



Pediatric Emergency Department Resource Utilization among Children with Primary Care Clinic Contact in the Preceding 2 Days: A Cross-Sectional Study

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Objectives To characterize pediatric patient contacts with their primary care clinic in the 2 days preceding a visit to the emergency department (ED) and explore how the type of clinic contact relates to ED resource use.

Study design We conducted a retrospective chart review of 368 pediatric ED visits in the first 7 days of each month, from September 2012 to August 2013. Visits were included if the family contacted their child's general pediatric clinic in the study health system in the 2 days preceding the ED visit. Descriptive statistics were calculated. Primary outcomes were ED resource use (tests, treatments) and disposition (admission or discharge). Outcomes by type of clinic contact were compared with χ^2 statistics.

Results Of 1116 records with ED visits in the 12 study weeks extracted from the electronic medical record, 368 ED visits met inclusion criteria. Most ED visits followed a single clinic contact (78.8%). Of the 474 clinic contacts, 149 were in-person visits, 216 phone calls when clinic was open, and 109 phone calls when clinic was closed. ED visits that followed an in-person clinic contact with advice to go to the ED had significantly greater rates of testing and admission than those advised to go to the ED after phone contact and those never advised to go to the ED.

Conclusions In-person clinic visits with advice to go to the ED were associated with the greatest ED resource use. Limitations include a study of a single health system without a uniform process for triaging patients to the ED across clinics. (*J Pediatr* 2017;188:245-51).

Overall, emergency department (ED) visits made by children in the US increased 14.4% between 2001 and 2010.¹ Primary care-related conditions represent common reasons for parents to seek acute care for their children, often by way of an ED visit.² Although some children require timely evaluation and acute intervention appropriate for the ED, other children could receive acute care in their primary care setting.^{3,4}

Populations with poor access to primary care, living in close proximity to an ED, and covered by Medicaid have been identified to use the ED for nonurgent conditions.⁴⁻⁸ In one study of reasons for ED self-referrals among parents of children predominantly covered by Medicaid and with primary care access (>90%), "convenience" was cited 63% of the time, and few parents (4%) indicated "no access to any other physician" as the reason for the ED visit.⁹ Less work has been done to explore emergency care among children whose parents contact their child's primary care clinic before an ED visit and how the type of primary care contact (in-person clinic visit vs by phone) relates to ED resource use. An understanding of primary care contacts in relation to ED resource use can begin to inform approaches to reduce ED use when a clinic visit would be a reasonable alternative.

In this study, we sought to characterize visits to a pediatric ED that followed contact with the pediatric primary care clinics within the same academic tertiary care health system. We hypothesized that in-person clinic visits where families were advised to go to the ED will have greater resource use than primary care contact by phone with advice to go to the ED and no specific advice to go to the ED. The direction of our hypothesis was chosen based on the assumption that an in-person assessment allows a provider to make a more informed decision about the need for ED care than is possible over the phone.

Methods

We conducted a retrospective chart review of records from patients seen in the ED in the 2 days after making contact with 1 of the 9 Michigan Medicine general pediatrics clinics during the first full week of each month in the 1-year period from

ED	Emergency department	NP	Nurse practitioner
EMR	Electronic medical record	PCP	Primary care provider
ESI	Emergency Severity Index	RN	Registered nurse

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September 1, 2012, to August 31, 2013. This sampling strategy allowed us to account for seasonal variation and obtain a manageable quantity of charts for review. The study was approved by the University of Michigan Medical School institutional review board.

Michigan Medicine includes 9 community-based general pediatrics clinics as well as the C.S. Mott Children's Hospital, a suburban, tertiary care academic medical center that includes a dedicated pediatric ED. The general pediatrics clinics have varying degrees of on-site diagnostic and therapeutic services (Table I; available at www.jpeds.com). Clinic characteristics were collected through an e-mail survey of the clinic lead physicians. The study ED is a Level 1 Pediatric Trauma Center that serves approximately 23 000 patients per year, with 17.5% of visits resulting in admission. At the time of study, the clinics kept approximately one-half of appointments available for urgent visits between October and April and one-third of appointments available as urgent from April to October. Providers throughout the study health system use an Epic (Epic Systems Corp, Verona, Wisconsin) electronic medical record (EMR), which enables researchers to analyze notes from all clinical encounters within Michigan Medicine. Clinics use the American Academy of Pediatric's Pediatric Telephone Protocols, 15th Edition, Editor Barton Schmitt, 2015, for triage. There is no standard process for communication between the primary care office and ED about referrals, and primary care providers (PCPs) rarely admit patients to the hospital directly.

