HIDI HealthStats
Statistics and Analysis From the Hospital Industry Data Institute

AUGUST 2014 ■ CHILDREN'S HEALTH

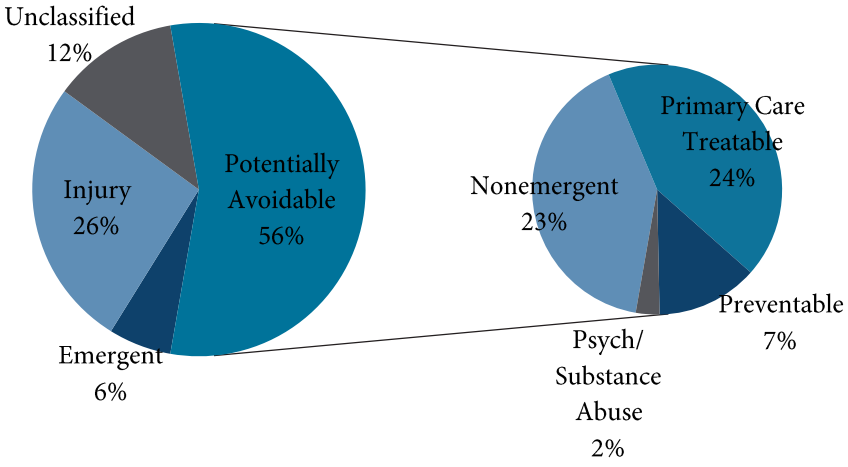
HOSPITAL INDUSTRY DATA INSTITUTE
The Data Company of the Missouri Hospital Association

Pediatric Emergency Room Utilization in Missouri: Potentially Avoidable Visits and Super Utilizers

The annual *KIDS COUNT Data Book*[i] examines the demographic, social, economic and policy factors that influence children's well-being at the state level, with a focus on children from lower sociodemographic status. In the 25th anniversary of the report that was released this year, Missouri ranks 29th out of 50 states in the nation. This is down two places from last year's 27th ranking and three places down from the 26th ranking in 2012. In the domains that calculate the overall rankings, Missouri was 22nd in childhood education, 24th in economic well-being, 27th in community and family supports, and 30th in child health. Among the factors that determine the child health score, Missouri improved in each category compared to the previous year except for one — the percent of children without health insurance.

Another major driver of the health of Missouri children is adequate access to primary and preventive pediatric care[ii] such as well-baby visits and childhood immunizations against communicable diseases. Emergency department utilization is often influenced by patients' access to primary care,[iii] and ED utilization is typically higher among populations with lower sociodemographic status. [iv] An evaluation of 2013 hospital discharge data suggests that avoidable and excess ED utilization among Missouri's children is an adverse health outcome that deserves attention.

Figure 1: Distribution of Pediatric ED Visits in Missouri in 2013



Visits classified with the NYU ED Classification Algorithm

Pediatric ED Utilization in Missouri

Missouri children visited a hospital emergency room nearly 693,000 times in 2013[1], for an age-adjusted rate of 496 visits per 1,000 children in the state.[v] More than half of all ED visits by Missouri children were classified as potentially avoidable during 2013 (Figure 1). Primary care treatable visits accounted for 24 percent of all pediatric visits, another 23 percent were nonemergent, 7 percent were emergent but preventable, and 2 percent were for psychiatric disorders or substance abuse.

1 *All ED source data are from the HIDI Fiscal Year 2013 Inpatient and Outpatient databases and limited to Missouri residents under age 18. Fiscal year 2013 spans Oct. 1, 2012, to Sept. 30, 2013.*

More than 215,000 Missouri children visited a hospital emergency room 361,000 times in 2013.

The percent of potentially avoidable pediatric ED visits varies widely throughout Missouri. With a range of 37 to 66 percent, Figure 2 shows this variation at the county-level for 2013. The highest portions of potentially avoidable pediatric ED visits were in St. Louis City and the southeast and southwest regions of Missouri. The lowest rates of potentially avoidable ED utilization by children were observed in the northern area of the state.

Pediatric ED Super Utilizers in Missouri

More than 215,000 Missouri children visited a hospital emergency room 361,000 times in 2013.[2] The majority of these patients (64 percent) had only one ED visit during the year. One out of five children (21 percent) had two trips to the emergency room, 8 percent had three visits, 7 percent had four or more visits, and only 549 children (0.3 percent) had 10 or more visits (Table 1). For the purposes of this analysis, pediatric super utilizers were defined as children under the age of 18 with four or more ED visits during 2013. Studies and intervention programs for adult super utilizers commonly focus on patients with three or more ED visits annually,[vi] or the 5 to 8 percent of patients who account for 21 to 28 percent of total visits. Because of the observed distributional differences between adult and pediatric ED utilization, this analysis focuses on the 7 percent of pediatric ED patients in Missouri who accounted for 23 percent of total ED visits in 2013.

