

# Placement Changes and Emergency Department Visits in the First Year of Foster Care

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**ABSTRACT.** *Objectives.* Despite great needs, many children in foster care do not receive adequate medical care. Suboptimal care may be attributable in part to placement changes, which disrupt continuity of care by both a consistent surrogate parent and potentially a primary care physician. These disruptions in turn may lead to increased use of the emergency department (ED) for outpatient care. The primary aim of this study was to test whether a greater rate of placement changes was associated with increasing use of the ED among children in their first year of foster care. The secondary aim was to compare ED visit rates with rates of visits to other ambulatory care settings among children in foster care and other Medicaid-eligible children not in foster care.

*Methods.* Using Medicaid claims linked to foster care administrative data, we assembled a retrospective cohort of foster children in a large urban municipality from 1993 to 1996. Eligible children spent at least 9 months in a new episode of foster care and were continuously eligible for Medicaid during a 1-year follow-up period. A comparison cohort was drawn from Medicaid-eligible children not in foster care during fiscal year 1995. The dependent variable was the rate of visits to the ED or other ambulatory care settings during a 1-year follow-up period. A negative binomial model estimated visit rates to the ED and other ambulatory care settings as the number of foster care placements increased. Potential interactions were considered between age and location of service use (ED or ambulatory care setting), between age and foster care placements, and between location of service use and number of foster care placements.

*Results.* The 2358 children in the sample accounted for 1206 ED visits during the follow-up period; 38% experienced  $\geq 2$  placement changes. Children of all ages exhibited increasing reliance on the ED for ambulatory care services as the number of placements increased, with the rates of ED use more than doubling for all age groups beyond infancy. However, other ambulatory care service use increased by only 41% to 53%; there was much less utilization in these nonemergency settings for all children but particularly toddlers and infants, compared with their Medicaid-eligible peers. Although the abso-

lute rates of all visits for younger foster children (<6 years of age) were low, older foster children had increasingly greater ED use than did their Medicaid-eligible peers, with nearly double the rate of ED visits in the adolescent age group. A temporal relationship between placements and ED visits was also identified; 75% of ED visits occurring within 3 weeks of a placement change occurred in the period after a placement change.

*Conclusions.* Foster children received fewer overall outpatient services than did their Medicaid-eligible peers, but with age and increasing numbers of placements, had higher visit rates and received a greater proportion of their overall outpatient care in the ED. These results suggest that poor access to nonemergent ambulatory care settings might have contributed to an increasing reliance on ED settings as foster care placements increased. The temporal relationship between ED visits and placement changes underscores the need for better health care management for foster children, particularly in the period after placement changes. *Pediatrics* 2004; 114:e354–e360. URL: <http://www.pediatrics.org/cgi/content/full/114/3/e354>; foster care, emergency department, health services.

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ABBREVIATIONS. ED, emergency department; AAP, American Academy of Pediatrics.

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The nearly 550 000 children living in our foster care system<sup>1</sup> are much more likely to have mental health and chronic medical problems, compared with their peers.<sup>2–7</sup> Addressing these needs requires good access to health care services, which is often problematic, because children in foster care are frequently moved between homes. These relocations, known as placement changes, may disrupt continuity of care at 2 levels, with both the surrogate parent and potentially the primary care provider being at risk for changing with each placement change. The disruption in continuity of care at these 2 levels may explain in part why, according to a 1995 federal report, 12% of foster children <3 years of age received no routine care, 34% received no immunizations, and 32% continued to have unmet needs after placement.<sup>8</sup>

One approach to improving the quality of care for children who experience placement changes while in foster care, as articulated by recent policy statements by the American Academy of Pediatrics (AAP), is to create a “medical home” for each child. The implicit assumption is that these children would benefit from a system of care that maximized their service use in a continuous ambulatory care setting and minimized

