Children with autism spectrum disorder (ASD) have higher healthcare utilization compared to children without ASD. This difference may be due to the increased medical burden often associated with psychiatric illness. Despite ample clinical and research interest in ASD, studies examining differences in healthcare utilization between early and late ASD diagnosis are lacking.

Objectives

- To evaluate the impact of early autism spectrum disorder (ASD) diagnosis on healthcare utilization.
- To demonstrate healthcare utilization changes prior to and following ASD diagnosis among those with early vs. late diagnosed ASD.

Methods

- **Study Design:** Cross-sectional study
- **Data Source:** Medical claims and enrollment data from Humana Inc., a large multistate healthcare company that offers Medicare Advantage, stand-alone prescription drug plan, and commercial plan offerings
- **Definitions:**
  - For each patient, the first claim in 2013 or 2014 with an ASD diagnosis was defined as the anchor date
  - Early ASD was defined as a diagnosis prior to age three, while diagnosis after age three was defined as late ASD

Inclusion Criteria:

- ≤7 years of age as of 12/31/2014
- Diagnosis of ASD, defined as one inpatient (IP) or emergency department (ED) visit, or two outpatient (OP) visits, with International Classification of Disease Ninth Revision Clinical Modification (ICD-9-CM) code 299.xx listed in the top six diagnostic codes
- Commercial healthcare coverage in 2014

Outcomes:

- Patient characteristics were described based on the most current patient record in 2014
- The following outcomes were assessed in the 12 months following the anchor date:
  - Inpatient admissions per 1000 patients
  - Outpatient visits per 1000 patients
  - ED visits per 1000 patients
  - Mean number of developmental screenings

- Inpatient, outpatient, and ED utilization was described as total and either medical- or behavioral-health related based on ICD-9-CM diagnosis codes on claims

Statistical Analyses:

- Outcomes were calculated for early and late ASD diagnosis groups
- Available data for the 12 months before and after the anchor date were used in the analysis but continuous enrollment was not required
- Descriptive statistics were used to compare outcomes in each group pre- and post-ASD diagnosis

Results

Table 1. Population Characteristics

<table>
<thead>
<tr>
<th>Measure</th>
<th>N=1218</th>
<th>Mean ± SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Sex, n (%)</th>
<th>Male</th>
<th>Female</th>
<th>Insurance type, n (%)</th>
<th>Self-insured</th>
<th>Commercial fully insured</th>
<th>Medicaid</th>
<th>ASD diagnosis, n (%)</th>
<th>Early</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean ± SD</td>
<td>4.88 ± 1.56</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>998 (82)</td>
<td>220 (18)</td>
<td>439 (36)</td>
<td>542 (45)</td>
<td>237 (19)</td>
<td></td>
<td>262 (22)</td>
<td>956 (78)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Healthcare Utilization Pre- vs. Post-ASD Diagnosis for Early and Late Groups

<table>
<thead>
<tr>
<th>Outcomes/1000 patients</th>
<th>Early ASD Diagnosis (n=262)</th>
<th>Late ASD Diagnosis (n=956)</th>
<th>Pre-diagnosis</th>
<th>Post-diagnosis</th>
<th>Numerical difference</th>
<th>Percent difference</th>
<th>Pre-diagnosis</th>
<th>Post-diagnosis</th>
<th>Numerical difference</th>
<th>Percent difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total inpatient admissions</td>
<td>124</td>
<td>41</td>
<td>-83</td>
<td>-67%</td>
<td>48</td>
<td>38</td>
<td>-10</td>
<td>-21%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral health-related</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>6</td>
<td>-5</td>
<td>-43%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical-related</td>
<td>124</td>
<td>41</td>
<td>-83</td>
<td>-67%</td>
<td>38</td>
<td>32</td>
<td>-6</td>
<td>-15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total outpatient visits</td>
<td>4149</td>
<td>10661</td>
<td>6512</td>
<td>157%</td>
<td>4168</td>
<td>7529</td>
<td>3360</td>
<td>81%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral health-related</td>
<td>592</td>
<td>2104</td>
<td>1512</td>
<td>256%</td>
<td>706</td>
<td>1529</td>
<td>822</td>
<td>116%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical-related</td>
<td>3557</td>
<td>8557</td>
<td>5000</td>
<td>141%</td>
<td>3462</td>
<td>6000</td>
<td>2538</td>
<td>73%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total ED visits</td>
<td>453</td>
<td>543</td>
<td>90</td>
<td>20%</td>
<td>395</td>
<td>448</td>
<td>53</td>
<td>13%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral health-related</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>16</td>
<td>12</td>
<td>-4</td>
<td>-23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical-related</td>
<td>453</td>
<td>543</td>
<td>90</td>
<td>20%</td>
<td>379</td>
<td>435</td>
<td>56</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Early diagnosis of ASD was associated with a higher mean number of developmental screenings in the pre-ASD diagnosis period.

Figure 1. Pre-ASD Diagnosis Developmental Screenings

![Graph showing mean number of developmental screenings](image)

Conclusions

- Only a small fraction of the study population was diagnosed with ASD before age three (early ASD).
- Children diagnosed with ASD before age three may exhibit higher severity symptoms which may contribute to increased healthcare utilization.

Limitations

- This research was done in a commercially insured population residing primarily in the South and, therefore, results may not be generalizable to other populations.
- Data limitations common with claims-based analyses (i.e., missing or improperly coded data and the inability to capture unavailable data that may be relevant confounders), are applicable to this study.
- This study did not require continuous enrollment because doing so for 12 months before and after the anchor date greatly reduced the number of patients available for study.
- The cross-sectional study design is not sufficient to establish a causal link between timing of ASD diagnosis and healthcare utilization.

Relevance to Policy, Delivery, Clinical Practice

- This is the first study to describe healthcare utilization for early and late ASD diagnosis. A deeper understanding of the relationship between symptom severity and healthcare utilization, and the impact of early diagnosis on the prevalence of medical conditions, treatment adherence and health-related quality of life is warranted.
- Research to further define differences between early and late ASD diagnosis may allow physicians to better design and tailor healthcare interventions to each population.