

# Association Between Parental and Childhood Emergency Department Utilization

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**ABSTRACT.** *Objective.* To examine the association between parental emergency department (ED) utilization and child ED utilization for overall numbers of ED visits, as well as numbers of nonurgent ED visits.

*Methods.* This was a secondary data analysis of the 2000 Medical Expenditure Panel Survey, a nationally representative survey of health care utilization. The numbers of overall self-reported ED visits were collected for parents and a single child randomly selected from each family. Negative binomial linear regression, with clustering within families, was used to determine the association between parental ED and child ED use, controlling for potential confounders. The analysis was repeated for nonurgent ED visits, classified with standard and modified versions of previously published criteria.

*Results.* The mean age of the 3182 children analyzed was 9.4 years; 51% were male, 18.1% were publicly insured, and 8.2% were uninsured. The mean number of overall ED visits in 2000 was 0.17 visits per year for the children (95% confidence interval [CI]: 0.15–0.19 visits per year), 0.18 visits per year for the mothers (95% CI: 0.15–0.21 visits per year), and 0.11 visits per year for the fathers (95% CI: 0.09–0.13 visits per year). Each maternal ED visit was associated with 1.30 additional child ED visits (95% CI: 1.07–1.59 visits); each paternal ED visit was associated with an additional 1.33 child ED visits (95% CI: 1.07–1.65 visits). The relationship between parental and child nonurgent ED visits was even more pronounced.

*Conclusions.* Increased parental ED utilization is significantly associated with increased childhood ED utilization. Parental patterns of ED use may have implications for childhood ED use. Future interventions aimed at decreasing ED utilization should focus on parental or family utilization. *Pediatrics* 2005;115:e147–e151. URL: [www.pediatrics.org/cgi/doi/10.1542/peds.2004-1798](http://www.pediatrics.org/cgi/doi/10.1542/peds.2004-1798); *emergency services, hospital, health services, utilization, non-urgent emergency care.*

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ABBREVIATIONS. ED, emergency department; MEPS, Medical Expenditure Panel Survey; IRR, incidence rate ratio; CI, confidence interval.

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Accepted for publication Sep 22, 2004.

doi:10.1542/peds.2004-1798

No conflict of interest declared.

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Emergency department (ED) overcrowding continues to be an important problem throughout the United States. Consequences of high ED utilization rates include increased demands on ED staff, patient dissatisfaction, prolonged wait times, adverse events secondary to delays in care, and increased costs.<sup>1–4</sup> Investigators have attempted to identify characteristics of high ED utilizers, to develop interventions aimed at improving ED efficiency and decreasing costs. Because children constitute nearly one quarter of the 100 million ED visits annually,<sup>5</sup> a principal focus of investigation has been on pediatric ED utilization. In addition, estimates of pediatric ED visits for nonurgent conditions have been reported to be as high as 58 to 82%,<sup>6,7</sup> which greatly contributes to the inefficient use of EDs nationwide.

Previous studies found associations between increased childhood ED utilization and particular child and parental demographic features,<sup>8–11</sup> as well as the quality of the primary care provider relationship.<sup>12–14</sup> However, these factors alone do not explain the parent's decision to seek care in the ED. A recent study of risk factors for childhood ED utilization found that mothers who recalled being treated in the ED as children were more likely to bring their own children to the ED.<sup>11</sup> This finding suggests that parents' conclusions that their children require ED evaluation may result from previously formed assessments of situations warranting ED care. Consequently, parental ED utilization would be related to child ED utilization. We found no previous studies that assessed parental ED utilization as an independent risk factor for childhood ED utilization.

We sought to examine the association between parental ED utilization and child ED utilization, for both overall and nonurgent ED visits. We hypothesized that parents who use the ED for their own care are more likely to use the ED for their children's care and that this association is even stronger for nonurgent ED visits. If parental ED utilization is associated with childhood ED utilization, then future efforts to decrease childhood ED utilization may benefit from focusing on parental, or family, ED utilization.

## METHODS

### Study Design

This was a secondary data analysis of the 2000 Medical Expenditure Panel Survey (MEPS) to determine the association between increasing parental ED utilization and childhood ED utilization.