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service use in settings with poorer continuity of care, such as the emergency department (ED).<sup>9</sup> The AAP has thus supported the creation of specialized health programs that are effective in identifying the special needs of these children<sup>10</sup> and other initiatives to ensure clear complete communication among physicians after placement changes.<sup>2,11</sup>

A population-level quality indicator that might assess how well a health and social service system promotes medical homes and overall quality of care focuses on the use of the ED for outpatient services. If a considerable proportion of children's care takes place in the ED, then it is likely that their medical care is less coordinated and continuous; their overall health may suffer as a result. In support of this argument, ED visits have been associated with incomplete well-child care,<sup>12</sup> underimmunization,<sup>13</sup> and poor continuity of care.<sup>14</sup>

We reasoned that the design and targeting of services for children in foster care could be improved with a better understanding of the relationship between foster children's placement changes and their use of the ED for ambulatory care services. A previous exploratory analysis of foster children in the state of Washington suggested that placement changes were associated with ED use among children, but the magnitude of this relationship and its importance for health policy planning were not considered.<sup>15</sup> We therefore conducted a population-based, retrospective, cohort study between 1993 and 1996, hypothesizing that children with multiple placements were more likely to seek services in the ED than in other ambulatory care settings.

## METHODS

We identified a sample of children who 1) entered a new episode of foster care in a large urban municipality between July 1, 1993, and June 30, 1995, 2) spent  $\geq 9$  months in foster care, and 3) were continuously eligible for Medicaid services for a 1-year follow-up period after entry into foster care. Continuous eligibility was defined as eligibility for Medicaid services for  $\geq 9$  months during the follow-up period. This assumption allowed us to account for possible administrative lapses in Medicaid eligibility attributable to familial sanctions or nonuse of services, which might have falsely excluded children who used fewer services during the year.<sup>16,17</sup> The study follow-up period could not be extended beyond 1996, when most Medicaid-eligible residents in the study region enrolled in capitated managed care and associated encounter data became unavailable.

Foster care administrative data from the Department of Public Welfare were linked with state Medicaid data in a 3-stage process. First, data were linked by using Social Security numbers; these matches accounted for 67% of the sample. If a match according to Social Security number failed, then a unique identifier was created from each child's name, date of birth, and gender; this process accounted for an additional 17% of the sample. When these data were not available, a combination of the first placement date and date of birth was used to create a match to the starting date of Medicaid eligibility and date of birth in the Medicaid claims data; this process accounted for an additional 9% of the sample. The latter merge capitalized on the common practice in our community of retroactively making foster children eligible for Medicaid on their placement dates. Only children whose foster care and Medicaid data were linked successfully with 1 of these methods (93% of the eligible children) were included in the study. All data were checked for duplicates, to ensure that each child was correctly identified and was represented in the cohort only once. The linkage process was also validated by comparing the equivalence of each linkage method for identifying the same Medicaid identi-

fier when  $\geq 1$  linkage method was successful for an individual child.

The primary dependent variable was the number of annual visits to the ED and other ambulatory care settings. Visits were identified from physician claims by using procedural codes specific to the ED and other ambulatory care settings. The primary predictor variable was the number of placements that a child experienced during the year. The primary covariate was the age of the child, which in prior studies was highly associated with service use in the ED and other ambulatory care settings.<sup>18,19</sup> Age was categorized into 4 mutually exclusive groups, ie, infants (0 to <2 years of age), preschool-aged children (2 to <6 years of age), early school-aged children (6 to <11 years of age), and adolescents (11 to 18 years of age).

