ORIGINAL REPORT

Real-World Treatment Patterns among Patients with Alopecia Areata in the USA: A Retrospective Claims Analysis

Nicolae DONE[1], Lauren BARTOLOME[2], Elyse SWALLOW[1], Wei GAO[1], Christopher CARLEY[1], Travis WANG[1] and Arash MOSTAGHIMI[3]
[1]Analysis Group, Boston, MA, [2]Pfizer, Collegeville, PA and [3]Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA

Alopecia areata is an autoimmune disorder characterized by hair loss, for which there are few treatment options. This claims-based study characterized recent real-world treatment patterns among patients in the USA with alopecia areata, including the subtypes alopecia totalis and alopecia universalis, in the first year after diagnosis of an episode of alopecia areata. Approximately 5% of all patients (adults (age ≥18 years), *n* = 7,703; adolescents (age 12–17 years), *n* = 595) had alopecia totalis or alopecia universalis. Corticosteroids were the most common first-line (1L) and second-line (2L) treatments. The mean time from diagnosis of alopecia areata to initiation of 1L treatment was 2.2 days for adults and 2.6 days for adolescents; mean 1L duration was 76.9 and 64.3 days, respectively. For adults (57.5%) and adolescents (59.7%) with 2L therapy, the mean time from 1L discontinuation to 2L initiation was 57.2 and 53.6 days, respectively; the mean duration of 2L treatment was 55.5 and 50.1 days, respectively. More patients with vs without alopecia totalis or alopecia universalis initiated 2L therapy (adults: 71.9% vs 56.8%; adolescents: 71.4% vs 58.9%). The proportion of days covered during the first year post-diagnosis was 36.7% (adults) and 34.1% (adolescents). These results highlight the substantial disease burden of alopecia areata and a need for more effective treatments.

Key words: alopecia areata; alopecia totalis; alopecia universalis; treatment; adult; adolescent.

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Corr: Nicolae Done, Analysis Group, 111 Huntington Ave, 14th Floor, Boston, MA 02199, USA. E-mail: Nicolae.Done@analysisgroup.com

SIGNIFICANCE

This study examined treatments received by patients in the USA with the hair loss disorder alopecia areata in the first year after diagnosis. The most common treatment was corticosteroids. On average, adult (adolescent) patients started their first treatment 2.2 (2.6) days after diagnosis and remained on this treatment for 76.9 (64.3) days. Nearly 60% of patients received a second treatment, which was continued for 55.5 (50.1) days. Only a minority of patients (37% of adults and 34% of adolescents) stayed on their medication. These results highlight a need for more effective treatments for alopecia areata.

Alopecia areata (AA) is an autoimmune disorder characterized by non-scarring hair loss on the scalp. It presents most commonly in a patchy form, with subtypes including full hair loss on the scalp (alopecia totalis; AT) or on the scalp, face, and body (alopecia universalis; AU) (1, 2). The estimated lifetime prevalence of AA in the USA is 2–2.5% (0.77% for AT or AU) (3, 4). Approximately 20% of cases are children and 60% of patients have an episode of AA before 20 years of age (5, 6). Episodes of limited patchy hair loss typically last <6 months, followed by spontaneous hair regrowth within a year (7, 8). However, relapse, usually within 4 years of the initial episode, is common (52% for childhood-onset and 44% for adult-onset AA) (9), and approximately 5–36% of patients progress to AT or AU, which has a lower probability of recovery (10–12). AA is frequently associated with atopic, autoimmune, and cardiovascular disorders, as well as psychiatric disorders such as depression and anxiety (5, 13–21); it also negatively impacts quality of life (22–25) and incurs substantial costs to patients and the healthcare system (26–30).

