP in last 7 days	128 (12.8)	NA	NA
PCP contacted by ED	575 (57.4)	NA	NA
Changes made by PCP contact	12 (1.2)	NA	NA
High ED physician confidence in history	822 (82.0)	101 (61.6)	<.01
High ED physician confidence in family's ability to comply	873 (87.1)	118 (72.0)	<.01

*Data are given as number (percentage) unless otherwise indicated. PCP indicates primary care physician; ED, emergency department; and NA, not applicable. Not all percentages sum to 100 because of rounding.

Table 2. Comparison of Emergency Department Management of Patients Grouped by Primary Care Physician (PCP) Status*

	PCP (n = 1002)	No PCP (n = 164)	*P* Value
Intravenous hydration	84 (8.4)	21 (12.8)	.07
Admitted	33 (3.3)	13 (7.9)	<.01
Incidence of any testing	342 (34.1)	76 (46.3)	<.01
Mean (±SD) test cost per patient, $	16 ± 36	23 ± 42	<.01
Mean (±SD) length of stay, min	125 ± 97	143 ± 130	.07
Median length of stay, min	100	110	.08

*Data are given as number (percentage) unless otherwise indicated.

Table 2 presents the unadjusted analysis of ED management across the cohorts with and without PCPs. Incidence of hospital admission, diagnostic testing, and mean test cost per patient varied significantly; incidence of IV hydration and mean length of ED stay did not differ. The length of ED stay for the cohort without PCPs ranged from 25 to 1280 minutes; the interquartile ranges were 75, 110, and 189 minutes. The length of ED stay for the cohort with PCPs ranged from 25 to 1480 minutes; the interquartile ranges were 70, 100, and 155 minutes.

Table 3 details the adjusted differences in ED assessment and management, comparing the 2 cohorts with each other (with vs without PCPs) and the cohort without PCPs with the group with familiar PCPs. Regression models incorporated patients' age, vital signs, clinical appearance, ethnicity, language, insurance status, patient care setting, and ED attending physician. The mean length of the ED visit was adjusted for hospital admission status.

Compared with the cohort with PCPs, the cohort without PCPs was more likely to have had a diagnostic test performed in the ED (OR, 1.8; 95% CI, 1.2-2.8). Although there was a trend toward greater resource use in the cohort without PCPs, differences in mean diagnostic test costs (mean difference, 28%; 95% CI, −11 to 68), likelihood of hospital admission (OR, 2.0; 95% CI, 0.8-5.4), and use of IV hydration (OR, 1.8; 95% CI, 0.9-4.0) did not reach statistical significance. There was also a trend toward a longer mean length of ED stay for the cohort without PCPs (mean difference, 10 minutes; 95% CI, −11 to 31).

When the groups with and without PCPs were compared in the same regression models, the group without

PCPs was significantly more likely to have received IV fluids (OR, 4.9; 95% CI, 1.8-12.8) and undergone diagnostic testing (OR, 1.8; 95% CI, 1.1-2.9) than the group with familiar PCPs. The 2 groups did not differ significantly regarding likelihood of hospital admission, mean diagnostic test costs, or mean length of ED stay. Within the cohort with PCPs, the patients with and without familiar PCPs were not significantly different regarding IV fluid administration, diagnostic testing, hospital admission, diagnostic test costs, or length of ED stay.

COMMENT

The interplay between PCPs and ED physicians is complex. Few would disagree that the interests of patients are well served through a constructive collaboration between these 2 groups. This collaboration begins with an understanding of the role that each will play in the management of an acute illness. However, when patients have no PCP, the ED physician must do without a valuable resource.

For the population studied, ED physicians may have varied their approach based on the patient's primary care status. These variations remained after controlling for numerous clinical and demographic factors, including acuity and insurance status. Lack of access to a PCP, in itself, was a risk factor for more extensive ED evaluations. Also, the ED physician's familiarity with a PCP may influence diagnostic testing and interventions in the ED.

At first glance, it may seem intuitive that uncertainty regarding reliable follow-up should prompt more diagnostic testing. However, before our study, a reasonable counterhypothesis existed that the input of PCPs might encourage additional resource use and, therefore, raise costs in treating patients with PCPs, including those who were nonreferred. It was conceivable that the PCPs, unable to acutely evaluate their patients, would urge the ED staff to manage these patients more conservatively. Although there were anecdotal examples of "unnecessary" diagnostic testing and administration of IV fluids or parenteral antibiotics at the insistence of PCPs, contact with the PCP rarely changed the ED course and had no effect on total costs.