The data were structured hierarchically with 2 observations for each child, 1 that encoded the number of visits to the ED and 1 that encoded the number of visits to other ambulatory care settings. The dependent variable became the number of visits, and a covariate specified whether those visits occurred in the ED or another ambulatory care setting. Negative binomial regression for each child estimated the association of multiple placements with rates of visits to the ED and ambulatory care settings, after accounting for the contribution of age to the likelihood of service use in each setting. Variance estimates accounted for repeated observations for the same child. Arranging the data with 2 observations for each child and clustering the analysis for each child permitted the estimation of visit rates according to individual visit type (ED versus other ambulatory care setting) as the number of placements increased. The length of time a child was in foster care during the year (0.75–1 year) provided the exposure time for the model, to account for the potential bias that visit rates might have been underestimated among children who spent less time in foster care. Race was excluded from multivariate analysis because our population was >85% African American, thus limiting our ability to conduct subgroup analyses for other racial groups. Gender was excluded from the analysis because it was not associated with service use in a univariate analysis. Tests for interaction were performed on the basis of the a priori hypotheses that 1) the age of the child might affect ambulatory care setting and ED use differently and 2) the number of placements might affect ambulatory care setting and ED use differently.

The best-fitting multivariate model (as determined by comparing Akaike information criteria<sup>20</sup> for logistic, Poisson, 0-inflated Poisson, and negative binomial models) was a negative binomial model of the outcome of visit number, which included the primary exposure of placements and 2-way interactions between age and placements ( $P = .07$ ), age and visit type (ED versus other ambulatory care setting,  $P < .001$ ), and visit type and placements ( $P < .001$ ). The first interaction term was included because it was empirically important and because we found statistically significant differences in rate ratios estimated with individual interaction terms. This model allowed us to estimate visit rates, visit rate ratios, and ratios of ED/ambulatory care visits as the number of placements increased. This model also allowed us to test for significant trends in visit rates and ED reliance as placements increased; trends were considered significant if the inclusion of an ordinal variable for placements resulted in a  $P$  value of  $\leq .05$ .

To better understand the importance of the visit rates among the foster care cohort, a reference population was identified from a prior study of Medicaid-eligible children not in foster care who were continuously eligible for Medicaid for a 1-year period during fiscal year 1995–1996.<sup>21</sup> A negative binomial model with a 2-way interaction between age and location of visit was used to mirror the analysis for the children in foster care. This model replicated the estimation of visit rates and ratios of ED/ambulatory care visits stratified according to the age groups of the children in this study. No statistical comparison was made between the foster care and non-foster care populations; the visit rates for the non-foster care population only provided a reference for interpreting the rates for the foster care population.

All statistical analyses were performed with Stata 8.0 software (Stata Corp, College Station, TX). The study was approved by the institutional review boards of Children's Hospital of Philadelphia and the University of Pennsylvania. Permission to use the data was granted by a memorandum of understanding between the Center for Mental Health Policy and Services Research at the University of Pennsylvania and the Commonwealth of Pennsylvania.

## RESULTS

Of the 3906 adjudicated dependent children who entered foster care during the study period, 2358 children (60%) spent  $\geq 9$  months in foster care and were continuously Medicaid-eligible for the 1-year follow-up period. The majority of these children (65%) had at least 1 ambulatory care setting visit during the year, 28% had at least 1 ED visit, and 27% had no visits to any ambulatory care setting during the year. More than one-third of the children (38%) had  $>2$  placements during the year of observation (Table 1).

The 665 children with ED visits accounted for a total of 1206 visits to the ED during the study period (incident rate: 1.8 visits/year; 95% confidence interval: 1.71–1.92 visits/year). More than one-half of the ED visits among younger children ( $<6$  years of age) were for treatment of infectious or respiratory conditions, with only 12% for treatment of injuries (Table 2). Respiratory conditions such as asthma or bronchitis were much more common among these younger foster children than among their Medicaid-eligible peers (14.2% vs 5.9%,  $P < .001$ ). Among older children (school-aged children and adolescents  $\geq 6$  years of age), injuries were the predominant reason for ED visits and occurred more frequently than among the Medicaid-eligible peers (43.0% vs 30.9%,  $P < .001$ ). Mental health diagnoses accounted for 6.4% of diagnoses among the older foster children, with nonspecific somatic complaints (such as fatigue or malaise) accounting for an additional 11.9% of diagnoses in the same group.

