

## The Doctor is in: How Pediatric Direct Primary Care Reduces Emergency Department Utilization

### Abstract

The influx of ambulatory care sensitive conditions (ACSC) to the emergency department (ED) in pediatrics may be avoidable if direct primary care access is available 24 hours per day. According to the Overview of Pediatric Emergency Department Visits, greater than 17% of children (ages 0-18y) in the United States visited the pediatric ED for care in a given year. The goal of our retrospective study is to review the number of pediatric ED visits in the United States compared to the number of visits from pediatric patients having access to direct primary care (DPC). Within a retrospective review spanning 1 year of our DPC study population, we found that 1 in 9 children had visited the ED. This strong correlation shows that direct primary care access may decrease the likelihood of ACSC reaching the ED. Patients with this 24/7 access are able to receive preventative care and have a treatment plan established prior to utilizing the ED for an ACSC.

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### Introduction

The excessive use of a Pediatric Emergency Department (ED) can result in increased cost and overcrowding [1]. This can potentially lead to discontinuous or inadequate care in the ED, and/or divert the medical staff's attention from other serious emergencies [2]. It is estimated that about 10% of US health spending is consumed in emergency care [3].

In 2015, 17% of children in the US (382.9 per 1,000 population) visited the ED at least once and fewer than 5% of those visits resulted in admission [1]. In one study, parents were asked why they sought care for their child in the ED. The most frequently reported reason, 28.4%, was because "clinic/physician office was closed or had no appointments available" [2]. This study raised the concern of how the current structure of clinic-based services available during working hours might not meet the needs of many families.

Another study revealed that about 13% of pediatric ED visits classify as Ambulatory Care Sensitive Conditions (ACSC) [4]. ACSC are medical conditions that arrive to the ED, but could have been prevented if the patient had adequate preventative primary care services [5]. Furthermore, almost one in seven US Pediatric ED visits may be preventable by improved access to primary care [5]. In 2006, it was estimated that the cost of hospitalization for pediatric patients with ACSC conditions in the US was about \$2.3 billion [5]. Studies in the adult population have tried to show the potential cost for ACSC related ED visits and potential savings if

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those visits were treated in primary care settings instead. One study showed that charges in the ED were 320-728% higher than those in the primary care clinics, and there was a potential savings of 69-86% if the ACSC visit was treated in an outpatient setting [6]. Although conditions classified under ACSC are primarily treated in the outpatient setting, it is seen that many ACSC needs are not being met in the primary care setting and there must be a change in the status quo for the goal of decreasing unnecessary ED visits [7].

Many policymakers have believed that by improving insurance coverage and access to healthcare, it can reduce ED visits and save healthcare in cost [4]. One study tried to find a trend between pediatric emergency department use after the affordable care act was established in 2014. This study showed no immediate decrease in pediatric ED visits after ACA's full implementation in 2014 [4]. Another study tried to improve preventative care and treatment of ACSC by providing medicaid recipients with 24/7 access to reach their pediatrician by telephone. The ED

use rate decreased by 24% after its implementation [8]. This reroute in preventative care can be known as direct primary care, which grants patients more access to their doctor. Many parents choose to go to the ED since it can be the path of least resistance, avoiding frustrating holds over the phone to reach the pediatrician that can be time consuming [9].

With direct primary care, patients have 24/7 access to reach their physician or the covering provider at any time, which may divert the parents attention from going to the ED first. This can lead to a decrease in pediatric ED overcrowding and inadequate use of the pediatric ED, which would save healthcare in cost and time. Additionally, direct primary care provides more personalized, individual care which can enhance the patient-physician relationships and may provide higher quality preventative care.

In this retrospective study, all subjects had received direct primary care, which includes access to the physician 24/7 via phone or secure messaging and same day sick visits during office hours Monday-Friday with weekend sick visit appointments available as needed. The aim of this study is to review the vast number of pediatric ED visits in the United States in a given year, compared to the number of pediatric ED visits in the patient population receiving direct primary care, in an attempt to reduce ED usage and ACSC conditions reaching the pediatric ED.

## Method

### Participants

The population sample of the study included a total of 489 pediatric subjects (N=489). This represents 178,485 patient care days over the study year. Of these 489 subjects, 55 children (n=55) visited the emergency department at least once in the 12 month time period this study included. The study group demographics for the population sample included 38.2% male (n=21) and 61.8% female (n=34), with age demographics ranging from 0 months to 18 years ( $M=6$  years). Our breakdown of age groups are as follows; 0-12 months, 12-24 months, 2-5 years, 6-11 years, and 12-18 years.