Prior to approval of the Janus kinase (JAK) inhibitor baricitinib, the first systemic treatment for AA, by the US Food and Drug Administration (FDA) in June 2022 (31, 32), treatment options were limited to off-label use of anti-inflammatory (e.g. corticosteroids) and immunomodulatory (e.g. cyclosporine, methotrexate) medications (33, 34), photodynamic therapy, and hair growth stimulants, such as minoxidil (26). However, there are currently no definitive treatment guidelines for AA in the USA, mainly because of a lack of evidence from randomized controlled trials (34, 35). The treatment strategy depends on patient age, disease activity and severity (i.e., extent of hair loss as determined by Severity of Alopecia Tool (SALT) score), response to previous treatment(s) (36), and health-related quality of life (37). The Alopecia Areata Consensus of Experts (ACE) study consensus is that injectable, topical, and/or oral corticosteroids are the appropriate first-line (1L) treatment for adolescents (aged 13–18 years) and adults with severe AA depending on their SALT score, with off-label use of JAK inhibitors as the preferred second-line (2L) therapy for adults (38).

There have been few studies on treatments used for AA in the real-world setting in the USA. A retrospective study of 2.6 million US outpatient visits for AA in the

National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey (2001–2010) found that topical or injectable corticosteroids (61.0%), minoxidil (5.9%), and topical tacrolimus (5.7%) were the most common treatments (39). Another study of US insurance claims data (2011 to 2018) found high rates of topical (80.3%) and oral (30.0%) corticosteroid use in the first year after AA diagnosis (26). Clarifying the types, sequence, and duration of AA treatments that were used in clinical practice before baricitinib became available, and differences thereof according to patient age and extent of disease, is essential for identifying the medical needs of patients. To address this gap in knowledge, this retrospective claims-based study characterized treatment patterns among US adults and adolescents with AA, including the more severe subtypes AT and AU, in the first year after diagnosis.

MATERIALS AND METHODS

Data source

This retrospective cohort study used the IBM MarketScan® Commercial Claims and Encounters Database and Medicare Supplemental and Coordination of Benefits Database (2014–2019 Q1) (40). The databases contain adjudicated administrative healthcare claims data for employees, their dependents, and Medicare-eligible retirees with employer-provided Medicare supplemental plans covered by the health benefit programmes of large US employers; data include patient enrollment history, billed medical procedures and diagnoses, pharmacy claims, and demographic variables for 30–50 million unique enrolees per year. The database complies with the Health Insurance Portability and Accountability Act and contains no identifiable patient information; therefore, institutional review board approval was not required for this study.

Patient selection and alopecia areata episode identification

The study population comprised commercially insured patients with ≥2 claims with a diagnosis code for AA (International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) code L63.x, including AT [L63.0] and AU [L63.1]) on different dates of service. The date of the first AA diagnosis between 1 October 2015 and 31 March 2018 was defined as the start date of the index AA episode (episode index date). AT and AU were identified based on a diagnosis on the episode index date or at any point thereafter. Patients were required to be aged ≥12 years on this date; have continuous enrolment in a health insurance plan for ≥12 months before and after this date; and to have initiated AA-related treatment within 30 days of the episode index date; and were stratified into adult (aged ≥18 years) and adolescent (aged 12–17 years) cohorts according to their age on the episode index date. Patients with a claim containing a diagnosis code for AA (code L63.x or ICD-9-CM code 704.01) within 1 year before the episode index date (washout period) were excluded to ensure that AA-related treatment sequencing was fully captured.

Study design and variables

Baseline characteristics. The baseline and study periods were defined as the 12 months before and 12 months after the episode index date, respectively. Patients' demographic (age, sex, geographical region, insurance type) and clinical characteristics (Charlson Comorbidity Index and individual AA-related comorbidities (atopic, autoimmune, cardiovascular, mental health, other)) were assessed during the baseline period.

Treatments for alopecia areata episode. Up to 2 lines of AA-related treatment during the 12-month follow-up period were described. AA-related treatments (and combinations) were defined at the class level and included: (*i*) injectable corticosteroids; (*ii*) oral corticosteroids; (*iii*) topical corticosteroids; (*iv*) topical immunomodulators, including calcineurin inhibitors (tacrolimus, pimecrolimus) and antipsoriatics; (*v*) systemic immunomodulators including azathioprine, cyclosporine, methotrexate, mycophenolate mofetil, sulfasalazine, etanercept, tumour necrosis factor inhibitors, dupilumab, and JAK inhibitors; (*vi*) other treatments including contact immunotherapy, phototherapy (psoralen + ultraviolet A, excimer laser), minoxidil, simvastatin/ezetimibe, and bimatoprost; (*vii*) combinations of immunomodulators and other treatments; and (*viii*) combinations of corticosteroids and other treatments. The full list of codes used to identify individual treatments in the claims data is shown in Table SII.