Adjusted incident rates of ED and other ambulatory care setting visits are presented in Table 3. Among infants, there was no significant trend in ED or ambulatory care setting visit rates; beyond infancy, there was a significant trend of increasing utilization in the ED as placements increased ( $P$  value for trend of  $<.001$  for each age group). This increase in ED use was proportionally greater than the modest increase in service use in other ambulatory care settings (Table 4). Although the rate of ED visits more than doubled as placements increased ( $P$  value for trend of  $<.001$ ), visits to other ambulatory care settings increased by only 41 to 54% among children  $>2$  years of age with multiple placements.

The estimated rate ratios of ED/other ambulatory care visits provided more information regarding relative reliance on the ED for ambulatory care services (Table 5). With more dramatic proportional increases in ED use than other ambulatory care use for all age groups, a significant trend in increasing reliance on the ED for ambulatory care services was seen for all children in the cohort, with the ratio of visits increasing by  $>50\%$  for children of all ages ( $P$  value for trend of .01).

A comparison of visit rates between foster care and non-foster care populations also revealed that there was much less service use in other ambulatory care settings by all children in foster care, but particularly among the youngest children ( $<6$  years of age), compared with the sample of Medicaid-eligible children from 1995. Younger children in foster care also had less ED service use than did their Medicaid-eligible

**TABLE 1.** Characteristics of the Study Population ( $n = 2358$  Children) and Incident Rates of Visits to ED or Ambulatory Care Settings for Children With These Characteristics

Characteristic	Percent of Total Cohort	Incident Rate, No. of Visits/Child per y in Foster Care (95% CI)	
		ED Visits	Ambulatory Care Visits
Age, y			
0–1	30.7	0.80 (0.74–0.87)	4.21 (4.06–4.37)
2–5	23.7	0.26 (0.22–0.31)	2.31 (2.18–2.44)
6–10	21.0	0.24 (0.20–0.29)	1.53 (1.43–1.65)
11–18	24.6	0.62 (0.56–0.69)	2.04 (1.93–2.16)
Gender			
Male	50.9	0.53 (0.49–0.57)	2.70 (2.61–2.80)
Female	49.1	0.49 (0.45–0.53)	2.62 (2.52–2.71)
Race			
White	9.1	0.45 (0.37–0.55)	2.96 (2.73–3.20)
Black	85.2	0.51 (0.48–0.54)	2.60 (2.53–2.67)
Other	5.7	0.60 (0.47–0.74)	3.08 (2.80–3.40)
No. of placements			
1	21.5	0.44 (0.38–0.50)	2.85 (2.71–3.01)
2	40.8	0.49 (0.45–0.54)	2.63 (2.52–2.73)
3	22.1	0.48 (0.43–0.55)	2.55 (2.42–2.69)
4	10.2	0.63 (0.53–0.74)	2.47 (2.28–2.68)
$>4$	5.4	0.81 (0.66–0.98)	2.99 (2.70–3.31)
Medical foster care			
No	90.4	0.47 (0.44–0.50)	2.34 (2.27–2.41)
Yes	9.6	0.89 (0.77–1.01)	5.67 (5.37–5.99)
Had an ED visit			
No	71.8	0	2.42 (2.35–2.50)
Yes	28.2	1.81 (1.71–1.92)	3.27 (3.14–3.41)
Had an ambulatory care setting visit			
No	34.9	0.38 (0.34–0.42)	0
Yes	65.1	0.58 (0.55–0.62)	4.09 (3.99–4.19)

CI indicates confidence interval.

**TABLE 2.** Diagnoses Given to Foster Care and Non-Foster Care Children in the ED Setting, as a Percentage of All ED Visits

	Diagnoses, %					
	Injury	Mental Health	Somatic Complaint	Infectious	Respiratory	Other
Preschool-aged (<6 y)						
FC	11.9	0.6*	4.1*	43.2	14.2*	26.1
Non-FC	14.1	0.1*	10.1*	39.8	5.9*	30.4
School-aged (≥6 y)						
FC	43.0*	6.4	12.1*	13.9	4.2	20.4*
Non-FC	30.9*	4.5	17.3*	15.2	4.2	27.9*
Total						
FC	24.3	2.9	7.3*	31.5*	10.2*	23.8
Non-FC	22.9	2.4	13.8*	26.9*	5.0*	28.9

FC indicates foster care; Non-FC, non-foster care.