Why Pediatric Super Utilizers Visit the ED

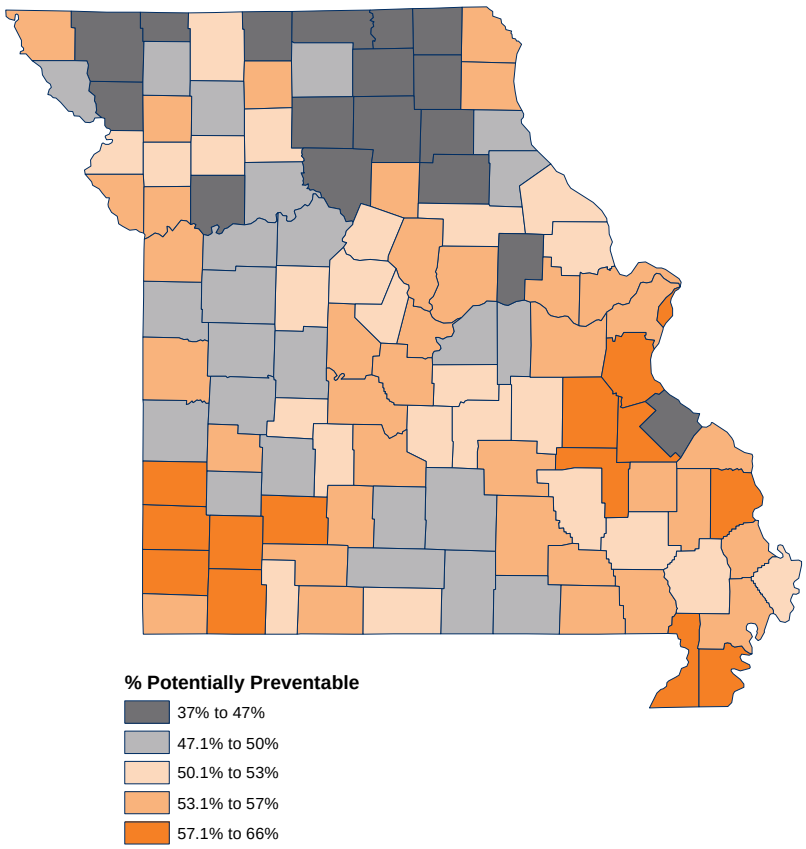
The most common causes of ED visits for pediatric super utilizers in Missouri are upper respiratory and influenza-like illnesses. Figure 3 shows the top 10 most common primary diagnoses for Missouri children with four or more ED visits in 2013. Acute upper respiratory infections, ear aches, fevers, sore throats and viral infections dominated the acute conditions leading to ED visits among pediatric super utilizers in 2013. The most common chronic condition leading to a trip to the emergency room for these children was asthma with exacerbation — the sixth most common primary diagnosis during the study period.

Table 1: 2013 Distribution of Pediatric ED Visits by Unique Patients* in Missouri

2013 Visits	Patients	% Patients	Total Visits	% Visits
One	137,643	64%	137,643	38%
Two	44,520	21%	89,040	25%
Three	17,471	8%	52,413	15%
Four or more	15,729	7%	82,014	23%
10 or more	549	0.3%	6,725	2%
Total	**215,363**	**100%**	**361,110**	**100%**

*for patients with a valid Social Security number[2]

Figure 2: 2013 Missouri Potentially Avoidable Pediatric ED Visits by County



2 *The number of patients represents the 48 percent of the 693,000 ED records with a valid Social Security number during fiscal year 2013. Hospital records for infants are often unaccompanied by a SSN because of incomplete assignment or parents don't know their child's SSN. Of the 52 percent of records without a valid SSN, 33 percent were for children under age 2.*

Potentially avoidable pediatric ED utilization appears to share an inverse U-shaped relationship with the number of ED visits the child has during the year. Figure 4 shows the percent of total ED visits that were classified as potentially preventable as contrasted by the child's total number of ED visits in 2013. For children with only one ED visit, roughly 55 percent of visits were classified as potentially avoidable.[3] Children with five to nine ED visits in 2013 had potentially avoidable rates between 73 and 76 percent. The prevalence of chronic conditions increases substantially in patients with 10 or more visits, so the percent of visits that are potentially avoidable decreases among these patient cohorts. For example, 7 percent of children with between one and three visits in 2013 had been diagnosed with asthma. For children with four to nine ED visits, the prevalence of an asthma diagnosis increases to 11 percent. The rate of asthma in children with 10 or more visits was twice the rate of children with one to three visits at more than 14 percent in 2013.

