Healthcare Utilization and Costs in Commercially Insured Patients with AL Amyloidosis

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INTRODUCTION

• Amyloid light chain (AL) amyloidosis is a rare, progressive, and typically fatal disease caused by extracellular deposition of misfolded immunoglobulin light chains.1
• Soluble toxic aggregates and deposited fibrils (amyloid) lead to progressive failure of vital organs, including the heart, kidneys, and nervous system, causing significant morbidity and mortality.2
• The economic burden of AL amyloidosis has not been well characterized.4

OBJECTIVE

• To examine healthcare utilization and costs associated with AL amyloidosis in the United States using real-world, nationally representative health insurance claims data.

METHODS

Study Design and Data Source

• Retrospective, cross-sectional study using Truven MarketScan® Commercial and Medicare Supplement Insurance Incidence Database
• These databases cover approximately 65 million commercially insured persons and their dependents and 5.3 million Medicare-eligible retired persons.
• An algorithm was developed to identify patients with AL amyloidosis given the lack of specific diagnostic codes for this disease (detailed in Study Population below).

Study Population

• Patients were identified separately by each calendar year.
• Patients aged ≥18 years with AL amyloidosis were identified if they:
  • Had ≥1 inpatient claim or ≥2 outpatient claims consistent with AL amyloidosis (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] code 277.30 or 277.39; International Classification of Diseases, Tenth Revision, Clinical Modification [ICD-10-CM] code E64.5, E64.5, or E65.95 in any diagnosis field)
  • Received ≥1 AL amyloidosis–specific treatment (e.g., chemotherapy, hematopoietic stem cell transplantation [HSCT]) on or after the first amyloidosis diagnosis.
• Patients enrolled with a healthcare plan from the beginning of each calendar year to the end of enrollment or the end of the calendar year, whichever occurred first.

Study Measures

• All-cause healthcare utilization in each calendar year, including inpatient hospitalization, emergency department (ED) visit, non-ED outpatient service visit, and any treatment.
• Total all-cause healthcare costs were calculated by adding inpatient, ED outpatient, non-ED outpatient, and pharmacy costs.

Statistical Analysis

• Mean ± standard deviation (SD) were calculated for continuous data.
• Relative frequencies and percentages were reported for categorical data.
• Mean healthcare utilization and costs were reported per patient without annualization.

RESULTS

Patient Demographics

• The overall study sample included 7362 patients (368-1080 unique patients per year, from 2007 to 2015).2
• Mean age was 63.6 (±12.1), 45% of patients were female, all US regions were represented, and most patients had commercial insurance and preferred provider organization plans (Table 1).

Table 1. Patient demographic characteristics and insurance types by calendar year

<table>
<thead>
<tr>
<th>Year</th>
<th>All</th>
<th>2007-2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group, mean [SD]</td>
<td>63.6 (±12.1)</td>
<td>68.7 (±11.4)</td>
<td>67.8 (±11.6)</td>
<td>63.8 (±10.2)</td>
<td>61.3 (±9.1)</td>
<td>59.6 (±8.7)</td>
<td>59.3 (±8.8)</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>53.8 (45.9)</td>
<td>58.1 (54.5)</td>
<td>54.0 (46.9)</td>
<td>54.2 (45.7)</td>
<td>53.0 (44.9)</td>
<td>53.5 (45.3)</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>46.2 (45.9)</td>
<td>41.9 (46.5)</td>
<td>46.0 (45.1)</td>
<td>45.8 (44.3)</td>
<td>47.0 (45.1)</td>
<td>46.5 (44.7)</td>
</tr>
<tr>
<td>Insurance type</td>
<td>Commercial</td>
<td>51.8 (23.5)</td>
<td>53.7 (24.3)</td>
<td>52.4 (24.7)</td>
<td>49.9 (25.0)</td>
<td>47.1 (24.7)</td>
<td>45.6 (24.9)</td>
</tr>
<tr>
<td></td>
<td>Medicare Supplement Insurance</td>
<td>37.7 (23.5)</td>
<td>37.2 (22.9)</td>
<td>37.0 (23.2)</td>
<td>37.0 (23.2)</td>
<td>37.4 (23.4)</td>
<td>37.6 (23.8)</td>
</tr>
<tr>
<td></td>
<td>Other (Medicaid, AOR, non-Prepaid)</td>
<td>10.5 (23.5)</td>
<td>10.8 (24.8)</td>
<td>10.6 (24.8)</td>
<td>10.0 (25.3)</td>
<td>14.5 (24.9)</td>
<td>16.8 (24.3)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100.0 (23.5)</td>
<td>100.0 (23.5)</td>
<td>100.0 (23.5)</td>
<td>100.0 (23.5)</td>
<td>100.0 (23.5)</td>
<td>100.0 (23.5)</td>
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</tbody>
</table>

