

RESEARCH NOTE

Influence of omalizumab on treatment costs for chronic rhinosinusitis with nasal polyps and asthma: an insurance claims analysis

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Potential conflicts of interest: L.T.R.: consultant for Tissium; advisory board for GSK, S.K.W.: advisory board for ALK-Abello, Genentech, OptiNose, and SinopSys Surgical, and consultant for NeurENT, Stryker, and Chitogel; J.M.D.: consultant for Medtronic and ProDex; J.M.L.: advisory board for Sanofi, Regeneron, and GSK, and recipient of research funding from Sanofi, Regeneron, AstraZeneca, Cumberland Pharma, and Optinose.

Funding source for the study: AAOA Foundation.

This work was presented at the annual meeting (virtual) of the American Academy of Otolaryngic Allergy, in October 2020.

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Biologics were recently approved for chronic rhinosinusitis with nasal polyps (CRSwNP),¹ with promising results regarding symptom improvement. Biologics are expected to be used as long-term medications, due to worsening of symptoms when treatment is stopped.² Cost-effectiveness analyses for use in CRSwNP suggest that surgical treatment is more cost-effective compared with biologics,³ and biologics have been found to be cost-effective only for severe asthmatics.^{4,5} CRSwNP patients with comorbid asthma have been shown to have a higher overall cost burden than those with CRSwNP alone.⁶ Recent work suggests that biologics prescribed for the indication of asthma provide improvement of comorbid CRSwNP symptoms.⁷ The goal of this study was to describe the costs for patients with CRSwNP and asthma who received biologic medication among a nationally representative insurance claims database.

METHODS

The MarketScan database (Truven Health Analytics) was queried for patients with diagnoses (from the *International*

Classification of Diseases—Ninth Revision) consistent with both CRSwNP and asthma between 2009 and 2015. Patients with at least 6 months of omalizumab use were considered omalizumab users. Although omalizumab was approved for use in 2020 as add-on therapy for nasal polyps in adults with inadequate response to nasal steroids, it has been widely used for asthma treatment for several years, allowing it to be easily investigated in a retrospective database. The cost of omalizumab was calculated using National Drug Codes. The cost of surgical management, including endoscopic sinus surgery and postoperative debridements, was calculated using Current Procedural Terminology codes. The utilization and cost of prescription medications, including nasal/oral/inhaled corticosteroids, albuterol inhalers, and oral antibiotics, were also investigated. The cost of surgical treatment, including postoperative debridements as well as nonbiologic prescription medications, before initiating omalizumab was compared with the post-omalizumab time frame, after a 6-month washout period to allow for treatment effect.

Average annual cost analyses were calculated for years in which a patient was fully insured. Annual costs were

TABLE 1 Demographic information for surgical patients with CRSwNP and asthma for omalizumab users vs non-users

	Omalizumab users (n = 481)	Omalizumab non-users (n = 27,270)	p value
Surgeries ^a	Mean: 0.19 (0.54); median: 0 (Q1: 0; Q3: 0.17)	Mean: 0.1 (0.4); median: 0 (Q1: 0; Q3: 0)	<0.0001
Cost of surgery/debridements ^a	Mean: 553.94 (1482.69); median: 0 (Q1: 0; Q3: 172.75)	Mean: 344.73 (1654.69); median: 0 (Q1: 0; Q3: 0)	<0.0001
Prescription costs (excluding omalizumab) ^a	Mean: 1926.73 (1562.27); median: 1613.12 (Q1: 682.31; Q3: 2748.14)	Mean: 936.96 (1128.09); median: 513.08 (Q1: 120.70; Q3: 1416.90)	<0.0001
Total costs ^a	Mean: 18,400.70 (12,865.75); median: 15,276.36 (Q1: 8840.04; Q3: 24,820.92)	Mean: 2079.96 (3103.52); median: 1233.24 (Q1: 183.60; Q3: 2800.41)	<0.0001
Total costs (excluding omalizumab) ^a	Mean: 3266.11 (2572.30); median: 2821.95 (Q1: 1697.65; Q3: 4165.40)	Mean: 2079.96 (3103.52); median: 1233.24 (Q1: 183.60; Q3: 2800.41)	<0.0001

^aPer patient/per year.

CRSwNP = chronic rhinosinusitis with nasal polyps.

calculated using the data from fully insured years after the year of initial treatment(s). Costs included charges to the patient and insurance claims for medications, surgery, and postoperative debridements. Inflation was controlled for through adjustment of gross payment to 2015 prices using an inflation index (see https://apps.bea.gov/itable/index_nipa.cfm). Mean (standard deviation) and median (Q1, Q3) were reported for continuous variables. Frequency (percentage) was reported for categorical variables. Comparisons of omalizumab users and non-users were assessed using the Wilcoxon-Mann-Whitney test. Comparisons of patients pre- and post-omalizumab use were calculated using the Wilcoxon signed-rank test. Statistical analysis was performed using SAS version 9.4 (SAS Institute, Inc, Cary, NC), with $p < 0.05$ considered significant.

