Alopecia Areata Treatment Patterns, Healthcare Resource Utilization, and Comorbidities in the US Population Using Insurance Claims

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ABSTRACT

Introduction: Alopecia areata (AA) is an autoimmune disorder causing sudden, non-scarring hair loss. There are currently no drugs approved for AA treatment. This study assessed prevalence of comorbidities, treatments, and healthcare costs and resource utilization among patients with AA in the USA.

Methods: Patients diagnosed with AA between January 2011 and December 2018 were identified in IBM MarketScan® Research Databases. Eligible patients had no other hair loss-related disorders and were continuously enrolled with medical and pharmacy benefits at least 12 months before and after AA diagnosis. Descriptive statistics were used to summarize comorbid conditions, treatments related to AA or other autoimmune/inflammatory conditions, and all-cause and AA-specific healthcare costs and resource utilization identified from claims data.

Results: A total of 68,121 patients with AA were identified. Mean (SD) age was 40.3 (17.8) years and 61.0% were female. The most common comorbidities included hyperlipidemia (22.4%), hypertension (21.8%), thyroid disorders (13.1%), contact dermatitis or eczema (10.8%), depression (9.5%), and anxiety (8.4%). Comorbid autoimmune diseases included atopic dermatitis (2.8%), psoriasis (2.1%), chronic urticaria (1.5%), and rheumatoid arthritis (1.1%). During the 12-month follow-up period, 37,995 patients (55.8%) were prescribed treatment for their AA or other comorbid autoimmune/inflammatory disease; 44.9% of treated patients were prescribed therapy within 7 days of AA diagnosis. Of patients receiving treatment, 80.3% received topical steroids and 30.0% received oral steroids. Mean (SD) total healthcare costs were $11,241.21 ($43,839.69) for all-causes and $419.12 ($1534.99) for AA. AA-related expenses were driven by outpatient and prescription costs.

Conclusion: Patients with AA have a high comorbidity burden and lack of treatment. Current AA treatments, including systemic therapies other than oral steroids, were not frequently utilized in this study population.
Healthcare costs incurred by patients with AA went beyond AA-related expenses. Longitudinal data are needed to better understand treatment trajectories and the disease burden in patients with AA.

**Keywords:** Alopecia areata; Comorbidity; Healthcare costs; Healthcare utilization; Treatment

### Key Summary Points

**Why carry out this study?**

There are currently no drugs approved by the US Food and Drug Administration for the treatment of alopecia areata (AA).

To better understand treatment needs and burden in AA, this study assessed the prevalence of comorbidities, treatment patterns, and healthcare costs in patients with AA.

**What was learned from the study?**

Of 68,121 patients with AA, 55.8% were prescribed treatment for AA within a year of diagnosis.

Existing off-label treatments for AA, including intralesional steroids for mild disease and topical and/or oral steroids for more severe cases, have limited effectiveness [9–11]. Given the limited treatment options, management of AA is difficult and can be burdensome to patients.

A better understanding of how current off-label treatments are utilized in the AA population, as well as the economic impact of AA care in these patients and co-occurrence of psychiatric and medical conditions, can provide important insight into treatment needs and burden in AA. Using administrative claims data, this analysis seeks to assess the prevalence of comorbidities, evaluate treatment patterns, and describe costs of care in patients diagnosed with AA in the USA.

### METHODS

**Data Source and Study Population**

This retrospective, observational claims analysis utilizes data from the IBM MarketScan® Commercial Claims and Encounters Database (Commercial) and the Medicare Supplemental and Coordination of Benefits Database (Medicare Supplemental). These research databases contain detailed, patient-level inpatient, outpatient, and outpatient prescription drug encounters of over 200 million people in the USA who receive care under fee-for-service and managed care plans, including exclusive...
provider organizations (EPO), preferred provider organizations (PPO), point-of-service (POS) plans, indemnity plans, and health maintenance organizations (HMOs). The databases contain standard codes for diagnoses, procedures, and medications, and all claims in the research databases are fully paid and adjudicated. Member identification codes allow patients to be followed longitudinally [12].