### Procedure

This study was done retrospectively through the documentation of patient emergency department visits and chart review. Two direct primary care physicians recorded detailed descriptions of the ED visit that included: date of service, age category, time seen at ED, sex, reason for ED referral, city of ED referral, discharge or admission, number of admission days if applicable, and if ED visit could have been avoided if outpatient services were available during that time.

In order to obtain the demographic data, a basic information ED visit tracker was created. This pamphlet documented subject ID number, date of birth, sex, date of ED visit, time of visit, reason for visit, whether child was admitted and number of days admitted, city of ED location and whether the visit could have been avoided if outpatient services were available at the time of event. Patient ED visits were quantified and evaluated by SPSS, a statistical software platform. A Chi-Square Test was conducted by SPSS to find the significance behind our hypothesis.

## Results

Of the population sample (N=489), 11.2% of patients visited the pediatric ED at least once in the span of one year. A chi-square test was conducted to evaluate whether the percentage of pediatric ED visits from the patient population receiving direct primary care, 11.2 per 100 population, was significantly lower than the national average percentage of pediatric ED visits in 2015, 38.3 per 100 population ( $p<.001$ ) (Table 1).

A chi-square test was conducted to evaluate whether treat and discharge, and admission rates were significantly different than the national average in 2015 (96.7% for treat and discharge and 3.3% for admission cases nationally) [1]. Treat and discharge in the study population receiving direct primary care was significantly less,  $\chi^2 (1, N=495) = 13.9, p<.001$ , than the national average, 87.3% treat and discharge and 12.7% admitted. Admission rate in the study population receiving direct primary care was significantly more than the national average (Table 1).

From the ED visit study population (n=55) patient age category were: 12.7% (n=7) in the 0-12 month age category, 21.8% (n=12) in the 12-24 month age category, 36.4% (n=20) in the 2-5 years category, 12.7% (n=7) in the 6-11 years category, and 16.4% (n=9) in the 12-18 years category. Additionally, 38.2% (n=21) of patients were male and 61.8% (n=34) were female. As seen in Table 2, patient ED visits were broken down according to time they were seen at the ED: 47.3% (n=26) during 8AM-5PM office hours and 52.7% (n=29) during non-office hours; Region that the ED visit took place was recorded as follows: 74.5% (n=41) in county where office is located, 14.5% (n=8) in county just south of office location, 5.5% (n=3) in another county in-state, and 5.5% (n=3) out of state.

The primary chief complaint of each ED visit was recorded. Figure 1 shows the primary chief complaint that was most often recorded for each age group. Injury was the primary chief complaint for 0-12 months, 2-5 years and 6-11 years age category. Fever was the primary chief complaint for 12-24 months, and the second most-common chief complaint for 2-5 years. Motor vehicle crash (MVC) and abdominal pain were both frequent primary chief complaints for 12-18 years. Additional information regarding the chief complaint for each age category can be seen in Table 3.

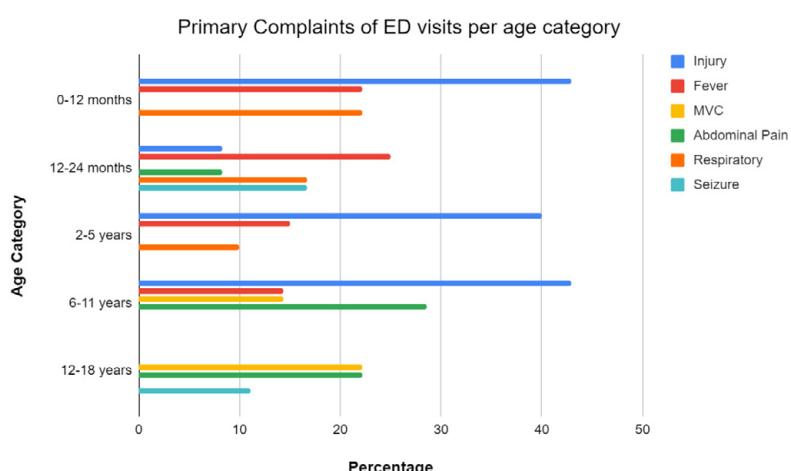
ED visits were deemed avoidable or unavoidable by the physician if outpatient services were available during the time of the visit, if the patient consulted the physician via the telephone prior to heading to the ED, or if the patient was in another region from the office and unable to be seen by the physician. Table 4 shows the total number and percent of avoidable versus unavoidable ED visits per age category, with the most avoidable ED visits occurring in the 6-11 years age category and most unavoidable ED visits occurring in the 12-18 years age category. As seen in