RESULTS

Omalizumab users vs non-users

For patients who required surgery during the study time frame, costs for consistent omalizumab users ($n = 481$) were compared with those of non-users ($n = 27,270$). When comparing annual costs per patient, including the cost of omalizumab, other nonbiologic prescription medications, and surgery/debridements, the omalizumab users had statistically significantly higher overall costs compared with non-users (median costs of \$15,276 and \$1233, respectively; $p < 0.001$). In addition, prescription costs for medications other than omalizumab, such as nasal/oral steroids, albuterol/steroid inhalers, and oral antibiotics, were statistically significantly higher in the omalizumab-user group (median costs of \$1613 and \$513, respectively; $p < 0.001$). Omalizumab users had a higher mean rate of sinus surgery compared with non-users (mean, 0.19 vs 0.1 surgery per year; $p < 0.001$) which correlates clinically to approxi-

mately 2 surgeries in a 10-year period compared with 1 surgery in a 10-year time period (Table 1).

Pre- and post-omalizumab comparisons

Claims were available for 306 patients for the pre-omalizumab and 6-month post-omalizumab analysis (Table 2). The mean number of surgeries decreased after 6 months of consistent omalizumab use (mean, 0.28 vs 0.17 surgery per year, $p = 0.0007$), which clinically correlates with approximately 3 surgeries in a 10-year period compared with approximately 2 surgeries in a 10-year time period. Prescription costs for medications other than omalizumab were higher after initiation of omalizumab (median costs, \$1459 and \$1556; $p = 0.0016$).

DISCUSSION

In this study we have investigated the relationship of biologics to medical and surgical costs associated with treatment for CRSwNP and asthma. Omalizumab users were noted to have higher overall costs, as well as increased surgical rates and increased utilization of nonbiologic medications, when compared with non-users. This may be due to differences in severity of disease between patient cohorts. After omalizumab use, overall cost was significantly higher and patients had increased costs related to nonbiologic medications, but there was a decreased need for surgery. This may be an attractive option for patients who wish to avoid surgery for medical or personal reasons.

Limitations of this database study include the need to evaluate patients with both asthma and CRSwNP, as polyps alone were not an indication for biologic use until 2019, with dupilumab and omalizumab approved for CRSwNP in 2019 and 2020, respectively. In addition, emergency

TABLE 2 Cost comparisons for patients with CRSwNP and asthma, before and after omalizumab use

	Pre-omalizumab use	Post-omalizumab use	Delta: post/pre	p value
Surgeries ^a (n = 279)	Mean: 0.28 (0.58); median: 0 (Q1: 0; Q3: 0.4)	Mean: 0.17 (0.48); median: 0 (Q1: 0; Q3: 0)	Mean: −0.1 (0.7); median: 0 (Q1: −0.33; Q3: 0)	0.0007
Cost of surgery/debridements ^a (n = 279)	Mean: 1349.82 (4120.92); median: 0 (Q1: 0; Q3: 1006.81)	Mean: 742.45 (2395.78); median: 0 (Q1: 0; Q3: 0)	Mean: −607.36 (4665.71); median: 0 (Q1: −748.87; Q3: 0)	0.0097
Prescriptions costs (excluding omalizumab) ^a (n = 306)	Mean: 1579.28 (1304.24); median: 1459.02 (Q1: 416.6; Q3: 2324.39)	Mean: 1984.98 (1893.92); median: 1556.13 (Q1: 637; Q3: 2731.36)	Mean: 405.7 (1697.68); median: 70.05 (Q1: −494.51; Q3: 1063.09)	0.0016
Total costs ^a (n = 270)	Mean: 2891.36 (4388.65); median: 1942.13 (Q1: 1015.67; Q3: 3293.86)	Mean: 23,310.35 (16,660.32); median: 19,506.87 (Q1: 10,521.4; Q3: 35,272.86)	Mean: 20,418.99 (16,767.75); median: 16,273.63 (Q1: 8284.95; Q3: 30,990.68)	<0.0001
Total costs (excluding omalizumab) ^a (n = 270)	Mean: 2891.36 (4388.65); median: 1942.13 (Q1: 1015.67; Q3: 3293.86)	Mean: 2700.24 (3199.4); median: 1922.62 (Q1: 725.17; Q3: 3469.85)	Mean: −191.12 (5024.31); median: −66.01 (Q1: −1297.03; Q3: 1426.66)	0.7464

^aPer patient/per year.

CRSwNP = chronic rhinosinusitis with nasal polyps.

room visits and inpatient admissions were not accounted for in this study, limiting our understanding of total costs for these patients. Constraints of this database only allowed for 6 years of follow-up; however, these findings improve upon the limited follow-up of recent studies evaluating biologics in CRSwNP.² The inability to objectively control for disease severity creates challenges in interpretation of this work. It remains possible that a higher disease burden among omalizumab participants resulted in increased health-care utilization and associated costs. The pre- and post-omalizumab analysis aims to control for this bias, but further work in this area is warranted as CRSwNP patients with comorbid asthma will likely be the most cost-effective cohort when considering biologics. Cost-effectiveness and cost-utility remain important areas of research as patient preference, surgical eligibility, and patient-centered decision-making are considered.³

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How to cite this article: Roland LT, Wise SK, Wang H, et al. Influence of omalizumab on treatment costs for chronic rhinosinusitis with nasal polyps and asthma: an insurance claims analysis. *Int Forum Allergy Rhinol.* 2021;1-3. <https://doi.org/10.1002/alr.22904>