Lines of treatment. 1L treatment included drugs or combinations of drug classes initiated on or within 30 days of the episode index date. Discontinuation was defined as a gap of ≥30 days between the supply end date of the current treatment (or of a drug class in a combination therapy) and date of initiation of the next treatment. 2L treatment was identified by treatment switching, re-initiation, or augmentation. Switching was defined as initiation of a new regimen that overlapped with the original regimen by 0–14 days, or as discontinuation of ≥1 drug class in a combination therapy (e.g. A+B+C to A+B). Re-initiation was defined as starting the same treatment regimen after a gap of >30 days post-discontinuation, with no other treatments during the gap. Augmentation was defined as adding ≥1 new drug class 30 days after initiation of the original regimen, with an overlap of ≥14 days between the new drug class(es) and original regimen.

Combination therapy (for both 1L and 2L) was defined according to the following criteria: (*i*) all AA-related drug classes in the combination therapy were initiated within 30 days of each other; and (*ii*) the overlap between each pair of drug classes in the combination therapy was ≥14 days. The 2 categories of combination therapy were immunomodulator and corticosteroid combinations. Immunomodulators in combination with corticosteroids were defined as an immunomodulator combination because of the greater potency of the former.

Treatment patterns. The following outcomes were reported: duration of therapy (DOT) for 1L and 2L (if any), assessed as the days of supply; time from the episode index date to 1L and 2L (if any) initiation; and proportion of days covered (PDC). Treatments administered on the episode index date had a time to initiation of 0 days. Days of supply were reported in claims identified in the pharmacy data, or were imputed using information from drug labels for claims in the medical setting.

Analyses. Baseline characteristics of adult and adolescent patients were reported. Outcomes were separately reported for AA adults or adolescents overall, AT/AU adults or adolescents, and non-AT/-AU adults or adolescents. Baseline characteristics were compared between patients with vs without 2L treatment. Means and standard deviations (SDs) were reported for continuous variables; counts and percentages were reported for binary and categorical variables.

RESULTS

Sample selection and patient characteristics

Of 14,088 patients with AA, 8,298 (7,703 adults and 595 adolescents) who initiated a treatment for AA within 30 days of the episode index date were included

in the analysis (Fig. S1). The mean (SD) age at index was 42.8 (13.7) years for adults and 14.5 (1.6) years for adolescents; 62.3% and 48.2%, respectively, were female (**Table I**).

Characteristics and comorbidities of patients stratified by receipt of 2L treatment during follow-up are shown in Table SI. Among patients without 2L treatment, the mean (SD) age was 42.4 (15.0) years for adults and 14.5 (1.6) years for adolescents; among those with 2L treatment, the mean (SD) age was 43.6 (15.1) and 14.6 (1.6) years, respectively. A larger proportion of patients with 2L treatment had AT or AU compared with patients without 2L treatment (adults: 5.6% vs 3.0%; adolescents: 7.0% vs 4.2%).