The effects of primary care status on ED decision making have important public policy implications. The role of managed care organizations as gatekeepers to ED care is becoming increasingly unpopular. Nevertheless, it is argued that substantial savings are realized by redirecting nonurgent complaints to the office setting.[22,23] Our findings do not dispute this claim. However, we suggest that some of the decreased ED resource use evident in these models may be because of the identification of a PCP for these patients.

Third-party payers, including government, have attempted to develop measures of patient complexity and medical decision making. Our findings indicate that primary care status should be considered in these analyses. Independent of the other clinical and demographic factors, lack of a PCP complicated ED decision making. Acknowledgment of this effect may assist urban EDs in seeking adequate reimbursement for patient visits.

By confining our study to generally healthy children and adolescents with a narrow range of complaints (ie, fever or symptoms of gastroenteritis), we identified similar cohorts of patients. We recorded the patients' age, vital signs, triage level, and general appearance to quantitate their severity of illness and included these in our regression models. However, various clinical or historical variables may have remained unmeasured.

Table 3. Adjusted Differences in Emergency Department (ED) Management Based on Primary Care Physician (PCP) Status*

	No PCP vs PCP	No PCP vs Familiar PCP
Odds ratio		
Use of intravenous hydration	1.8 (0.9-4.0)	4.9 (1.8-12.8)
Likelihood of admission	2.0 (0.8-5.4)	2.6 (0.8-8.6)
Likelihood of any testing	1.8 (1.2-2.8)	1.8 (1.1-2.9)
Difference		
Mean test cost, %	28 (−11 to 68)	34 (−9 to 77)
Mean length of stay, min†	15 (−2 to 33)	10 (−11 to 31)

*Data are given as adjusted difference (95% confidence interval). Models incorporate patient age, vital signs, initial appearance, ethnicity, language, insurance status, patient care setting, and ED attending physician.
†Adjusted for admission status.

Unfortunately, the missed group of inappropriately excluded patients was significantly younger than the included group. Our surveillance on these excluded patients was basic; collecting detailed data on every patient would have been time-consuming without the certain gain of useful information. We believe that our results might have been more significant had we captured this group of younger patients, but this is only speculative. We think that this group may have been at higher risk for the interventions described herein, and inclusion of them would have strengthened our findings. Nevertheless, because of the size of our study population, our data accurately represent the medical decision making in our ED.

Although we recognize that ethnicity as a single independent variable in our models is a crude and incomplete measure,[24] it was important to include it because it represented information that was readily available to ED decision makers. Our attempts to isolate the effects of primary care status also prompted us to include insurance status as an additional independent variable. However, primary care status likely covaried with other important variables not directly measured, such as parental income and educational levels, language and cultural barriers, single-parenting, and lack of transportation.[25] Our results do not establish a direct, causative link between increased ED resource use and the content of primary care; rather, the inability to identify a PCP may serve as a marker for socially disadvantaged patients, for whom more extensive evaluation is indicated.

We made no effort to independently verify a caregiver's report of the patient's primary care status. Undoubtedly, some patients with a PCP were misclassified into the group without PCPs (and vice versa). However, because our outcomes of interest were measures of medical decision making, our main independent variable was the ED physician's perception of the patient's primary care status.

What This Study Adds

Lack of access to a PCP adversely affects the health of children. Primary care providers may also reduce societal costs by directing nonurgent patients away from the ED. However, it is unclear how attachment to a PCP affects medical decision making in the ED.

Despite controlling for multiple clinical and demographic factors, children and adolescents without a PCP had higher rates of ED resource use. This effect was independent of gatekeeping and triage mechanisms. Conversely, a previously undescribed additional cost to EDs caring for underserved populations has now been documented.

Future research can answer many questions regarding the way ED physicians and PCPs practice as part of an integrated medical community. Focusing on the evaluation and management of specific disease states or compiling larger data sets may disclose more differences than those described herein. Yet, our findings demonstrate the effect a PCP may have on ED management. This previously unstudied effect on health care delivery has public health implications. It highlights the cost savings associated with accessible primary care and contains an important message for government agencies and other payers who reimburse providers of urgent and emergency care to underserved populations.