Service Utilization

• Hospital admission was common: 50.1% (n=3670) of patients in the overall study sample were admitted ≥1 time, and 11.3% (n=827) were admitted ≥3 times (Table 2).
• Among admitted patients, mean (SD) length of stay was 14.7 (±19.5) days (Table 2).
• Rates of any hospital admission decreased from 57.0% in 2007 to 49.3% in 2015.
• More than one-third of all patients (34.3%; n=2514) had ≥1 ED visit during the 9-year period, and 6.8% (n=496) had ≥3 ED visits (Table 2). ED visits remained stable during the study period.
• Patients had a mean (SD) of 43.2 (±36.2) non-ED outpatient visits per year. Patients were seen in an office setting a mean of 23.4 (±18.4) times per year. Non-ED outpatient visit rates increased during the study period from 30.0% in 2007 to 57.9% in 2015 (Table 2).

Table 2. Inpatient and outpatient service utilization by calendar year

<table>
<thead>
<tr>
<th>Year</th>
<th>All</th>
<th>2007-2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Hospital Admissions</td>
<td>%</td>
<td>50.1% (n=3670)</td>
<td>49.2% (n=2250)</td>
<td>50.1% (n=2361)</td>
<td>51.5% (n=2515)</td>
<td>52.2% (n=2610)</td>
<td>51.0% (n=2610)</td>
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<tr>
<td></td>
<td>N</td>
<td>7362</td>
<td>7362</td>
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<tr>
<td></td>
<td>Mean (SD)</td>
<td>14.7 (±19.5)</td>
<td>14.7 (±19.5)</td>
<td>14.7 (±19.5)</td>
<td>14.7 (±19.5)</td>
<td>14.7 (±19.5)</td>
<td>14.7 (±19.5)</td>
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<tr>
<td></td>
<td>N</td>
<td>2514</td>
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<td>%</td>
<td>34.3%</td>
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<td></td>
<td>N</td>
<td>496</td>
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<td>%</td>
<td>6.8%</td>
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<td>6.8%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Outpatient Visits</td>
<td>%</td>
<td>43.2% (±36.2)</td>
<td>36.1% (±36.2)</td>
<td>42.9% (±36.2)</td>
<td>47.3% (±36.2)</td>
<td>53.1% (±36.2)</td>
<td>63.6% (±36.2)</td>
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<td>N</td>
<td>7362</td>
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</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>23.4 (±18.4)</td>
<td>23.4 (±18.4)</td>
<td>23.4 (±18.4)</td>
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<td>23.4 (±18.4)</td>
<td>23.4 (±18.4)</td>
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</table>

CONCLUSIONS

• We identified AL amyloidosis patients with confidence given the algorithm we used, which was confirmed with input from clinicians; however, we acknowledge that existing ICD-9-CM and ICD-10-CM codes are not specific to AL amyloidosis, and we might have included a small number of ATTR amyloidosis patients in this study.
• Approximately 38.9% of our study population had coexisting multiple myeloma, based on having ≥1 claim with a relevant ICD-9-CM or ICD-10-CM code. Our data are not clinically detailed enough to determine which diagnosis was most appropriate for these patients.
• Our data source represents care for persons (or their dependents) who are able and willing to work and have commercial or Medicare Supplement Insurance. Given this healthy-worker bias, utilization and costs reported here may be underestimated.
• Our cost estimates include direct healthcare costs and do not take into account important indirect costs associated with caregiver burden, loss of productivity, and reduced quality of life.

LIMITATIONS

• The use of bortezomib-based regimens to treat patients with AL amyloidosis increased from 2007 to 2015.
• Patients with AL amyloidosis use substantial healthcare resources.
• In a given year, half the patients with AL amyloidosis were admitted to the hospital at least once and had an average stay of ≥2 weeks.
• Visits to laboratories, offices, and other outpatient sites occurred almost twice a month.
• The cost of this care totaled more than $100,000 per patient and rose during the period studied.
• New therapies aimed at improving organ response have the potential to reduce these disease burdens.

REFERENCES