Table I. Patient characteristics and comorbidities

Characteristic	Adolescents $N=595$	Adults $N=7,703$
Age (years), mean±SD	14.5±1.6	42.8±13.7
Sex, *n* (%)		
Female	287 (48.2)	4,802 (62.3)
Male	308 (51.8)	2,901 (37.7)
US region, *n* (%)		
Midwest	122 (20.5)	1,355 (17.6)
Northeast	141 (23.7)	2,072 (26.9)
South	252 (42.4)	2,977 (38.6)
West	80 (13.4)	1,299 (16.9)
Insurance type, *n* (%)		
Managed care[a]	19 (3.2)	316 (4.1)
Consumer-driven[b]	141 (23.7)	1,610 (20.9)
Comprehensive	435 (73.1)	5,777 (75.0)
Type of alopecia areata, *n* (%)		
Alopecia totalis or alopecia universalis	35 (5.9)	345 (4.5)
Other alopecia areata	560 (94.1)	7,358 (95.5)
Comorbidities, *n* (%)		
Anaemia	6 (1.0)	246 (3.2)
Any atopic disorder[c]	152 (25.5)	1,471 (19.1)
Any autoimmune disorder[d]	36 (6.1)	1,087 (14.1)
Any cardiovascular disorder[e]	34 (5.7)	1,069 (13.9)
Any mental health disorder[f]	80 (13.4)	1,470 (19.1)
Charlson Comorbidity Index, mean±SD	0.2±0.4	0.3 ± 0.8
Charlson Comorbidity Index categories, *n* (%)		
0	477 (84.4)	5,839 (80.5)
1–2	86 (15.2)	1,222 (16.8)
3–4	1 (0.2)	154 (2.1)
5+	1 (0.2)	40 (0.6)
Charlson Comorbidity Index component comorbidities, *n* (%)		
Myocardial infarction	0 (0.0)	27 (0.4)
Congestive heart failure	0 (0.0)	68 (0.9)
Peripheral vascular disease	1 (0.2)	134 (1.7)
Cerebrovascular disease	2 (0.3)	153 (2.0)
Dementia	0 (0.0)	6 (0.1)
Chronic pulmonary disease	85 (14.3)	768 (10.0)
Rheumatic disease	2 (0.3)	208 (2.7)
Peptic ulcer disease	1 (0.2)	32 (0.4)
Liver disease, mild	1 (0.2)	206 (2.7)
Diabetes without chronic complications	10 (1.7)	440 (5.7)
Diabetes with chronic complications	0 (0.0)	108 (1.4)
Hemiplegia or paraplegia	0 (0.0)	9 (0.1)
Renal disease	1 (0.2)	90 (1.2)
Any malignancy, including leukaemia and lymphoma, except malignant neoplasm of skin	0 (0.0)	186 (2.4)
Liver disease, moderate, or severe	1 (0.2)	8 (0.1)
Metastatic solid tumour	0 (0.0)	18 (0.2)
AIDS/HIV	0 (0.0)	16 (0.2)

[a]Composite of health maintenance organization, preferred provider organization, point of service, and exclusive provider organization plans. [b]Composite of consumer-driven health plans and high-deductible health plans. [c]Composite of allergic rhinitis, asthma, atopic dermatitis, celiac disease, chronic urticaria, and conjunctivitis. [d]Composite of ankylosing spondylitis, Crohn's disease, diabetes mellitus, Hashimoto's disease, psoriasis, rheumatoid arthritis, systematic lupus erythematosus, Sjögren's syndrome, ulcerative colitis, and vitiligo. [e]Composite of atherosclerosis, chest pain, dyspnoea, heart palpitations, and shortness of breath. [f]Composite of attention deficit hyperactivity disorder, anxiety disorders, depression, obsessive-compulsive disorder, and substance abuse. SD: standard deviation.

Treatment patterns

Adults. The most common 1L treatment among adults was corticosteroids, including injectable (64.2%), topical (16.0%), and oral (1.0%) monotherapy and corticosteroids in combination with other drug classes (14.2%). Immunomodulators were less frequently used (combined with other drugs: 2.6%; topical: 1.7%; systemic: 0.2%), as were bimatoprost and minoxidil (0.2%) (Fig. S2). Among adults who initiated 2L (57.5%), the most common treatments were injectable (35.0%), topical (9.0%), and combination (7.4%) corticosteroids.

Among adults who received injectable corticosteroids in 1L ($n=4,945$), 54.9% received no 2L treatment and 28.1% received the same therapy in 2L. Most adults on corticosteroid combination therapy in 1L (83.4%) received injectable corticosteroid monotherapy in 2L. The mean (SD) time from AA diagnosis to 1L treatment initiation was 2.2 (6.2) days, and the DOT was 76.9 (65.3) days. The mean (SD) time from 1L discontinuation to 2L initiation was 57.2 (74.7) days, and the mean (SD) DOT of 2L was 55.5 (51.1) days. The mean (SD) PDC was 36.7% (23.8%).