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REFERENCES

1. Newacheck PW, Hughes DC, Stoddard JJ. Children's access to primary care: differences by race, income, and insurance status. *Pediatrics.* 1996;97:26-32.
2. Chessare JB. Utilization of emergency services among patients of a pediatric group practice. *Pediatr Emerg Care.* 1986;2:227-230.
3. DeAngelis C, Fosarelli P, Duggan AK. Use of the emergency department by children enrolled in a primary care clinic. *Pediatr Emerg Care.* 1985;1:61-65.
4. Halperin R, Meyers AR, Alpert JJ. Utilization of pediatric emergency services. *Pediatr Clin North Am.* 1979;26:747-757.
5. Chande VT, Krug SE, Warm EF. Pediatric emergency department utilization habits: a consumer survey. *Pediatr Emerg Care.* 1996;12:27-30.
6. St Peter RF, Newacheck PW, Halfon N. Access to care for poor children: separate and unequal? *JAMA.* 1992;267:2760-2764.
7. Lowe RA, Young GP, Reinke B, White JD, Auerbach PS. Indigent health care in emergency medicine: an academic perspective. *Ann Emerg Med.* 1991;20:790-794.
8. Clancy CM, Eisenberg JM. Emergency medicine in population-based systems of care. *Ann Emerg Med.* 1997;30:800-803.
9. Weitzman M, Moomaw MS, Messenger KP. An after-hours pediatric clinic for an entire urban community: utilization and effectiveness of follow-up care. *Pediatrics.* 1980;65:964-970.
10. Fosarelli P, DeAngelis C, Kaszuba A. Compliance with follow-up appointments generated in a pediatric emergency room. *Am J Prev Med.* 1985;1:23-29.
11. Vivier PM, Lewander WJ, Block SH, Simon PR, Alario AJ, Linakis JG. Is continuity of care preserved in children who utilized the pediatric emergency department? *Pediatrics.* 1995;95:37-41.
12. Hurley RE, Freund DA, Taylor AM. Emergency room use and primary care case management: evidence from four Medicaid demonstration programs. *Am J Public Health.* 1989;79:843-846.
13. Piehl MD, Clemens CJ, Joines JD. Decreasing emergency department use by children enrolled in the Medicaid program by improving access to primary care. *Arch Pediatr Adolesc Med.* 2000;154:791-795.
14. Gadomski AM, Perkis V, Horton L, Cross S, Stanton B. Diverting managed care Medicaid patients from pediatric emergency department use. *Pediatrics.* 1995;95:170-178.
15. Hampers LC, Cha S, Gutglass D, Krug SE, Binns H. The effect of price information on test-ordering and patient outcomes in a pediatric emergency department. *Pediatrics.* 1999;103:877-882.
16. McLeod PJ, Tamblyn RM, Gayton D, et al. Use of standardized patients to assess between-physician variations in resource utilization. *JAMA.* 1997;278:1164-1168.
17. Lawthers AG, Localio AR, Laird NM, Lipsitz S, Hebert L, Brennan TA. Physicians' perceptions of the risk of being sued. *J Health Polit Policy Law.* 1992;17:463-482.
18. Macario A, Roizen MF, Thisted RA, Kim S, Orkin FK, Phelps C. Reassessment of preoperative laboratory testing has changed the test-ordering patterns of physicians. *Surg Gynecol Obstet.* 1992;175:539-547.
19. Scholer SJ, Pituch K, Orr DP, Clark D, Dittus RS. Effect of health care system factors on test ordering. *Arch Pediatr Adolesc Med.* 1996;150:1154-1159.
20. McGillivray DL, Roberts-Brauer R, Kramer MS. Diagnostic test ordering in the evaluation of febrile children. *AJDC.* 1993;147:870-874.
21. Krug SE, Paul RI, Chessare JB, Christopher N, Satkowiak L. Hospital admissions of children from the emergency department: are decisions regarding children on public assistance different? *Pediatr Emerg Care.* 1997;13:87-91.
22. Starfield B, Powe NR, Weiner JR, et al. Costs vs quality in different types of primary care settings. *JAMA.* 1994;272:1903-1908.
23. Baker LC, Baker LS. Excess cost of emergency department visits for nonurgent care. *Health Aff (Millwood).* 1994;13:162-171.
24. Rivara FP, Finberg L. Use of the terms *race* and *ethnicity* [editorial]. *Arch Pediatr Adolesc Med.* 2001;155:119.
25. Hampers LC, Cha S, Gutglass DJ, Binns HJ, Krug SE. Language barriers and resource utilization in a pediatric emergency department. *Pediatrics.* 1999;103:1253-1256.