## Study Setting and Population

MEPS is a national survey conducted by the Agency for Healthcare Research and Quality that represents the civilian noninstitutionalized population of the United States.<sup>15</sup> MEPS collects data on health care utilization for individual households, including the number and sites of health care visits, the services rendered, and the costs of these services. Oversampling techniques are used to gather more accurate information for underrepresented subsets of the population. Person-level data in the MEPS sample are weighted to provide national estimates. Families composed of at least 1 parent and 1 child that participated in MEPS interviews for the year 2000 were considered eligible for this study.

## Study Protocol

Parents with children dwelling within the same household during the year 2000 were identified in the MEPS database. For households with multiple children, a single child was selected randomly for the analysis, to avoid the problem of observations for multiple children within the same family and to provide a representative sample of children from all age groups. The demographic characteristics associated with ED use for parents and children were included in the analysis, ie, age, gender, race/ethnicity (Hispanic, black non-Hispanic, or white non-Hispanic combined with other), and insurance status (private insurance, any public insurance, or uninsured at the conclusion of 2000). Health status (excellent, very good, good, fair, or poor), highest level of maternal education (no degree, General Educational Development certificate, high school diploma, bachelor's degree, master's degree, doctorate, or other), and income status, as a function of poverty level, were also recorded. Values for all variables were based on self- or parent-report. The study was given exempt status by the hospital institutional review board.

## Overall ED Utilization

ED utilization data for parents and children were collected for the first part of the analysis. Overall ED utilization was defined as the number of reported ED visits in the year 2000.

## Classification of Urgent and Nonurgent ED visits

ED visits were classified as urgent for parents with previously published criteria used with MEPS.<sup>14,16</sup> Specifically, ED visits were considered to be urgent if the visit resulted in hospital admission or the reason for the visit was an "accident or injury" diagnosis and a radiograph, magnetic resonance imaging study, electrocardiogram, or electroencephalogram was obtained for the patient. The remaining parental ED visits were classified as nonurgent.

Urgent and nonurgent ED visits for children were classified with a modified version of the standard criteria listed above. A review of these criteria by a panel of experts in pediatric emergency medicine determined that performance of a laboratory study should be included as an indicator for urgent classification of pediatric ED visits. Therefore, we modified the standard criteria to include laboratory testing as an additional criterion for an urgent child ED visit. Our analysis was then repeated, to measure the effect of parental nonurgent ED utilization (determined with the standard criteria) on pediatric nonurgent ED utilization (determined with the modified criteria). Because our classification of urgent and nonurgent pediatric ED visits with the modified criteria has not been used previously, we also performed a tertiary analysis, using the standard criteria applied to both parents and children.

## Statistical Analyses

The numbers of overall ED visits and nonurgent ED visits were tabulated for parents and a randomly chosen child from each household. The outcome counts (numbers of ED visits) were modeled as an overdispersed Poisson variable.<sup>17</sup> Therefore, a negative binomial linear regression model was used to determine the relationship between parental and child ED utilization for overall ED visits, as well as nonurgent ED visits, controlling for the potential confounders described in the study protocol. Parents and children were clustered within families, and all analyses were performed with the use of survey weights to yield population estimates. The resulting regression model yielded increasing rates of child ED

utilization as a function of increasing parental ED utilization rates. Stata 8.0 statistical software (Stata Corp, College Station, TX) was used for all data analysis.

## RESULTS

### Study Population Characteristics

A total of 3182 families with at least 1 parent and 1 child were identified and eligible for the study. These families were composed of 3082 mothers, 2288 fathers, and 5967 children. For families with >1 child in the household, a single child was randomly selected for the study, resulting in a total of 3182 study children. These 3182 children represent an estimated 37 003 879 total children in the national population. There were no significant differences between these 3182 children and the 5967 children before random selection, with respect to age, gender, race/ethnicity, and insurance status (data not shown). The age (mean  $\pm$  SD) of the randomly selected children was  $9.4 \pm 6.4$  years. The mean age of mothers was  $37.1 \pm 10.5$  years, and the mean age of fathers was  $39.8 \pm 8.4$  years. Survey-weighted demographic characteristics of the study family members are presented in Table 1.