Compared with non-AT/-AU patients, adults with AT or AU ($n=345$) had higher use of 1L topical (22.0% vs 15.7%), oral (5.0% vs 0.83%), and combination (15.4% vs 14.1%) corticosteroids, but lower use of injectable corticosteroids (49.0% vs 64.9%) (**Fig. 1**). A larger proportion of patients with vs without AT or AU initiated 2L treatment (71.9% vs 56.8%).

Adolescents. As for adults, the most common 1L treatment among adolescents was corticosteroids, including injectable (49.4%), topical (27.7%), and oral (1.3%) monotherapy and corticosteroids in combination with other drug classes (15.3%). Immunomodulators were less frequently used (combinations: 3.5%; topical: 2.4%; systemic: 0.3%), and no other treatments were reported (Fig. S2). Among adolescents who initiated 2L (59.7%), the frequency of different treatment types was comparable to 1L.

Among adolescents who received injectable corticosteroids in 1L ($n=294$), 54.8% received no 2L treatment and 31.3% received the same therapy in 2L. Of those receiving topical corticosteroid monotherapy in 1L ($n=165$), 41.2% had no 2L treatment and 30.3% received the same treatment in 2L (i.e. same drug class or combination). Among adolescents who received corticosteroid combinations in 1L, 75.8% received injectable corticosteroid monotherapy in 2L. The mean (SD) time from diagnosis to 1L treatment initiation was 2.6 (6.6) days and the DOT was 64.3 (56.4) days. Among adolescents who received 2L treatment, the mean (SD) time from 1L discontinuation to 2L initiation was 53.6 (71.9) days and DOT of 2L was 50.1 (47.4) days. The mean (SD) PDC was 34.1% (24.4%).

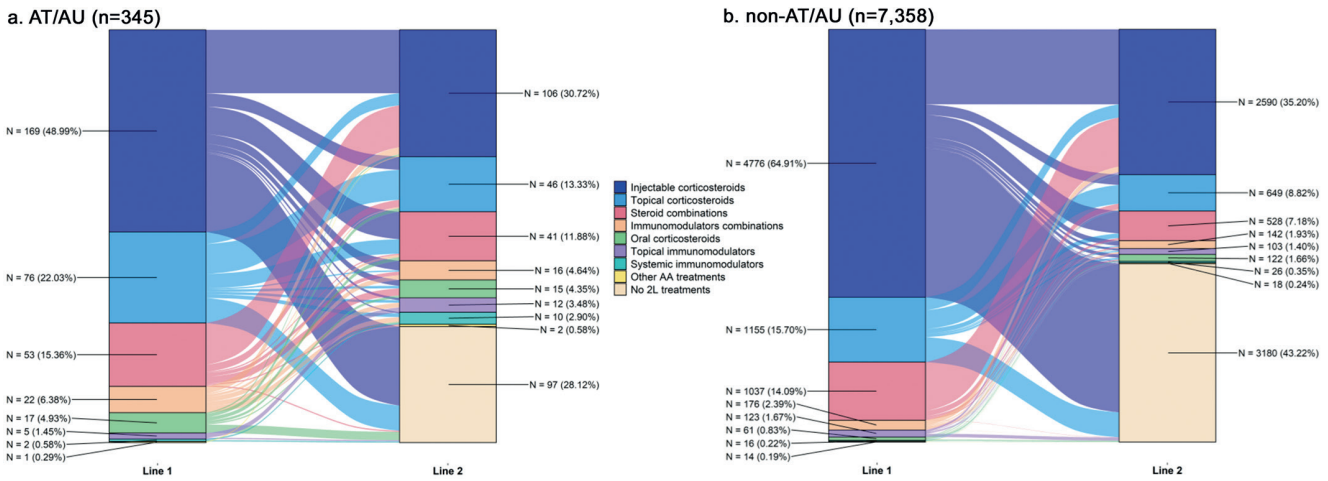

Fig. 1. Sankey diagram of treatment sequences among adults with alopecia areata (AA), with and without alopecia totalis (AT) or alopecia universalis (AU).

Compared with non-AT/-AU adolescent patients, those with AT or AU (n=35) had higher use of combination (17.1% vs 15.2%) and oral (11.4% vs 0.71%) corticosteroids but lower use of injectable corticosteroids (28.6% vs 50.7%) (**Fig. 2**). As in the adult cohort, a larger proportion of adolescent patients with AT or AU initiated 2L treatment compared with patients without AT or AU (71.4% vs 58.9%).