Table 2: 2013 Pediatric ED Super Utilizer Predictive Model Specification and Parameter Estimates

Sample			
	Mean	**n**	**C-Statistic**
2013 ED Visits	2.1	93,828	0.77
Explanatory Variables	**Frequency**	**Odds Ratio**	**P-Value**
Demographic Factors			
Age (mean)	9	0.97	<.0001
Male	50.3%	0.81	<.0001
African American	22.0%	0.82	<.0001
Nonwhite, other race	8.7%	1.23	<.0001
Sociodemographic Factors			
Medicaid (managed care)	39.5%	2.6	<.0001
Medicaid (fee-for-service)	32.6%	2.6	<.0001
Medicare (disability)	0.4%	2.4	<.0001
Presence of Chronic Conditions			
Psychiatric	5.5%	2.6	<.0001
Diabetes	0.9%	2.1	<.0001
Asthma	13.4%	2.4	<.0001
COPD	2.4%	2.8	<.0001
Heart Disease	3.4%	3.2	<.0001
Utilization			
ED Visits in 2012 (mean)	2.1	1.4	<.0001

For children with only one ED visit, roughly 55 percent were classified as potentially unavoidable.

Predicting Children at Risk of ED Super Utilization

Using fiscal year 2012 and 2013 data, a logistic regression model was fit to determine the factors that contribute to excess ED utilization among children in Missouri. The model was based on data from nearly 94,000 individual patients[4] under the age of 18 during 2013. The average age of children in the study was 9, and the average number of ED visits was 2.1 (Table 2). The dependent variable was patients with four or more ED visits in 2013. The model, therefore, estimated the probability a patient would be a super utilizer,[5] as defined by four or more ED visits in this analysis.

Explanatory variables included demographic factors as explained by age, gender and race. Older children were less likely to be ED super utilizers, with a marginal decrease of three percentage points per year of age (OR = 0.97, P<.0001). Males were nearly 19 percent less likely to be super utilizers (OR = 0.81, P<.0001) as were African-American children (OR = 0.82, P<.0001). Children of other nonwhite races were approximately 23 percent more likely to have four or more ED visits (OR = 1.23, P<.0001).

Sociodemographic factors included the child's insurance status being Medicaid managed care, Medicaid fee-for-service and Medicare. The Medicaid variables were included to ascertain differences in outcomes for

3 *To attribute a total number of visits per patient, this and subsequent analyses were limited to the 48 percent of records with a valid corresponding Social Security number.*

4 *Because the number of ED visits during the previous year was used as an explanatory variable, the sample was limited to patients with at least one ED visit during fiscal year 2012 (Oct. 1, 2011, through Sept. 30, 2012).*

5 *Logistic models estimate probability in log-odds. A logarithmic conversion was subsequently used to estimate the predicted probability that each patient would visit an ED four or more times.*

6 *Medicare eligibility for individuals under age 65 is determined by disability status.*

children from low-income families. Medicaid managed care and fee-for-service were evaluated individually to compare differences in the ability of the two payment structures to manage the patients' care and reduce excess ED utilization. Medicare was used as a proxy to adjust for the presence of disability.[6] The data revealed no statistical difference between Medicaid managed care or fee-for-service beneficiaries, signaling no comparative advantages between the two insurance categories in managing the care for utilizers of pediatric ED care. Each of the sociodemographic factors included in the model significantly increased the probability of the child having four or more ED visits (OR = 2.4 to 2.6, each with P<.0001), signaling the influence that sociodemographic status and disability have on health outcomes for patients of all ages. Nearly 40 percent of children were covered by Medicaid managed care while 32.6 percent had traditional Medicaid as their primary payer. Less than 1 percent of the sample (0.04 percent) had Medicare as a primary insurer.

The presence of certain chronic comorbidities also was included as explanatory variables. Children diagnosed with psychiatric disorders, diabetes, asthma and chronic obstructive pulmonary disease were more than twice as likely to be pediatric ED super utilizers in 2013. Children diagnosed with a chronic heart condition were 3.2 times more likely to visit an emergency room four or more times during 2013 (OR = 3.2, P<.0001). At 13.4 percent, asthma was the most prevalent chronic condition for Missouri pediatric ED patients during 2013, followed by psychiatric disorders at 5.5 percent.

Previous ED utilization was the final factor included to predict a child's likelihood of having four or more ED visits in 2013. The number of ED visits during the previous year was a significant predictor of ED visits during the current year, with the marginal effect of visits in the previous year increasing the odds a child would be a super utilizer by roughly 40 percent per visit in 2012 (OR = 1.4, P<.0001).

Converting the model parameter estimates into the predicted probability of each child visiting a hospital emergency room four or more times annually reveals that a large majority of children have a very low chance of this outcome (Panel 1, top). This technique also displays exceptional fit between the predicted and actual percent of children who become ED super utilizers, with 97 percent of the variance between observed and predicted values explained by the data (Panel 1, bottom). The overall discriminant ability of the model to ascertain children who would have four or more ED visits in 2013 was more than three in four pediatric patients (C-statistic = 0.77, table 2).