### Numbers and Classification of ED Visits

The numbers of overall ED visits were collected for eligible study families (Table 2). Study children made 541 overall ED visits during the year 2000, which represents an estimated 6 385 131 annual pediatric ED visits. Mothers made 559 overall ED visits, whereas fathers made a total of 243 visits. Overall ED visits for children, mothers, and fathers were then classified as nonurgent with the initial criteria; nonurgent child ED visits were also calculated with the modified criteria, with laboratory tests included as a criterion for urgent ED visits (Table 2).

### Relationship Between Parental and Childhood ED Utilization

Our evaluation of overall ED visits revealed a survey-weighted mean of ED visits for study children of 0.17 visits per year (95% confidence interval [CI]: 0.15–0.19 visits per year). Mothers made an average of 0.19 visits per year (95% CI: 0.15–0.21 visits per year), whereas fathers made a mean of 0.11 visits per year (95% CI: 0.09–0.13 visits per year). Results of the regression analysis demonstrated that increasing maternal and paternal ED visits resulted in significant increases in childhood ED visits, with an increase in 1 parental visit being associated with a 30% increase in the rate of childhood ED utilization (Table 3).

### Relationship Between Parental and Childhood Nonurgent ED Utilization

Analysis of nonurgent visits revealed similar numbers for mothers but a stronger relationship for fathers. With the modified criteria, children made a mean of 0.07 visits per year (95% CI: 0.06–0.09 visits per year). With the standard criteria, mothers made an average of 0.10 visits per year (95% CI: 0.08–0.12 visits per year) and fathers made an average of 0.04 visits per year (95% CI: 0.03–0.6 visits per year). When the regression analysis was repeated, control-

**TABLE 1.** Population Characteristics of Children, Mothers, and Fathers

Characteristics	No. in Sample	Sample Proportion, %	Survey-Weighted Population Estimate, %
Children	3182	100	100
Gender			
Male	1620	50.9	50.9
Female	1562	49.1	49.1
Race/ethnicity			
Hispanic	1007	31.6	16.5
Black non-Hispanic	499	15.7	14.5
White/other	1676	52.7	70.0
Insurance status			
Any private	2071	65.1	71.3
Public	768	24.1	20.3
Uninsured	343	10.8	8.4
Health status			
Excellent	1515	47.6	51.0
Very good	1016	31.9	31.8
Good	557	17.5	15.1
Fair	82	2.6	1.9
Poor	12	0.4	0.2
Mothers	3082	100	100
Race/ethnicity			
Hispanic	910	10.0	13.6
Black non-Hispanic	471	15.3	14.3
White/other	1701	74.7	72.1
Insurance status			
Any private	2146	69.6	77.8
Medicaid	381	12.4	9.8
Uninsured	555	18.0	12.4
Highest education			
Doctorate	22	0.7	0.1
Masters	139	4.5	6.1
College	411	13.3	17.5
High school	1407	45.7	48.0
GED	178	5.8	5.2
No degree	671	21.8	13.2
Other	254	8.2	8.9
Percent of federal poverty level			
<100%	541	17.6	12.7
100–125%	183	5.9	4.4
125–200%	560	18.2	14.9
200–400%	1017	33.0	33.5
>400%	781	25.3	34.4
Fathers	2288	100	100
Race/ethnicity			
Hispanic	697	30.5	13.3
Black non-Hispanic	203	8.9	8.1
White/other	1388	60.6	78.6

GED indicates General Educational Development certificate.

ling for the same child and maternal characteristics, increasing maternal and paternal nonurgent ED use rates were associated with significant increases in child nonurgent ED use. Each increase of 1 maternal nonurgent ED visit was associated with an even greater increase in childhood nonurgent ED use (incidence rate ratio [IRR]: 1.33; 95% CI: 1.02–1.73), whereas increasing nonurgent paternal ED visits resulted in an almost twofold increase in childhood nonurgent ED visits (IRR: 2.07; 95% CI: 1.04–4.15).

Application of the standard criteria to child ED visits resulted in a 19% increase in the number of nonurgent visits. The mean number of child nonurgent ED visits with these criteria was 0.09 visits per year (95% CI: 0.07–0.10 visits per year). Results of the regression analysis with the standard criteria for

child nonurgent ED visits were similar to results with the modified criteria. Increasing numbers of child nonurgent visits were associated with each additional maternal (IRR: 1.36; 95% CI: 1.05–1.77) and paternal (IRR: 2.27; 95% CI: 1.18–4.38) nonurgent ED visit.