Study subjects included those enrolled in the MarketScan databases who had at least one outpatient visit, inpatient admission, or healthcare provider visit with an AA diagnosis (International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9-CM] diagnosis codes 704.01 or 704.09, or Tenth Revision [ICD-10-CM] diagnosis codes L63.0, L63.1, L63.2, L63.8, or L63.9) between January 1, 2011 and December 31, 2018. The index date was defined as the date of the first observed AA diagnosis. Patients must have been continuously enrolled with medical and pharmacy benefits for at least 12 months before the index date (baseline period) and at least 12 months after the index date (follow-up period). Excluded from this analysis were patients with other hair loss disorders, including trichotillomania, androgenic alopecia, telogen effluvium, tinea capitis and tinea barbae, scarring alopecia, unspecified non-scarring hair loss, pseudopelade, folliculitis decalvans, and other specified hair loss.

This study was conducted in accordance with ethical principles of the Declaration of Helsinki and Good Clinical Practice guidelines. This study was exempt from informed consent requirements and institutional/ethical review board approval was not required because this was a non-interventional study based on secondary data use. All patient data were de-identified and compliant with the Health Insurance Portability and Accountability Act of 1996.

Measures and Outcomes

Demographics and Clinical Characteristics
Demographics measured on the index date included age, sex, geographic region, and primary payer (Commercial or Medicare). Newly diagnosed AA was defined as having a diagnosis of AA during the follow-up period (including the index date) and no diagnosis of AA during the baseline period. Severity of AA was determined using diagnosis codes and/or prescription treatments as a proxy measure. Patients with a diagnosis code for alopecia universalis (L63.0) or alopecia totalis (L63.1) or prescriptions for any immunomodulators, oral steroids, systemic non-steroids, or phototherapy were classified as having moderate-to-severe disease, while patients who were prescribed topical therapies, intralesional steroids, non-traditional treatments, or other treatments were categorized as having mild disease. The list of treatments is in the supplementary material (Table S1).

Comorbidities
Comorbid conditions were identified by the presence of at least one inpatient or non-diagnostic outpatient medical claim with an ICD-9-CM and ICD-10-CM diagnosis code during the baseline and follow-up periods. Comorbidities were compared between the baseline versus follow-up periods and between mild versus moderate-to-severe disease.

Treatments
Medications and therapies related to AA or other autoimmune/inflammatory conditions included topical steroids, intralesional triamcinolone, oral steroids, phototherapy, immunomodulators, and alternative therapies (Table S1 in the supplementary material). Prescribed treatments were evaluated within 7 days of diagnosis with AA (index therapy) and during the first 12 months post-AA diagnosis (follow-up treatment).

Healthcare Costs and Utilization
All-cause and AA-specific healthcare resource utilization and costs were measured for inpatient, outpatient, and emergency room (ER) visits and outpatient prescriptions during the 12 months after diagnosis with AA. AA-related encounters and costs included those associated with inpatient claims with AA as the principal diagnosis, outpatient or ER claims with an AA
diagnosis in the first position, or AA-related medications. The costs of services provided under capitated arrangements were estimated using payment proxies that were computed on the basis of paid claims at the procedure level. All costs were inflated to 2019 US dollars using the Medical Care Component of the Consumer Price Index.

Statistical Analysis

The study sample selection and creation of analytic variables were conducted using Instant Health Data (IHD), a Software as a Service-based real-world evidence analytics platform (Boston, MA, USA). Descriptive statistics were used to summarize the study population, comorbidity prevalence, treatments, and healthcare resource utilization and costs, with counts (N) and percentages for categorical measures and means and standard deviations (SDs), medians and interquartile ranges (IQRs), and ranges (min–max) for continuous measures. Data were analyzed using R, version 3.2.1 (Vienna, Austria).