\* Statistical significance,  $P < .001$ , in comparison of foster care and non-foster care groups, with Bonferroni correction for multiple group comparisons.

**TABLE 3.** Incident Rates of ED and Other Ambulatory Care Setting Visits Among Children in the Year After Placement in Foster Care, According to Number of Placements

	Non-Foster Care Medicaid*	Incident Rate, No. of Visits/Child per y in Foster Care (95% CI)					P Value†
		Foster Care					
		1 Placement	2 Placements	3 Placements	4 Placements	>4 Placements	
0 to <2 y							
AMB	4.89 (4.58–5.23)	4.47 (3.93–5.09)	4.28 (3.91–4.68)	4.09 (3.60–4.66)	3.92 (3.19–4.81)	3.75 (2.80–5.02)	.352
ED	1.29 (1.17–1.42)	0.75 (0.63–0.89)	0.8 (0.71–0.90)	0.85 (0.73–1.00)	0.91 (0.71–1.15)	0.97 (0.69–1.35)	.244
2 to <6 y							
AMB	3.6 (3.42–3.79)	2.06 (1.74–2.15)	2.25 (2.00–2.52)	2.45 (2.18–2.75)	2.67 (2.25–3.17)	2.91 (2.27–3.74)	.06
ED	0.63 (0.58–0.68)	0.2 (0.15–0.26)	0.24 (0.20–0.30)	0.29 (0.24–0.37)	0.36 (0.27–0.47)	0.43 (0.30–0.62)	.001
6 to <11 y							
AMB	3.27 (3.09–3.46)	1.34 (1.10–1.63)	1.49 (1.30–1.70)	1.65 (1.46–1.87)	1.84 (1.53–2.21)	2.05 (1.56–2.68)	.04
ED	0.46 (0.42–0.51)	0.18 (0.14–0.24)	0.22 (0.18–0.29)	0.28 (0.22–0.35)	0.34 (0.26–0.46)	0.43 (0.29–0.62)	<.001
11–18 y							
AMB	3.31 (3.12–3.51)	1.77 (1.49–2.11)	1.95 (1.73–2.20)	2.14 (1.95–2.34)	2.35 (2.10–2.63)	2.58 (2.19–3.04)	.01
ED	0.49 (0.45–0.53)	0.44 (0.35–0.56)	0.54 (0.46–0.64)	0.66 (0.57–0.77)	0.81 (0.67–0.98)	0.99 (0.76–1.29)	<.001

CI indicates confidence interval; AMB, ambulatory care setting.

\* Comparison population drawn from Medicaid-eligible children not in foster-care during fiscal year 1995.

† P value for trend in incident rates as placements increase, analyzed only among foster children.

**TABLE 4.** Incident Rate Ratios of Ambulatory Care Setting and ED Visits in the First Year After Placement in Foster Care, According to Number of Placements

Age Group	Visit Type	Incident Rate Ratio* (95% CI)				
		1 Placement	2 Placements	3 Placements	4 Placements	>4 Placements
0 to <2 y	AMB	1	0.96 (0.87–1.05)	0.92 (0.76–1.10)	0.88 (0.66–1.16)	0.84 (0.58–1.21)
	ED	1	1.07 (0.96–1.19)	1.14 (0.92–1.41)	1.21 (0.88–1.67)	1.29 (0.84–1.98)
2 to <6 y	AMB	1	1.09 (1.00–1.19)	1.19 (0.99–1.42)	1.3 (0.99–0.70)	1.41 (0.98–2.02)
	ED	1	1.21 (1.08–1.36)	1.47 (1.17–1.85)	1.79 (1.27–2.53)	2.17 (1.37–2.44)
6 to <11 y	AMB	1	1.11 (1.01–1.23)	1.24 (1.01–1.52)	1.38 (1.02–1.87)	1.54 (1.03–2.31)
	ED	1	1.23 (1.09–1.39)	1.52 (1.20–1.92)	1.87 (1.31–2.67)	2.30 (1.43–3.70)
11 to 18 y	AMB	1	1.10 (1.02–1.18)	1.21 (1.05–1.40)	1.33 (1.08–1.65)	1.47 (1.10–1.95)
	ED	1	1.22 (1.10–1.34)	1.48 (1.22–1.80)	1.80 (1.35–2.42)	2.19 (1.49–3.24)