## DISCUSSION

The results of our study demonstrated that increased parental ED utilization was associated with increased overall childhood ED utilization. Increasing rates of maternal and paternal ED utilization were associated with significant increases in the numbers of childhood ED visits. For nonurgent ED utilization, this relationship was even more pronounced. These increases in childhood ED utilization persisted even after controlling for other known characteristics of high childhood ED utilization. Although previous studies examined characteristics of children and parents associated with increased childhood ED utilization, our study is the first to directly examine the association between parental ED utilization and child ED utilization.

There have been several investigations of risk factors for increased overall and nonurgent childhood ED utilization. Familial characteristics that have been associated with increased childhood ED utilization include younger age of the child,<sup>8,9</sup> lower socioeconomic status, and public insurance coverage.<sup>11,18,19</sup> The results of our study confirmed the presence of these associations, consistent with the results of previous studies of childhood ED utilization. Although parents and their children share many of the aforementioned characteristics, these explain childhood ED utilization only in part; to date, there are no assessments in the literature of parental ED utilization itself as a potential risk factor for increased childhood ED utilization. Therefore, by assessing parental ED utilization individually and accounting for known risk factors for childhood ED utilization, we were able to demonstrate the relationship between parental ED utilization and child ED utilization.

We also demonstrated an association between parental and child nonurgent ED utilization. Nonurgent ED visits constitute more than one half of all ED visits; therefore, shifting of these visits to the primary care provider's office could reduce ED overcrowding effectively and safely and improve the care of children through improved continuity with a provider. There has been much debate regarding classification of nonurgent ED visits,<sup>20,21</sup> because no valid criteria exist. We chose to use nonurgent ED visit criteria based on resource utilization. Previous investigators of MEPS used these criteria,<sup>14,16,22</sup> and our estimates of the number of nonurgent visits are consistent with those of other published studies. In addition, resource utilization-based criteria have been used for other health care settings, such as intensive care and ambulance transport.<sup>23–26</sup> Other authors used *International Classification of Diseases, Ninth Revision*, or physician billing codes to define nonurgent visits.<sup>27</sup> However, we think that these measurements do not as accurately reflect the severity of illness at the time of presentation to the ED. In addition, because clas-

**TABLE 2.** Number of Overall ED Visits and Nonurgent ED Visits

	No.	No. of Overall ED Visits	No. of Nonurgent ED Visits, Standard (% of Overall)	No. of Nonurgent ED Visits, Modified* (% of Overall)
Children	3182	541	279 (51.6)	226 (41.8)
Mothers	3082	559	313 (56.0)	
Fathers	2288	243	102 (42.0)	

\* With laboratory testing as an additional criterion for urgent ED visits.

**TABLE 3.** Results of Multivariate Regression for the Association Between Overall Childhood ED Utilization and Parental ED Utilization

	Increase in Overall Child ED Visits, IRR (95% CI)
Parental ED visits	
Maternal ED visits	1.30 (1.07–1.59)*
Paternal ED visits	1.33 (1.07–1.65)*
Children	
Gender	
Male	1
Female	0.68 (0.55–0.86)*
Race/ethnicity	
Hispanic	1
Black non-Hispanic	0.90 (0.44–1.85)
White/other	0.84 (0.47–1.50)
Insurance status	
Any private	1
Public	0.94 (0.58–1.52)
Uninsured	0.86 (0.48–1.57)
Health status	
Excellent	1
Very good	1.14 (0.81–1.61)
Good	1.58 (1.12–2.23)*
Fair	1.80 (1.05–3.08)*
Poor	3.76 (1.55–9.13)*
Mothers	
Race/ethnicity	
Hispanic	1
Black non-Hispanic	1.34 (0.64–2.88)
White/other	1.80 (0.99–3.27)
Insurance status	
Any private	1
Medicaid	0.96 (0.64–1.44)
Uninsured	0.90 (0.56–1.44)
Percent of federal poverty level	
<100%	1
100–125%	1.21 (0.68–2.15)
125–200%	1.03 (0.74–1.43)
200–400%	0.86 (0.57–1.30)
>400%	0.65 (0.44–0.96)*
Health status	
Excellent	1
Very good	1.06 (0.72–1.57)
Good	0.94 (0.66–1.36)
Fair	1.09 (0.69–1.75)
Poor	0.96 (0.31–2.95)
Highest education	
One category (per increase)	0.99 (0.92–1.07)

\* Statistically significant after regression analysis.

sifications for nonurgent ED visits were developed primarily for application to general ED visits, we modified the urgent ED visit criteria to include laboratory studies for child ED visits. This modified classification resulted in 19% fewer child nonurgent ED visits, compared with standard criteria; however, the association between child and parental nonur-

gent ED visits remained significant. The fact that our results reflect an even greater magnitude of association between parent and child nonurgent ED visits strengthens the case that child ED use is directly related to parental patterns of ED use.