RESULTS

Patient Characteristics

A total of 68,121 patients with a diagnosis of AA were identified between 2011 and 2018 (Fig. S1 in the supplementary material). The mean (SD) age at the time of diagnosis was 40.3 (17.8) years and 61.0% of patients were female (Table 1). About half (53.8%) were seen by a dermatologist and 96.4% were newly diagnosed with AA. About half (53.8%) were seen by a dermatologist and 96.4% were newly diagnosed with AA. A total of 10,305 (15.1%) had mild AA, 23,730 (34.8%) had moderate-to-severe AA, and 34,086 (50.0%) had unknown/indeterminate severity. The diagnosis codes for alopecia totalis and alopecia universalis were identified in 900 patients (1.3%) and 435 patients (0.6%), respectively.

Comorbidities

The prevalence of comorbidities before and after diagnosis with AA is listed in Table 2. In general, the percentages of patients with comorbid conditions were higher in the follow-up period. The most common coexisting conditions during follow-up were hyperlipidemia (22.4%), hypertension (21.8%), thyroid disorders (13.1%), contact dermatitis or eczema (10.8%), depression (9.5%), and anxiety (8.4%). Comorbid autoimmune diseases included atopic dermatitis (2.8%), psoriasis (2.1%), chronic urticaria (1.5%), and rheumatoid arthritis (1.1%).

Comorbidities among the subset of 34,035 patients for whom disease severity was

### Table 1 Characteristics of patients with a diagnosis of alopecia areata (N = 68,121)

| Characteristic                        | N (%)       |
|--------------------------------------|-------------|
| Age, mean (SD)                       | 40.3 (17.8) |
| Gender                               |             |
| Female                               | 41,561 (61.0%) |
| Male                                 | 26,560 (39.0%) |
| Geographic region                    |             |
| Midwest                              | 12,424 (18.2%) |
| Northeast                            | 15,423 (22.6%) |
| South                                | 26,220 (38.5%) |
| West                                 | 12,754 (18.7%) |
| Unknown                              | 1300 (1.9%) |
| Primary payer                        |             |
| Commercial                           | 63,127 (92.7%) |
| Medicare                             | 4987 (7.3%) |
| Unknown                              | 7 (0.01%)   |
| Disease severity<sup>a</sup>         |             |
| Mild                                 | 10,305 (15.1%) |
| Moderate-to-severe                   | 23,730 (34.8%) |
| Unknown/indeterminate                | 34,086 (50.0%) |
| Diagnosed by a dermatologist         | 36,620 (53.8%) |
| New AA diagnosis                     | 65,678 (96.4%) |

<sup>a</sup> Disease severity was defined using treatments and diagnosis as a proxy.
### Table 2 Prevalence of comorbidities in patients with alopecia areata during the baseline and follow-up periods (N = 68,121)