**Table 1** Direct Primary Care (DPC) ED visits compared to national Pediatric ED visits per 1,000 in 2015.

Variable n(%)	DPC	p	National
Number of visits	112.5 (11.2)	< .001	382.9 (38.3)
Treat & Discharge	98.2 (87.3)	< .001	370.4 (96.7)
Admission	14.3 (12.7)	< .001	12.5 (3.3)

**Table 2** Demographics of ED Visits per Age Group (n=55).

Variable (%)	0-12 months	12-24 months	2-5 years	6-11 years	12-18 years	Total (n)
All ED visits						
Number of visits	12.7	21.8	36.4	12.7	16.4	55
Sex						
Male	28.6	66.7	65	71.4	66.7	21
Female	71.4	33.3	35	28.6	33.3	34
Time						
Office Hours (8AM-5PM)	57.1	33.3	55	42.9	44.4	26
Non Office Hours	42.9	66.7	45	57.1	55.6	29
Region						
County of office location	71.4	66.7	80	85.7	66.7	41
Bordering county to south	14.3	16.7	10	14.3	22.2	8
Other county in state	14.3	8.3	5	0	0	3
Out of state	0	8.3	5	0	11.1	3

**Figure 1** Primary Complaints of ED visits per age category.**Table 3** Primary Complaint.

%	Injury	Fever	MVC	Abdominal Pain	Respiratory	Seizure
0-12 months	42.9	22.2	0	0	22.2	0
12-24 months	8.3	25	0	8.3	16.7	16.7
2-5 years	40	15	0	0	10	0
6-11 years	42.9	14.3	14.3	28.6	0	0
12-18 years	0	0	22.2	22.2	0	11.1

**Table 4** Avoidable vs Unavoidable ED Visits per age Category if Outpatient Service Available.

Age group n(%)	Avoidable	Unavoidable	Total n
0-12 months	1(14.3)	6(85.7)	7
12-24 months	4(33.3)	8(66.7)	12
2-5 years	4(20.0)	16(80.0)	20
6-11 years	3(42.9)	4(57.1)	7
12-18 years	1(11.1)	8(88.9)	9

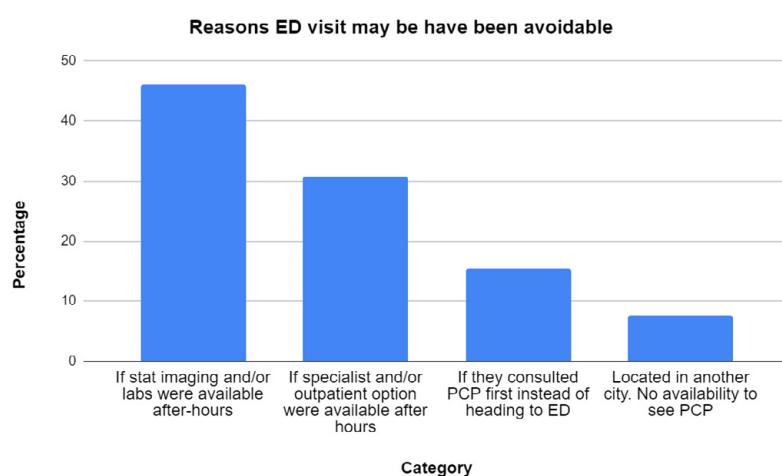
**Table 5** and **Figure 2**, 46.1% of ED visits that were categorized as avoidable if stat imaging and/or labs were available after-hours for the patient. Other reasons that the physician might consider

an ED visit avoidable and their percentage was recorded in Table 5 and shown in **Figure 2**.