Figure 3: Top Ten Primary Diagnoses for Pediatric ED Superutlizers in 2013

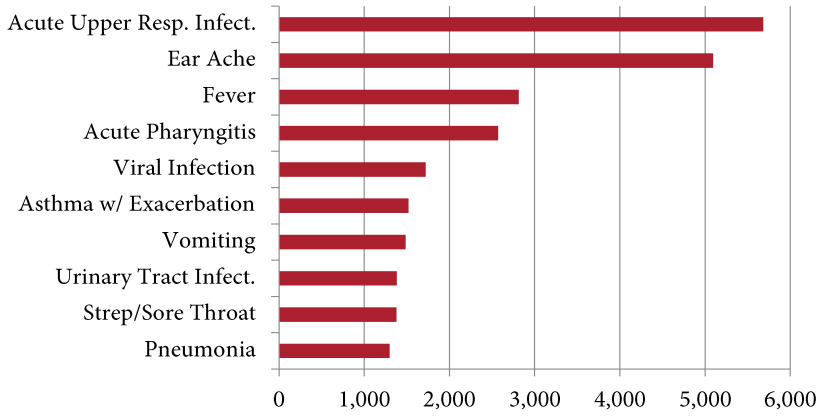
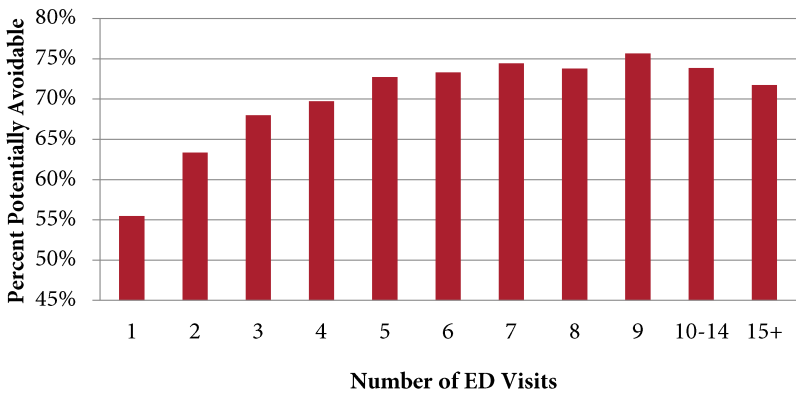


Figure 4: Potentially Avoidable Pediatric ED Visits by Number of Visits in 2013



Nearly 40 percent of children were covered by Medicaid managed care while 32.6 percent had traditional Medicaid as their primary payer.

For Additional Information

on analyzing statewide hospital-specific ED utilization, please contact the author at mreidhead@mail.mhanet.com

Suggested Citation

Reidhead, M. *HIDI HealthStats*, August 2014: Pediatric Emergency Room Utilization in Missouri: Potentially Avoidable Visits and Pediatric ED Super Utilizers. Missouri Hospital Association, Hospital Industry Data Institute. Available at MHAnet.com.

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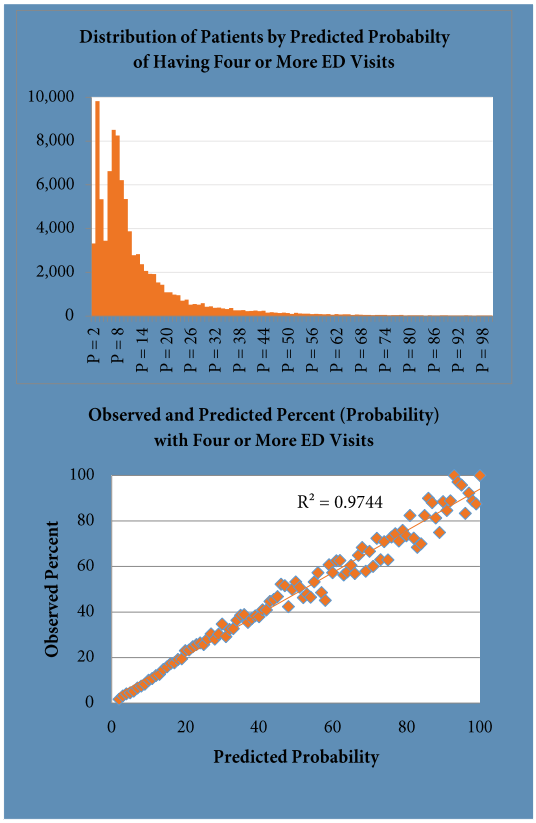
Panel 1: Pediatric ED Super Utilizer Predictive Model Results



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