CI indicates confidence interval; AMB, ambulatory care setting.

\* Ratio of visit rates in each placement category to visit rates in reference category (1 placement).

peers (Table 3). Among the older children (≥6 years of age), however, the comparative rates were much different. Although other ambulatory care setting visit rates remained well below the rates among children not in foster care, ED visit rates became greater as the number of placements increased. This increase was most striking among the adolescents, with the rates of ED visits among children with >4 placements being more than twice the rates of ED visits among adolescents not in foster care. These trends of low use of other ambulatory care services and increasingly greater use of ED services led to the highest ED reliance ratios among school-aged children

and adolescents, whose ratios, as placements increased, far surpassed those of other Medicaid-eligible children (Table 5).

To delineate in more detail the temporal relationship between placements and health service use, we performed an additional analysis of our data with respect to the timing of visits (Fig 1). We evaluated any ED visit that occurred within 3 weeks before or after a placement change and found that, of the 1206 visits to the ED among the cohort, 298 visits (25%) met this criterion. The striking finding was that, among those visits, nearly 75% occurred in the period immediately after a placement change, suggest-

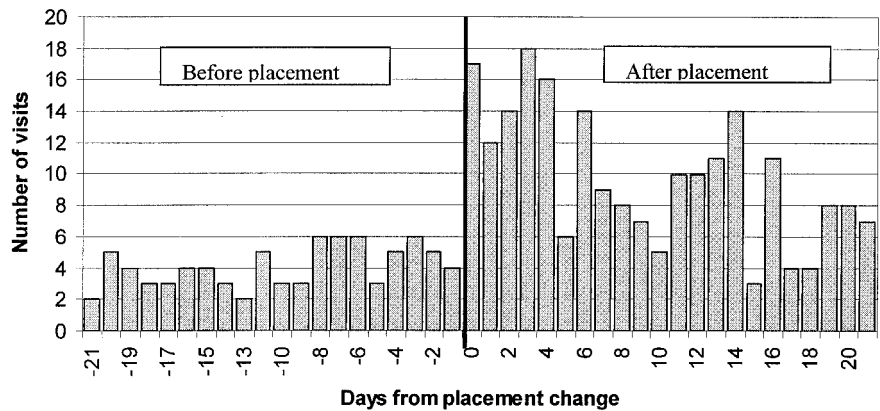
**TABLE 5.** Ratios of ED to Other Ambulatory Care Setting Visits as the Number of Placements Increase During the First Year of Foster Care

	ED/Ambulatory Care Setting Visit Ratio (95% CI)					
	Non-Foster Care Medicaid*	Foster Care				
		1 Placement	2 Placements	3 Placements	4 Placements	>4 Placements
0 to <2 y	0.26 (0.24–0.39)	0.17 (0.14–0.20)	0.19 (0.16–0.22)	0.21 (0.18–0.24)	0.23 (0.19–0.28)	0.26 (0.20–0.34)
2 to <6 y	0.18 (0.16–0.19)	0.1 (0.07–0.13)	0.11 (0.09–0.14)	0.12 (0.10–0.15)	0.13 (0.10–0.17)	0.15 (0.11–0.20)
6 to <11 y	0.14 (0.13–0.16)	0.14 (0.10–0.18)	0.15 (0.12–0.20)	0.17 (0.13–0.22)	0.19 (0.14–0.24)	0.21 (0.15–0.28)
11–18 y	0.15 (0.13–0.16)	0.25 (0.20–0.31)	0.28 (0.23–0.33)	0.31 (0.26–0.37)	0.35 (0.29–0.42)	0.39 (0.30–0.49)

CI indicates confidence interval.