This study has shown a 70.8% reduction in ED visits in the study

**Table 5** Reasons ED visit may have been avoidable.

Category	Response (%)
If stat imaging and/or labs were available after-hours	46.1
If specialist and/or outpatient option were available after hours	30.8
If they consulted PCP first instead of heading to ED	15.4
Located in another city. No availability to see PCP	7.7

**Figure 2** Reasons ED visit may have been avoidable.

population with direct primary care, compared to the national average in 2015. Furthermore, the average ED cost is about \$3,731 [3]. Using this data, an estimate of the healthcare ED cost reduction was made and is shown in Table 6. The estimated ED visit cost without utilizing direct primary care is about \$111.9 billion annually. Due to the 70.8% reduction in ED visits in the DPC study population, it can be estimated that the cost of pediatric ED visits in those with direct primary care access is about \$33.6 billion. This is an estimate of \$78.4 billion in healthcare savings due to this reduction with direct primary care access.

## Discussion

The focus of this retrospective study was to examine the number of pediatric patients with access to direct primary care visiting an ED in the United States within one year compared to pediatric national averages. Our main objective states that by having a “concierge” or direct primary care pediatrician, there would be a significant decrease of patients visiting the ED compared to the national averages. In 2015, there were roughly 30 million ED visits of children 18 years or younger, with a rate of 382.9 per 1000 in the population of children 18 years or younger [1]. The Statistical Brief by the Healthcare Cost and Utilization Project (HCUP), provides general statistics on healthcare data within the United States, supplying us with the comparative test value against that of our obtained study value. The data found in our study supports our objective, and found a strong significant correlation that those with around-the-clock access to direct primary care have a significantly decreased likelihood of going to an ED.

There are many factors that play into why this finding is significant, and even more beneficial outcomes that support

the model of direct primary care. A considerable portion of this research project dwells into the subject of ambulatory care sensitive conditions (ACSC) and healthcare. With a decrease in patients from our study visiting an ED, we expected a decrease in ACSC arriving at the ED due to these patients being able to communicate with their physicians who can provide close to immediate care, meaning that there would be an increase in admissions recorded as a percentage of ED visits. This increase means that the patients from our study genuinely need to be admitted according to their emergent situation, compared to getting discharged for an ACSC. This seems to be the case, as seen in the Chi-Square test that was conducted, the relationship between the direct primary care practice treat and discharge/admission versus the nation’s treat and discharge/ admission was significant. Out of the 11.2% of ED visits from our study, 12.5% were admitted compared to the nation’s numbers of 3.4% admission; their smaller percentage of admissions could be due to more individuals coming in for treatable conditions that don’t require admission. This highlights that access to a direct PCP steers patients in the course of treatment without utilizing more scant or expensive resources via the ED, with a much lesser need for ACSC cases arriving at an ED.

Moving to the reasons for seeking urgent care, we broke down chief complaints for visiting an ED by amount in percentage and age category. As seen in Figure 1, it was found that in age groups 0 to 12 months, 2 to 5 and 6 to 11 years, injury was the primary complaint. Age group 12 to 24 months had a primary complaint of fever, and group 12 to 18 years had an equal amount of motor vehicle accidents to abdominal pain for the primary complaint. Along with the primary complaints, additional and/or complaints

that could not be grouped into the primary complaints, were recorded by age. In the 2015 statistical briefing by McDermott, Stock and Freeman, the most common pediatric ED primary complaints were respiratory disorders and injury/poisoning. The difference seen between our study and the 2015 statistical briefing article could be due to a decrease in ACSC visits in the study population, since it is hypothesized that high quality direct primary care can reduce ACSC visits in the ED<sup>5</sup>. Approximately 84.6% of patients from the study population that went to the ED were directed to go by the pediatrician after receiving an initial triage and/or examination. Table 5 shows that 15.4% of patients from the study population that went to the ED were deemed as possibly avoidable, due to not consulting the pediatrician beforehand and going to the ED instead. After the study population receives quality direct primary care, they are directed to go to the ED by the pediatrician because the physician with parent/guardian input deems the primary complaint to need assistance by the hospital due to lab or radiology imaging necessity, possible admission or additional testing and guidance that could not be resolved in the primary care office. In a corollary, the most common primary complaint in the study population was injury, in which additional lab or radiology imaging was necessary for the patient.