| Comorbidities                              | Baseline       | Follow-up      |
|--------------------------------------------|----------------|----------------|
| Hyperlipidemia                             | 13,904 (20.4%) | 15,226 (22.4%) |
| Hypertension                               | 13,751 (20.2%) | 14,858 (21.8%) |
| Thyroid disorder                           | 7549 (11.1%)   | 8949 (13.1%)   |
| Contact dermatitis and eczema              | 5379 (7.9%)    | 7324 (10.8%)   |
| Depression                                 | 5505 (8.1%)    | 6466 (9.5%)    |
| Anxiety                                    | 4452 (6.5%)    | 5718 (8.4%)    |
| Obesity                                    | 4216 (6.2%)    | 5236 (7.7%)    |
| Asthma                                     | 4489 (6.6%)    | 4690 (6.9%)    |
| Osteoarthritis                             | 4125 (6.1%)    | 4375 (6.4%)    |
| Diabetes mellitus                          | 4273 (6.3%)    | 4186 (6.1%)    |
| Coronary heart disease                     | 2650 (3.9%)    | 2936 (4.3%)    |
| Atopic dermatitis                          | 1352 (2.0%)    | 1932 (2.8%)    |
| Tobacco dependency                         | 1441 (2.1%)    | 1733 (2.5%)    |
| Psoriasis                                  | 908 (1.3%)     | 1408 (2.1%)    |
| Cerebrovascular disease                    | 1303 (1.9%)    | 1387 (2.0%)    |
| Chronic urticaria                          | 851 (1.3%)     | 996 (1.5%)     |
| Hypersensitivity                           | 829 (1.2%)     | 829 (1.2%)     |
| Rheumatoid arthritis                       | 683 (1.0%)     | 750 (1.1%)     |
| Vitiligo                                   | 261 (0.4%)     | 561 (0.8%)     |
| Alcohol abuse                              | 414 (0.6%)     | 478 (0.7%)     |
| Suicidal ideation                          | 428 (0.6%)     | 472 (0.7%)     |
| Systemic lupus erythematosus               | 385 (0.6%)     | 460 (0.7%)     |
| Ulcerative colitis                         | 310 (0.5%)     | 334 (0.5%)     |
| Crohn’s disease                            | 295 (0.4%)     | 282 (0.4%)     |
| Sjogren’s syndrome                         | 200 (0.3%)     | 247 (0.4%)     |
| Multiple sclerosis                         | 192 (0.3%)     | 209 (0.3%)     |
| Celiac disease                             | 144 (0.2%)     | 186 (0.3%)     |
| Uveitis                                    | 190 (0.3%)     | 165 (0.2%)     |
| Hidradenitis suppurativa                   | 119 (0.2%)     | 154 (0.2%)     |
| Psoriatic arthritis                        | 118 (0.2%)     | 136 (0.2%)     |
| Ankylosing spondylitis                     | 53 (0.1%)      | 60 (0.1%)      |
| Systemic sclerosis                         | 45 (0.1%)      | 60 (0.1%)      |
estimated are summarized in Table 3. The prevalence of comorbid conditions was numerically higher among patients with more severe disease. In patients with moderate-to-severe and mild disease, respectively, thyroid disorders were prevalent in 14.7% and 9.7% of patients, depression was reported in 11.2% and 7.3% of patients, and anxiety was observed in 8.6% and 7.1% of patients.

Treatments

During the 12 months after diagnosis with AA, 37,995 (55.8%) patients were prescribed treatment for their AA or other comorbid autoimmune/inflammatory disease, with 10,352 patients (27.2% of treated patients, 15.2% overall) receiving at least two treatment types. Within 7 days of AA diagnosis, 17,062 patients (44.9% of treated patients, 25.1% overall) were prescribed treatment. Overall, 30,126 (44.2%) patients were not prescribed treatment in the year following diagnosis, including 29,071/65,678 patients (44.3%) who were newly diagnosed with AA.

The distributions of treatments prescribed within 7 days and 12 months of AA diagnosis are listed in Table 4. Topical steroids and oral steroids, respectively, were given to 80.3% and 30.0% of treated patients throughout follow-up.

Healthcare Costs and Utilization

In the 12 months after diagnosis with AA, mean (SD) total healthcare costs were $11,241.21 ($43,839.69) for all-causes and $419.12 ($1534.99) for AA (Fig. 1). Out-of-pocket costs totaled $1175.20 (1654.52) for all-causes and $104.19 (201.20) for AA. Outpatient visits ($226.17 [526.42]) and prescriptions ($190.39 [1423.16]) were the main sources of AA-related expenses. About 71.7% and 55.3% of patients had outpatient and pharmacy visits, respectively, during the 12-month period after diagnosis (Table 5).