\* Reference cohort of non-foster care, Medicaid-eligible children from fiscal year 1995.

**Fig 1.** Timing of ED visits that occurred within 21 days before or after a placement change ( $n = 298$  visits, of a total of 1206 visits during the follow-up period).



ing that placement changes were precipitating, in part, subsequent utilization of the ED.

### DISCUSSION

Our study demonstrated that foster children of all ages had increasing visits to and increasing reliance on the ED for outpatient care as their placements increased. There was also less utilization in other ambulatory care settings among all children, particularly toddlers and infants, compared with their Medicaid-eligible peers (Table 3). The overall result of underutilization in the ambulatory care setting and increasing visitation in the ED was an increasing reliance on ED settings as a source of outpatient care as placements increased. This reliance was most striking among the school-aged children and adolescents because their ED use surpassed the ED use of other children in the Medicaid program. Although the younger children also had increasing rates of ED visits, their use of services in both the ED and other ambulatory care settings was well below that of their Medicaid-eligible peers.

Despite the difficulty of identifying a comparable population with the same needs as children in foster care, there is still a benefit in measuring their health service use against other vulnerable children not in foster care. The underutilization of outpatient services among children in foster care, compared with other children in the Medicaid program, is particularly alarming given prior evidence that Medicaid-eligible children visit the ED at much greater rates and utilize other ambulatory care services at much lower rates than privately insured children.<sup>18,19,22</sup> An inference from this underutilization is that the increasing ED reliance we observed was likely attributable in part to the poor availability of nonemergent

ambulatory care settings for children entering foster care. This finding is also consistent with the findings of a General Accounting Office study from the same time period and suggests that these children may have received insufficient care.<sup>8</sup> The low rate of service use in other ambulatory care settings is also contrary to what might have been expected, given strong evidence of the greater health needs of these children, compared with children in Medicaid,<sup>2–7</sup> and additional evidence that children with medical problems,<sup>23,24</sup> developmental problems,<sup>25</sup> and mental health problems<sup>6,26–34</sup> are more likely to drift from placement to placement and spend considerable time in the foster care system.

By substantiating the hypothesis that children in foster care are more likely to have greater reliance on the ED for outpatient care, this study can assist policy-makers for foster care programs in designing interventions that target the specific needs of the foster care population. The low overall rate of service use in nonemergent settings provides direct evidence to support the AAP recommendation of mandatory health evaluations for all children entering foster care, with a comprehensive evaluation within 1 month after placement. Furthermore, children experiencing frequent placement changes might particularly benefit from programs to enhance continuity of health care, such as medical homes, which would remain constant despite changes in placement. The goal would be to minimize these higher-risk children's increased reliance on the ED and thereby improve the quality of their overall health care. Finally, the temporal association of ED visits with placement changes strongly suggests that families would benefit from improved access to nonemergent ambulatory settings, preferably with a consistent provider,

in the period immediately after placement changes. Some health care providers and local jurisdictions have also detected this need and have incorporated mandatory visits after placement changes into their routine practice.<sup>6</sup>

The nature of any intervention to improve the quality of health care services offered to children in foster care would depend on the underlying cause of the relationship between placement changes and ED visitation, which this study cannot determine. Conceivably, the placement change might traumatize the child physically and emotionally, precipitating acting-out behavior, which might lead to the high prevalence of injury diagnoses in the cohort. Alternatively, a lack of information regarding the child's health might precipitate acute exacerbations of existing conditions, which might have been prevented if the new caregiver was better informed; on the contrary, the lack of information provided to a foster care family might lead them to desire health care access as soon as possible, precipitating ED visits to identify the needs of the child when access to routine ambulatory care services is not available. Finally, the child welfare system may respond to placement changes by sending children to the ED for rapid health screening, rather than waiting for an office visit with a primary care physician in (ideally) the child's medical home. These 3 potential targets for intervention, ie, distressed children, new foster care parents, and the child welfare system, would each need specifically designed interventions to surmount their problems.

