Impact of COVID-19 on Inpatient Utilization and Outcomes for Children with Medical Complexity

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Impact of COVID-19 on Inpatient Utilization and Outcomes for Children with Medical Complexity

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Has documented no financial relationships to disclose or Conflicts of Interest (COIs) to resolve.

Dr. Markham
Has documented this presentation will not involve discussion of unapproved or off-label, experimental or investigational use.
Background

- Coronavirus disease 2019 (COVID-19) has impacted patients and health systems around the world
- Children have experienced:
  - Declines in emergency department visits
  - Declines in hospitalizations
  - Delays in accessing care
- Limited investigation of children with medical complexity (CMC)
Background

• CMC are at high risk for:
  • Hospital admissions
  • Readmissions
  • Prolonged lengths of stay
  • Increased healthcare costs
  • Health declines with service disruptions
• Understanding the impact of the pandemic on CMC may improve the future provision of healthcare
Objectives

1. To describe the impact of the COVID-19 pandemic on hospitalizations for CMC

2. To describe the impact of the COVID-19 pandemic on hospital utilization metrics (e.g., length of stay) for CMC
Methods

• Study Design
  • Multicenter, cross-sectional study of data from 49 children’s hospitals using the PHIS database

• Study Population
  • Inclusion: Children 0-18 years of age with complex chronic conditions
  • Exclusion: Transfers, left against medical advice, data quality concerns
Methods

• Exposures
  • COVID vs. pre-COVID

• Outcomes
  • Total number of admissions
  • Clinical: length of stay, readmission rates, ICU use, mortality
  • Financial: standardized costs
Methods

• Analysis
  • Descriptive statistics
  • Generalized linear mixed models (GLMM) with adjustments for important demographic and clinical characteristics
  • All GLMMs included a random hospital effect to account for clustering
## Results

<table>
<thead>
<tr>
<th>Index Admissions</th>
<th>Overall</th>
<th>Pre-COVID</th>
<th>COVID</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>67,950 (24.0)</td>
<td>52,668 (23.4)</td>
<td>15,282 (26.3)</td>
</tr>
<tr>
<td>1-4</td>
<td>67,279 (23.8)</td>
<td>54,609 (24.3)</td>
<td>12,670 (21.8)</td>
</tr>
<tr>
<td>5-9</td>
<td>50,848 (18.0)</td>
<td>41,292 (18.3)</td>
<td>9,556 (16.5)</td>
</tr>
<tr>
<td>10-14</td>
<td>56,185 (19.8)</td>
<td>44,597 (19.8)</td>
<td>11,588 (20.0)</td>
</tr>
<tr>
<td>15-18</td>
<td>40,835 (14.4)</td>
<td>31,872 (14.2)</td>
<td>8,963 (15.4)</td>
</tr>
<tr>
<td><strong>Number of CCCs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>158,129 (55.9)</td>
<td>126,063 (56.0)</td>
<td>32,066 (55.2)</td>
</tr>
<tr>
<td>2</td>
<td>57,722 (20.4)</td>
<td>45,839 (20.4)</td>
<td>11,883 (20.5)</td>
</tr>
<tr>
<td>3</td>
<td>35,970 (12.7)</td>
<td>28,541 (12.7)</td>
<td>7,429 (12.8)</td>
</tr>
<tr>
<td>≥4</td>
<td>31,276 (11.0)</td>
<td>24,595 (10.9)</td>
<td>6,681 (11.5)</td>
</tr>
</tbody>
</table>
Results

Total Inpatient Admissions

N, Admissions

Week

Pre-COVID
COVID
Results

Total Inpatient Admissions

Week

N, Admissions

US Declaration of Public Health Emergency 2020
US Declaration of National Emergency 2020

Pre-COVID
COVID

PAS
Pediatric Academic Societies
Results

Percent Change in Hospital Admissions from Pre-COVID

- No Medical Complexity
- Medical Complexity
Results

- **Pneumonia**
  - Pre-COVID
  - COVID

- **Seizure**
  - Pre-COVID
  - COVID

- **Diabetes**
  - Pre-COVID
  - COVID
Results

N, Admissions vs. Week for Pneumonia

- **Pre-COVID** (dashed blue line)
- **COVID** (solid red line)

Week: 0 4 8 12 16 20 24 28 32 36

Admissions: 0 50 100
Results

Seizure

N, Admissions

Week

0 4 8 12 16 20 24 28 32 36

Pre-COVID
COVID
Results

Diabetes

N, Admissions

Week

Pre-COVID

COVID
## Results

<table>
<thead>
<tr>
<th></th>
<th>Pre-COVID</th>
<th>COVID</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length of Stay (hours)</strong></td>
<td>80.7 [75.6, 86.2]</td>
<td>82.8 [77.5, 88.5]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>30- Day Readmission Rates</strong></td>
<td>15.2% [14.2%, 16.3%]</td>
<td>14.5% [13.4%, 15.6%]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>ICU Utilization</strong></td>
<td>21.5% [18.3%, 25.0%]</td>
<td>22.5% [19.2%, 26.3%]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>1.5% [1.2%, 1.9%]</td>
<td>1.4% [1.1%, 1.9%]</td>
<td>0.166</td>
</tr>
<tr>
<td><strong>Cost (US Dollars)</strong></td>
<td>$13,396 [$11,552, $15,535]</td>
<td>$13,728 [$11,833, $15,927]</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Limitations

- Use of administrative data
- Our analysis focused on admissions to children’s hospitals
- Individual communities were impacted differently by lockdowns and social distancing policies over time
Conclusions

• Admissions for CMC declined by nearly 25% during the COVID pandemic
• Declines in admissions for CMC were not quite to the extent and recovered more quickly and fully compared to those without medical complexity
• The impact of the pandemic on CMC varied based on admission indication
• Overall outcomes were similar for CMC between COVID and pre-COVID periods
Thank You!

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