DISCUSSION

This comprehensive study of claims data sought to describe comorbidities, treatment patterns, and healthcare costs and utilization in patients diagnosed with AA in the USA. Comorbid conditions, including thyroid disorder, depression, anxiety, and other autoimmune diseases, were more commonly reported after AA diagnosis and in patients with moderate-to-severe disease. About 55.8% of patients were treated with off-label treatments for AA or another autoimmune/inflammatory condition in the first year after AA diagnosis, with 44.9% of these patients being prescribed treatment within 1 week of their AA diagnosis. The most prescribed treatments were topical steroids, followed by oral steroids. Finally, AA-related healthcare expenditures were largely driven by outpatient and medication costs. Together, these findings can contribute to our understanding of treatment needs and burden in AA.

Hyperlipidemia and hypertension were the most prevalent comorbid conditions in this study population, with rates similar to those previously reported [13]. Depression and anxiety were also common in this cohort. Prior studies have found that rates of mental health
| Comorbidities                        | Mild ($N = 10,305$) | Moderate-to-severe ($N = 23,730$) |
|-------------------------------------|----------------------|-----------------------------------|
| Hypertension                        | 1786 (17.3%)         | 6242 (26.3%)                      |
| Hyperlipidemia                      | 1816 (17.6%)         | 6133 (25.8%)                      |
| Thyroid disorder                    | 999 (9.7%)           | 3484 (14.7%)                      |
| Contact dermatitis and eczema       | 1081 (10.5%)         | 3110 (13.1%)                      |
| Depression                          | 750 (7.3%)           | 2649 (11.2%)                      |
| Obesity                             | 674 (6.5%)           | 2061 (8.7%)                       |
| Diabetes mellitus                   | 457 (4.4%)           | 2050 (8.6%)                       |
| Anxiety                             | 734 (7.1%)           | 2034 (8.6%)                       |
| Osteoarthritis                      | 439 (4.3%)           | 2028 (8.6%)                       |
| Asthma                              | 509 (4.9%)           | 1936 (8.2%)                       |
| Coronary heart disease              | 300 (2.9%)           | 1248 (5.3%)                       |
| Atopic dermatitis                   | 451 (4.4%)           | 694 (2.9%)                        |
| Tobacco dependency                  | 236 (2.3%)           | 629 (2.7%)                        |
| Cerebrovascular disease             | 150 (1.5%)           | 575 (2.4%)                        |
| Psoriasis                           | 253 (2.5%)           | 554 (2.3%)                        |
| Chronic urticaria                   | 113 (1.1%)           | 402 (1.7%)                        |
| Hypersensitivity                    | 62 (0.6%)            | 395 (1.7%)                        |
| Rheumatoid arthritis                | 59 (0.6%)            | 389 (1.6%)                        |
| Systemic lupus erythematosus        | 37 (0.4%)            | 223 (0.9%)                        |
| Suicidal ideation                   | 55 (0.5%)            | 193 (0.8%)                        |
| Alcohol abuse                       | 65 (0.6%)            | 162 (0.7%)                        |
| Vitiligo                            | 132 (1.3%)           | 154 (0.7%)                        |
| Ulcerative colitis                  | 29 (0.3%)            | 136 (0.6%)                        |
| Sjogren’s syndrome                  | 8 (0.1%)             | 128 (0.5%)                        |
| Crohn’s disease                     | 23 (0.2%)            | 127 (0.5%)                        |
| Multiple sclerosis                  | 19 (0.2%)            | 92 (0.4%)                         |
| Uveitis                             | 6 (0.1%)             | 79 (0.3%)                         |
| Hidradenitis suppurativa            | 18 (0.2%)            | 70 (0.3%)                         |
| Psoriatic arthritis                 | 11 (0.1%)            | 68 (0.3%)                         |
| Celiac disease                      | 19 (0.2%)            | 66 (0.3%)                         |
| Systemic sclerosis                  | 4 (0.0%)             | 33 (0.1%)                         |
| Ankylosing spondylitis              | 9 (0.1%)             | 26 (0.1%)                         |
disorders are higher in patients with AA versus controls without AA [14, 15]. Psychiatric conditions may be both contributors to and consequences of AA [14, 16], underscoring the significance of these disorders in patients with this disease. Thyroid and other autoimmune disorders were also common among patients with alopecia in this analysis. Many studies suggest an association between AA and autoimmune conditions, including psoriasis, systemic lupus erythematosus, vitiligo, and atopic dermatitis [13, 17]. Awareness of these potential comorbidities is important for therapeutic management of AA [18].

