Additional Contributions: We thank the adolescents and families at the Botswana-Baylor Children’s Clinical Centre of Excellence who shared their experiences as part of the adolescent Ba Nana Adherence Study as well as the Botswana-Baylor staff and, in particular, the Ba Nana Adherence Study staff.


Direct Admission to Hospitals Among Children in the United States

While a decade of research and policy interventions has begun to transform hospital discharge processes, research focused on hospital admissions is lacking. Emergency departments (EDs) are increasingly serving as portals of hospital admission, contributing to national concerns about ED volumes, wait times, and discontinuity of care. Despite this, there is a paucity of research examining other options for hospital admission.

Direct admission, defined as admission to a hospital without receiving care in the hospital’s ED, is 1 alternative. Although direct admission has potential benefits for patients and health care systems, little is known about its use or effectiveness. To our knowledge, only 1 study has examined outcomes as part of the adolescent Ba Nana Adherence Study as well as the Botswana-Baylor Children’s Clinical Centre of Excellence who shared their experiences as part of the adolescent Ba Nana Adherence Study as well as the Botswana-Baylor staff and, in particular, the Ba Nana Adherence Study staff.

Methods | We analyzed the Agency for Healthcare Research and Quality’s 2009 Kids’ Inpatient Database, including neonatal, nonmaternal, and nonelective pediatric hospitalizations in children younger than 18 years. Our study received institutional review board approval from the Baystate Medical Center and was deemed exempt from participation consent. Interhospital transfers, including transfers to or from a different hospital or health care facility, were excluded as a result of our inability to accurately assess total hospital costs. Reasons for hospitalization were categorized using All Patient Refined Diagnostic Related Groups. Weighted direct admission frequencies, proportions, and hospital-level variation in direct admission rates were calculated for each All Patient Refined Diagnostic Related Group. For the 10 most common All Patient Refined Diagnostic Related Groups, we assessed differences between children admitted directly and those admitted through EDs using Rao-Scott tests for categorical variables and weighted tests for continuous variables. Hierarchical generalized linear models with a random effect for hospitals were developed to assess differences in total hospital costs between children admitted directly and through EDs, using cost-to-charge ratios provided by the Kids’ Inpatient Database and controlling for the characteristics shown in the Table.

Results | Of 1.47 million nonelective pediatric hospitalizations, 24.6% occurred via direct admission. The 10 most common diagnoses accounted for 49.2% of these hospitalizations and characterize variation in direct admission rates across diagnoses and hospitals.

### Table. Patient and Hospital Characteristics Associated With Direct and ED Admissions Among Children Hospitalized for the 10 Most Common Indications Weighted to Reflect National Estimates

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Direct Admission, No. (SD Weighted Frequency) [%]</th>
<th>ED Admission, No. (SD Weighted Frequency) [%]</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, y</td>
<td>1.8</td>
<td>2.1</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Female</td>
<td>68 316 (2983)[45.3]</td>
<td>248 463 (8224)[44.2]</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>67 801 (2920)[44.9]</td>
<td>214 282 (8115)[38.1]</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>15 694 (1141)[10.4]</td>
<td>99 185 (7048)[17.6]</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>29 298 (3293)[19.4]</td>
<td>131 068 (8520)[23.3]</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>10 170 (663)[6.7]</td>
<td>43 928 (3305)[7.8]</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>28 010 (3019)[18.6]</td>
<td>74 292 (8806)[13.2]</td>
<td></td>
</tr>
<tr>
<td>Insurance status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>75 600 (4161)[50.1]</td>
<td>306 304 (11 485)[54.4]</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>66 573 (2602)[44.1]</td>
<td>215 290 (7930)[38.3]</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Uninsured</td>
<td>32 31 (260)[2.1]</td>
<td>23 010 (1881)[4.1]</td>
<td></td>
</tr>
<tr>
<td>No charge/other/unknown</td>
<td>55 691 (567)[3.7]</td>
<td>18 151 (1154)[3.2]</td>
<td></td>
</tr>
<tr>
<td>Comorbid complex chronic conditiona</td>
<td>14 062 (865)[9.3]</td>
<td>52 007 (2643)[9.2]</td>
<td>.06</td>
</tr>
<tr>
<td>APR-DRG disease severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (Lowest)</td>
<td>90 015 (4060)[59.6]</td>
<td>329 248 (10 709)[58.5]</td>
<td>.04</td>
</tr>
<tr>
<td>2</td>
<td>51 301 (2375)[34.0]</td>
<td>198 131 (7136)[35.2]</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>88 411 (583)[5.9]</td>
<td>31 767 (1677)[5.6]</td>
<td></td>
</tr>
<tr>
<td>4 (Highest)</td>
<td>81 815 (868)[0.5]</td>
<td>349 254 (254)[3.6]</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
Among children with these diagnoses, children admitted directly were more likely to be white, privately insured, and had lower disease severity compared with children admitted through EDs (Table). There was substantial variation in direct admission rates across conditions, ranging from 8.9% for appendectomy to 38.0% for cellulitis. The variation in direct admission rates across conditions and hospitals and associated adjusted costs of direct admission relative to admissions originating in emergency departments (EDs) is presented in Figure A. The figure shows the hospital direct admission rate, the ratio of cost (adjusted), and the direct/ED admissions ratio of cost (adjusted) for different conditions. The hospital-level variation in direct admission rate for each condition is indicated by arrowheads, bars, and outliers, with the interquartile range beyond the upper quartile.
bipolar disorder (Figure). Similarly, we observed considerable hospital-level variation, with appendectomy showing the least variation and bipolar disorder showing the greatest variation in direct admission rates. In models adjusting for patient and hospital characteristics and disease severity, direct admissions were associated with 5% to 31% lower costs than ED admissions.