DISCUSSION

There are limited treatment options for AA and data on treatments received by patients in real-world practice settings are scarce. This study used insurance claims data to examine treatment patterns in a large cohort of commercially insured patients with AA in the USA, including adult and adolescent patients and patients with or without AT or AU. The results showed that nearly 60% of patients initiated 1L treatment for AA within 30 days of diagnosis of an AA episode, which is comparable to the proportion reported by a previous US claims-based study (56%) (26). The mean time from diagnosis to treatment initiation was less than 3 days. Nearly 60% of patients received 2L treatment, which was continued for a mean of 56 days. However, the rate of adherence to medication was only 37% in adults and 34% in adolescents. These results suggest that traditional treatments for AA are inadequate and that alternative therapies are needed.

Most adult and adolescent patients with AA who initiated therapy were treated with corticosteroids, most commonly via injection in both 1L and 2L. This is consistent with ACE consensus study recommendations for 1L treatment of AA (38) and findings from other studies (39, 41). Non-systemic therapies predominated in 1L and 2L, with just 2% of all patients and 11% of those with AT or AU receiving systemic therapies (defined as a regimen comprising oral corticosteroids or systemic immunomodulators) at any time (data not shown). The low usage of systemic therapies, even among patients with more extensive disease or who received 2L treatment, and

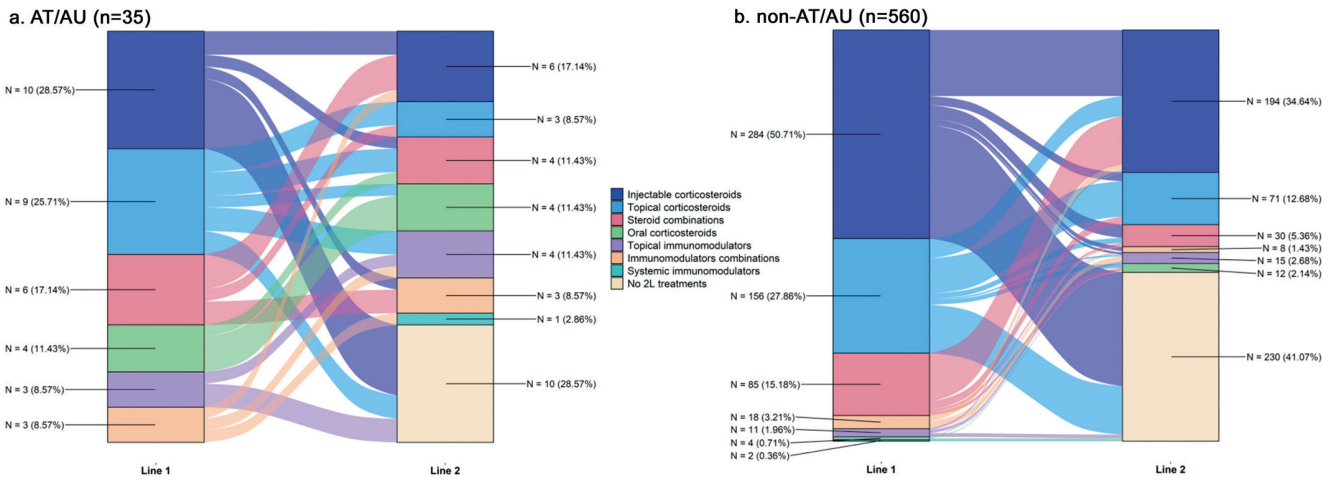

Fig. 2. Sankey diagram of treatment sequences among adolescents with alopecia areata (AA), with and without alopecia totalis (AT) or alopecia universalis (AU). 2L: second-line.

low PDC may reflect the suboptimal efficacy of currently available systemic treatment options or patients' fear of side-effects associated with current off-label medications, such as weight gain and bone mineral density loss (42, 43). Adolescents used injectable corticosteroids less frequently than adults, but had higher use of topical corticosteroids regardless of disease status (i.e., without or with AT or AU). This difference could be related to the pain caused by injectables, although intralesional steroid injections can be trialled as tolerated in children over 10 years of age with limited areas of hair loss, and pain during injections can be reduced with a topical anaesthetic and vibrational devices (44).