In this study, 55.8% of patients received prescription treatment in the 12-month period following diagnosis with AA, with 25.1% of all patients being prescribed treatment within 1 week of diagnosis. The apparent delay in prescribing treatment likely reflects both watchful waiting in some patients, as spontaneous hair regrowth occurs in about half of mild cases [19],
and worsening of disease in other patients, as up to a quarter of patients progress to alopecia totalis or alopecia universalis [2].

Most treated patients were prescribed topical steroids, which may be beneficial in managing mild disease. However, topical steroids may not be beneficial in the long term and are less effective in treating more severe types of alopecia [2]. Oral steroids have demonstrated efficacy in stimulating hair regrowth in many cases of AA [10]. Intralesional steroids are considered the standard of care for patchy AA of limited extent [10]. In addition, immunosuppressive and immunotherapy drugs have been found to be somewhat effective in treating alopecia [17]. However, these treatments were not frequently utilized in the study population.

About 44% of patients in this study did not receive any prescription treatment for AA. These patients may, in part, represent those with mild

![Fig. 1 Proportion of healthcare spending for all causes and alopecia areata in the 12 months after diagnosis](image-url)
In this study, AA-related expenses largely consisted of outpatient and prescription costs. Over half of patients had pharmacy visits and nearly three-quarters had outpatient visits related to their AA. Though AA-related costs were a relatively small proportion of total healthcare costs in this study, other studies suggest that AA care is financially burdensome to patients [22]. The comparatively low cost of AA care in this study may reflect the large number of patients who were not prescribed any treatment. Additionally, the AA costs in this analysis do not include other important expenditures for these patients, including headwear or cosmetic options [22]. These findings also do not capture the substantial financial impacts of potential psychological distress or work productivity loss [23].

This analysis has important limitations. The study population was limited to individuals in the USA with private health insurance and Medicare supplemental coverage, and therefore these findings may not be generalizable beyond commercially insured patients with AA. It was not possible to link prescription claims to a specific diagnosis; the inability to confirm that medications were prescribed for AA treatment could inflate treatment rates reported in this study. Claims data have limited clinical and diagnostic characteristics. Prescription treatments were used as a proxy for disease severity, which may not accurately represent disease and fails to capture severity for untreated patients. Nearly half of patients were diagnosed with AA by non-dermatologists, and AA diagnoses could not be confirmed with chart reviews. It is possible that certain comorbid conditions were misclassified; patients with atopic dermatitis likely also experience contact dermatitis or eczema, and their condition may have been coded as such.

**CONCLUSIONS**

This large, comprehensive analysis highlights the high rate of comorbidities and utilization of...
healthcare in the AA patient population. Current off-label methods for treating AA, including systemic therapies beyond oral steroids, were not frequently used in this study population. As there are presently no FDA-approved treatments for AA, these findings underscore the need for effective long-term treatment options to manage disease. Healthcare costs associated with AA are largely due to outpatient and medication costs, though the economic impact of AA cannot be fully captured in claims data. Future longitudinal analyses may consider the AA treatment trajectory throughout the course of disease to better understand the sequence and timing of treatments given. Studies of non-prescription management of disease would also yield important information into the burden of disease not captured in claims data.

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**Data Availability.** The data that support the findings of this study were provided by IBM. Restrictions apply to the availability of these data, which were used under license for this study and therefore not publicly available. Requests may be sent to IBM for more information on data availability and licensing.

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