Discussion | Direct admissions represent approximately 1 in 4 unscheduled pediatric hospitalizations nationally, with characteristics of children admitted directly aligning with those more likely to have a medical home, including white race/ethnicity and private health insurance coverage.7 The substantial variation in direct admission practices across hospitals and conditions may be influenced by disparities in access to timely outpatient care as well as differences in hospitals' and referring physicians' capacities to facilitate admissions without ED involvement.

While the differences in costs between direct and ED admissions were striking, we acknowledge that our findings may have been influenced by residual confounding and we were unable to draw definitive conclusions about quality, safety, and effectiveness. In addition, direct admission points of origin were not reflected in these analyses. Nevertheless, our results suggest that increasing access to direction admissions may be a means to reduce ED volumes and health care costs. To accomplish this, research is needed to better understand key stakeholders' admission preferences, the drivers of these cost differences, and conditions and procedures best suited for this admission approach.

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Drafting of the manuscript: Leyenaar.

Critical revision of the manuscript for important intellectual content: All authors.

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Obtained funding: Leyenaar.

Administrative, technical, or material support: Lagu, Lindenauer.

Study supervision: Lagu, Pekow, Lindenauer.

Conflict of Interest Disclosures: None reported.

Funding/Support: This study was supported by the Charlton Grant Research Program at Tufts University School of Medicine. Dr Lagu is supported by award KO1HL134745 from the National Heart, Lung, and Blood Institute of the National Institutes of Health.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.


Trends in Energy Intakes by Type of Fast Food Restaurant Among US Children From 2003 to 2010

The percentage of energy from fast foods consumed by US adults declined from 12.8% in 2007 to 2008 to 11.3% in 2009 to 2010.1 Other than analyses of menu offerings,2 there are no comparable data on fast food consumption by children. While sources of energy by food groups and sources have previously been evaluated,3 to our knowledge, no study has evaluated trends in energy by fast food restaurant (FFR) type. This study used data from the National Health and Nutrition Examination Survey to analyze trends in children’s energy consumption by FFR type.

Methods | Data on the locations of origin for all foods/beverages including FFRs in the National Health and Nutrition Examination Survey were first collected in 2003 to 2004.4 The present analyses were based on the first 24-hour recall from 4 cycles from 2003 to 2010.

Per University of Washington policies, the use of publicly available data was not considered human participant research. Participants or their parent/guardian provided written informed consent and all procedures were approved by the National Center for Health Statistics Research Ethics Review Board.

A multistep algorithm was developed to assign FFR eating occasions into 8 segments by the following restaurant type: burger, pizza, sandwich, chicken, Mexican cuisine, Asian cuisine, coffee/snack, or fish. Data on the latter 3 FFR types were not presented owing to their infrequent use by children. The dietary recall data were scanned for 1 of 26 sentinel foods characteristic of each FFR segment (eg, hamburger/pizza). Eating events with multiple sentinel foods were flagged for additional scrutiny. Details of the algorithm have been published.5


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