Targeted interventions to address the potential needs of these children could further be refined by noting the differences in service use according to age; specifically, school-aged children and adolescents in foster care had the greatest reliance on ED services, compared with their Medicaid-eligible peers. Other investigators have also observed that older children in foster care have greater mental health needs, with nearly 40% to 80% of older children meeting criteria for serious emotional or behavioral disorders at the time of entry into foster care.<sup>6,35-40</sup> There is also increasing evidence that children with significant behavioral and emotional problems utilize regular health services at much greater rates than their peers.<sup>41,42</sup> Therefore, our results offer important evidence to support the implementation of more comprehensive interventions, such as specialized health centers<sup>10</sup> or treatment foster care<sup>43</sup> (which includes weekly mental health services and in-home behavioral therapy), to serve those older children who are most at risk for suboptimal health care.

Our study has several shortcomings that warrant discussion. First, we could not perform case-mixture adjustments to account for the possibility that children with a greater burden of illness were more likely to have both multiple placements and increased service use. However, if illness were confounding the relationship between placement stability and service use, we would have expected greater nonemergency ambulatory care setting use than was observed. At the very least, though, more frequent placement changes remain a useful marker, in terms

of targeting interventions, indicating that a child is at increased risk of greater ED use and potential fragmented care. Second, the use of administrative data does not allow us to interpret with validity the reasons why families sought care in the ED or to identify the effects of mental health problems in precipitating greater ED use. Although we can provide some information regarding the diagnoses encountered in the ED, these data cannot adequately discriminate the level of urgency for individual visits. These remain important questions, and we hope our findings will lead to future research to target these questions more specifically. Finally, this retrospective cohort study of foster care children enrolled in fee-for-service Medicaid during the 1993-1996 period may not be applicable to foster care children who have been enrolled in managed care plans since 1997. However, there is no evidence that the relative effects of foster care placement changes on service use would be expected to change with the advent of managed care. Furthermore, recent data for the community from which our sample was drawn revealed that patterns of ED and ambulatory care use among infants did not change appreciably after Medicaid changed from a fee-for-service program to managed care in 1997,<sup>44</sup> and among states now enrolling foster children in capitated managed care plans, there is some evidence that delays in obtaining Medicaid coverage after entry into foster care may be impeding timely access to ambulatory care services.<sup>45</sup>

Despite these limitations, the findings of this study offer important evidence to support interventions for improving health care delivery to children in foster care. Given the ongoing national debate regarding the health and welfare of children in foster care, there is a need within our profession to better understand the needs of these children and the quality of care we are able to provide for them. If the care is suboptimal, then we must consider potential interventions to improve the quality of care delivered. At the same time, research is needed to better understand the changing health care needs of children who experience placement changes and to determine how placement changes affect those needs.

Notwithstanding the need for more research, the AAP has already advocated for improved communication among physicians caring for children in foster care and has highlighted the potential role of specialized health care centers for children in foster care.<sup>11</sup> The current study supports such initiatives, particularly for children who experience multiple placement changes, because they are at increased risk for suboptimal use of health services. Furthermore, the propensity for service use to occur after placement changes suggests that interventions must target in the period immediately after a placement change. Finally, in an era of limited resources to fund interventions for children in foster care, our results suggest that these limited resources might be effectively and efficiently directed toward specific interventions that optimize health care services for children in foster care, particularly targeting better health supervision for all children and perhaps more rigorous interventions for those in greatest need (ie, those

experiencing frequent placement disruptions), who are also more likely to have poor access to a consistent health care provider.

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