Direct primary care is at the forefront of practicing preventive medicine, and a key feature of preventive care is averting diseases and promoting health and well-being. Although some emergency situations are unavoidable, having quick access to a physician who knows the patient well to guide a treatment plan and increasing accessibility to facilities are a great way to give immediate care and prevent worsening health. In this study, it was found that the majority of the ED visits, after consulting with their direct PCP were unavoidable. This was due to multiple factors related to the triage of the chief complaint which required care only found through an emergency department. Reasoning behind the avoidable ED visits were further categorized as shown in Figure 2. The primary reason why some ED visits could have been avoided was if stat imaging/lab facilities were readily available. For example, one ED visit due to a finger injury could have been avoided if an imaging center was open after hours, close to the time of the event. While the local hospitals offer simple x-rays by appointment or walk-in during business hours, imaging is only available if registered through the ED after-hours or on weekends. Similarly, if pediatric specialists or outpatient options were available after hours, this would bypass some trips to the ED, and help reduce ED overcrowding and long wait times.

According to a study done by Soliday and Hoeksel (2001), the most frequently reported reason for using the ED was lack of an available physician; Either the physician's office was closed or there were no available appointments for the patients to be seen by their doctor. Our study population has access to their direct primary care pediatrician 24/7, with same day sick visits available, and even access to communicate with their doctor on weekends and holidays. Because of the smaller panels of patients cared for by each DPC physician, the 24/7 availability becomes less of a burnout cause and affords an improved work-life balance. Other studies have focused their attention on increasing insurance coverage and access to the primary care physician. It was shown

that this may not be the best method in decreasing ED visits and getting patients better access to quality primary care [4]. No immediate decrease in ED visits were found after the affordable care act full implementation in 2014 [4]. This finding conveys that having access to health insurance does not necessarily mean they have appropriate access to healthcare. Having access to public insurance does not always mean guaranteed access to care [10]. Even with full health insurance coverage, many patients are not able to have access to a primary care physician which results in an increase in ED visits for ACSC conditions that could have been managed if they had quality preventative care available at a time that was convenient to them. Many times, health insurance does not equal quality healthcare. It is also hypothesized that greater efforts to reduce pediatric ED visits focuses on a type of primary care system that has extended hours for accessibility [11]. Direct primary care systems reduce this barrier of limited availability, and with increased access can provide improved preventative care to their patients.

In our study, we found that 112.4 per 1000 of the study's subjects visited the pediatric ED at least once in the span of one year, which compared to the rate of 382.9 per 1000 in the United States general pediatric population, is a 70.8% reduction in ED visits. This reduction is significant, and supports this study's hypothesis that children with access to direct primary care pediatricians will have a decreased likelihood of visiting the ED. There was also a decrease in treat and discharge, and an increase in admission rate compared to the national average, which shows that pediatric patients with direct PCPs will visit the ED more for non-ACSC, urgent matters. We also found that almost half of the ED visits in the study were categorized as avoidable if stat imaging and/or labs were available after-hours for the patient, and the remaining unavoidable ED visits were correctly guided by their direct PCP for treatment. With most pediatric emergency departments located in hospitals that allow walk-in or appointments scheduled for labs and/or imaging during normal business hours, removing this feature after-hours can lead to unnecessary use of the ED. Staffing may be a concern, but there are already staff available and working 24 hours per day at these facilities.

With an average total cost of an ED visit being \$3,731 in the United States, the estimated total healthcare savings by this reduction in ED visits via access to direct primary care would be \$78.4 billion, using the national average of ED visit rates. These savings can potentially be allocated elsewhere in the healthcare system, such as advancing graduate medical education or redirecting it to support high quality healthcare systems. These high-quality healthcare systems should focus on providing direct primary care to all patients that includes 24/7 access to reach their primary care physician. There should also be a focus on providing outpatient services, such as imaging and labs, during the weekends and extended hours. Table 5 shows that 46.1% of ED visits that were deemed as avoidable were due to stat imaging and/or labs not being available after hours or on the weekends. Patients could be able to bypass the ED completely by providing more locations where the primary care physician can send patients after hours for imaging or labs, therefore reducing the number of ACSC visits.

Direct primary care may not be the cure all solution for the flaws in the US healthcare system today, but by implementing more systems like DPC, where preventive and personalized patient care is prioritized, the path to improvement and better healthcare systems is just on the horizon.

## Future Works

Future research can be done to further analyze the financial elements mentioned in this study, specifically cost savings through reduced emergency department utilization. Future work can also investigate areas that would benefit most from the savings of direct primary care systems, such as job opportunities for incoming medical residents, funding for graduate medical education with a focus on primary care and redirecting these

savings to the patient's individual healthcare via reduced health insurance premiums.

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## Potential Conflicts of Interest

The authors have no conflicts of interest to disclose.

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