A smaller proportion of patients with AT or AU used injectable corticosteroids compared with patients without AT or AU. Injectable corticosteroids are generally not recommended for patients with a high degree of scalp involvement or with AT/AU, because of their limited efficacy and the high treatment burden of this patient population (45). The current results show that such patients instead received oral, topical, or combination corticosteroids. More than half of all adult and adolescent patients and nearly three-quarters of those with AT or AU received 2L treatment within 12 months of their diagnosis, underscoring the unmet therapeutic needs of patients with AA, particularly those with more extensive disease. The ACE consensus statement lists JAK inhibitors as the preferred 2L therapy for adults with severe AA (38). However, in the current study, JAK inhibitors were not the main treatment used by patients with AT or AU, although a caveat is that the definitions of severe AA and AT/AU may not be equivalent. The low rate of JAK inhibitor use in the current study population may also be attributable to the recency of their development and application to the treatment of AA, which was after the data collection period of this study (2015 to 2018).

The results presented herein should be interpreted within the context of the study design. The MarketScan® database provided a large patient sample that is representative of commercially insured US patients with AA. This allowed assessment of patient subpopulations that potentially differed with respect to disease burden (i.e., adults vs adolescents, patients with vs without AT/AU). Patients were followed longitudinally for 12 months following the diagnosis of an AA episode, allowing the evaluation of multiple lines of therapy; moreover, this study had the advantage of a broad time frame.

Limitations

Nonetheless, this study also had certain limitations. First, although a validated search methodology was used, disease misclassification was possible (46). For example, as prescription data were not linked to diagnoses in the MarketScan® database, reported treatments may have been for conditions other than AA. The current study attempted to limit misidentification by requiring 1L therapy to be initiated within 30 days of the initial AA diagnosis. Secondly, this study did not capture over-the-counter or other medications that were not covered by patients' health insurance plans. Thirdly, the study findings may not be generalizable to patients without commercial or Medicare supplemental insurance coverage (e.g., those with Medicaid or who are uninsured). Fourthly, as only 5 years of medical history were available for patients, it was not possible to capture their first lifetime AA diagnosis; as such, patients may have previously received treatment for AA that could have influenced treatment selection for the index episode in the current study. Fifthly, DOT was calculated for all patients who initiated 1L treatment, including those who were still on this line of therapy at the end of the follow-up period; however, as this group constituted only 0.9% of the study population, the impact on the DOT calculation was probably negligible. Finally, PDC assumes that patients are taking their medication as prescribed and may be sensitive to the definition used for a gap between supplies; this assumption cannot be verified using claims data alone, which is a limitation inherent to all studies based on healthcare claims.

Conclusion

More than half of patients with AA in this study sought treatment shortly after their diagnosis. The most commonly used treatment was corticosteroids, alone or in combination with other corticosteroids or drug classes. However, approximately two-thirds of patients had 2L treatment within the first 12 months after AA diagnosis. Collectively, these results suggest a substantial disease burden and need for alternative therapeutic options for AA. Additional research is needed to assess clinical outcomes associated with different treatments, patients' treatment preferences, and changes in treatment patterns as novel therapies become available.

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The data that support the findings of this study were derived from the IBM MarketScan® Research Databases with permission and license from IBM Watson® Health currently Merative and therefore cannot be publicly shared. Researchers may request access to the MarketScan® databases directly at: https://www.ibm.com/products/marketscan-research-databases/databases.

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Conflicts of interest: LB is an employee of Pfizer Inc. and holds stock and/or stock options with Pfizer Inc. ND, ES, WG, and TW are employees of Analysis Group, Inc., which received consulting fees from Pfizer for this study. CC was an employee

of Analysis Group, Inc. at the time this study was conducted. AM reports consulting fees from Pfizer, Concert, Lilly, AbbVie, hims™, and 3Derm; equity from Lucid and hims™; and is an associate editor at JAMA Dermatology.

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