The implications of this unique link between parental and childhood ED utilization may provide a basis for future efforts aimed at optimizing childhood ED utilization. Interventions directed at family health care utilization could be designed. Parental education regarding illness and illness severity may be useful and could be designed for both parental and childhood illnesses. It has been shown that parental assessment of illness severity is associated with increased child ED utilization,<sup>28</sup> and it is likely that parents are using similar judgments regarding their own state of illness, resulting in higher rates of ED utilization. Perceived lack of access to a usual source of care has also been associated with increased ED utilization, for both adults<sup>14,29</sup> and children.<sup>18,30</sup> Parents who use the ED themselves, because of lack of access to a usual source of care, may view the ED as the appropriate site of sick care, even if the child has improved access to a primary care provider. The assessments of health care needs for children are likely similar to the parents' self-assessments. Attempts to educate parents about illness severity and to improve perceived access to a usual source of care could be useful in decreasing family ED utilization.

There have been previous attempts to improve child health care by directing interventions at parents. Dubay and Kenney<sup>31</sup> demonstrated that the enrollment of children in health insurance plans could be improved by insuring their parents. Previous studies attempted to decrease pediatric ED utilization by directing interventions at parents. However, those studies used interventions educating parents about their children's health care but not their own health care. Grossman et al<sup>27</sup> demonstrated a modest decrease in nonurgent ED utilization (14.5% vs 11.1%) for 6 months after educational interventions aimed at linking children with a primary care provider. In a similar study, Chande et al<sup>32</sup> also used an educational intervention regarding the need for a primary care provider, but those authors were unable to demonstrate an effect on child ED utilization after 6 months. The conflicting results of these studies indicate that directing interventions at childhood health care alone is not sufficient. Neither of the studies targeted parental need for a primary care provider or based interventions on parents' per-

ceptions of their own difficulty accessing care. The results of our study indicate that there is potential to improve pediatric health care use by targeting parental health care. If parents with a greater likelihood to utilize the ED are targeted for intervention, then it is possible that a greater reduction in childhood ED utilization could be elicited.

There are important limitations to our study. First, the data collected by MEPS is based on self- or parent-report; therefore, the numbers of ED visits might be an inaccurate estimate of actual health care utilization. Despite this potential limitation, the strengths of MEPS, such as collection of health care data for entire households, details of family demographic characteristics and other confounders, and information regarding visit data and outcomes, make it an optimal source to determine the relationship between parental and childhood ED utilization. Second, as with any multivariate regression, the potential exists for residual confounding from variables not included in the analysis. Finally, although we were able to show a relationship between parental and childhood ED utilization, this analysis was cross-sectional in nature; therefore, we were able to determine only that an association was present. Whether parental ED utilization is truly a causative factor in childhood utilization cannot be determined from this study. Nonetheless, ours is the first study to demonstrate that there is a relationship between parental and childhood ED use. By analyzing rates of utilization, we were even able to show a type of dose-response effect for increasing parental utilization. To truly evaluate a causative effect, longitudinal studies of family ED utilization must be conducted.

### CONCLUSIONS

Increased parental ED utilization is associated with higher rates of childhood ED utilization. Furthermore, parental nonurgent utilization results in an even greater increase in childhood nonurgent utilization. This finding suggests that future interventions aimed at optimizing ED utilization should be aimed at the parents or the family as a whole. Additional studies are needed to describe characteristics of high family ED utilizers, to delineate areas for future intervention.

### ACKNOWLEDGMENT

This project was funded in part by an Ambulatory Pediatric Association Young Investigator grant (to D.C.B.).

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*Pediatrics* 2005;115;e147

DOI: 10.1542/peds.2004-1798

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