We identified all potentially eligible patient charts with a visit to the ED in the first week of the month and an associated contact with clinic (in-person or by phone) also in the first week of the month, including the final 2 days of the previous month through a query of the EMR. A researcher screened the charts to determine those that met study criteria of having clinic contact in the 2 days preceding the ED visit within the same health system. We did not require contact to be with the clinic where the patient's pediatrician is stationed as occasionally phone calls are routed to providers in other clinics within Michigan Medicine. We excluded charts if the clinic contact was made more than 2 days before the ED visit, after an ED visit, with a specialty clinic, when the child was on their way to or already in the ED, or if the reason for clinic contact was unrelated to the reason for the ED visit (based on chief complaint and final ED diagnosis). Two investigators coded the reasons for clinic contact and ED visits to determine whether they were related and resolved discrepancies by consensus.

Charts were reviewed and data were extracted by study team members via a standard template. The data collected included patient characteristics (age, sex, insurance status, history of chronic medical conditions), type of primary care clinic contact (in person or by phone), date and time of the clinic contact, type of provider (registered nurse [RN] or physician/nurse practitioner [NP]), reason for clinic visit, and advice given (coded as explicitly go to the ED, follow-up in clinic, or monitor symptoms at home).

Data collected from ED visits included date and time of ED arrival, chief complaint at ED triage, Emergency Severity Index (ESI) triage score (1-5; high to low acuity), diagnostic studies

and therapies listed in the encounter notes, ED visit duration as calculated in the patient-tracking system, ED diagnosis(es), and visit disposition (admission or discharge). Tests and treatments delivered in the ED were recorded and then coded as being available in the patient's primary care clinic or not based on information gathered from the clinic lead physicians. For example, if the child received in the ED only tests available in their home clinic or medications available over the counter (eg, acetaminophen or ibuprofen) or only a prescription for medication (without receiving the medication in the ED), they were coded as having received tests or treatments available in clinic. Questions on coding were resolved by discussion with a second team member.

We used date and time to determine day of week and if the clinic was open or closed during the encounters. Contact time was partitioned into time blocks to represent the following time periods: overnight (12:00-7:59 a.m.); morning (8:00-11:59 a.m.); early afternoon (12:00-3:59 p.m.); late afternoon (4:00-7:59 p.m.); and evening (8:00-11:59 p.m.). In general, clinics were open from 08:00 a.m. to 5:00 p.m. Monday to Friday and from 08:00 a.m. to 12:00 p.m. on Saturday. During those times, phones were answered in the clinic and not forwarded to the call center. The only exception was for holidays (Labor Day, New Year's Day, and the Fourth of July), when the clinics were closed. When multiple contacts with the clinic occurred, the last contact before the ED visit was used in the main analysis.

Statistical Analyses

Data were entered into a password-protected Excel Spreadsheet (Microsoft, Redmond, Washington) and converted to Stata version 13.1 (Stata Corp, College Station, Texas) for analyses. We assessed the initial agreement between reviewers on whether the clinic contact was related to the ED using the kappa statistic. Our main outcome was ED resource use as assessed by (1) ESI triage category, (2) testing, (3) treatments, (4) subspecialty consultation, (5) new outpatient consult referral, and (6) duration of ED visit. We also examined the outcome of the ED visit (admission or discharge). Our secondary outcomes were whether the testing or treatment was available in the child's clinic and if the ED visit occurred when the clinic was open or closed.

Descriptive statistics were calculated to characterize the study population, the clinic contacts, and the ED visits. We compared advice given by clinic contact type, frequency (single contact or multiple contacts), and provider using χ^2 statistics. We compared ED resource use and ED disposition by the type and advice from the last clinic contact using χ^2 statistics. We compared the duration of ED visits using the Kruskal-Wallis Test. *P* values <.05 were considered statistically significant.

Results

A total of 1116 records were retrieved from the query of the EMR system based on the presence of both an ED visit during the first 7 days of each month in the study period and a clinic contact in the same time frame plus the last 2 days of the

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