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# Prescribing trends for biologic drugs among Ohio dermatologists

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## Abstract

The role of biologic therapies in the field of dermatology continues to evolve as newer drugs and biosimilars are introduced to the U.S. market. Prescribing patterns and expenditures regarding biologic drugs are not well described. To address this knowledge gap, a retrospective review was conducted using the Medicare Provider Utilization and Payment Data: Part D Prescriber dataset between January 1<sup>st</sup>, 2013 and December 31<sup>st</sup>, 2015. The primary outcome was claims per provider per calendar year. Secondary outcomes included drug cost, shared cost per dermatologist, and practice location. Median claims per provider remained stable between 2013 and 2014 (24 versus 23, respectively;  $P=0.64$ ). The majority of 2015 claims were for adalimumab (50.1%) and etanercept (41.4%). Total spending from Medicare payment data for biologic drugs prescribed by Ohio dermatologists increased by \$3 million during the study period. The Gini coefficient for provider contributions to overall costs was 0.47, indicating moderate inequality among Ohio dermatologists. Spending associated with biologic drugs used for dermatologic indications is increasing in Ohio. As the market changes, providers should be aware of these patterns to better care for patients in need of biologic therapies.

*Keywords: adalimumab, biologic drugs, claims, dermatology, drug costs, etanercept, Medicare Part D, Ohio, secukinumab, ustekinumab*

## Introduction

The introduction of biologic therapy revolutionized clinical strategies to tackle the burden of skin disease associated with their targeted efficacy, improve speed of onset, and increase tolerability [1]. Despite their clinical benefit, patient access has been limited owing to the costly nature of these therapies. Biologics have been reported to account for 28% of prescription drug spending in the United States (U.S.) despite only making up 1% of prescriptions [2]. Global biologic sales are predicted to surpass \$390 billion by the year 2020 [2, 3].

The predicted increases in spending may increase the financial burden for payers and patients. With anticipated increases in biologic therapy options and the introduction of biosimilars to the field of dermatology, interest in assessing how these changes may affect spending has been increasing. To address this knowledge gap, we studied Medicare expenditures on biologic drugs prescribed by Ohio dermatologists. The Ohio cohort was selected to allow for analyses at the level of individual providers who worked in communities that the with whom the authors were familiar. Our objective was to determine median number of claims per provider. Secondary outcomes included claims per unique biologic drug prescribed, contributions by provider and drug on overall costs, and provider practice location.

## Methods

### Study design and dataset

This study was exempt from Institutional Review Board approval at University Hospitals Cleveland Medical Center. A retrospective review was conducted on the utilization of biologics among Ohio dermatologists between January 1<sup>st</sup>, 2013 and December 31<sup>st</sup>, 2015. Data was identified through the Medicare Provider Utilization and Payment: Part D Prescriber dataset, and was accessed on August 1<sup>st</sup>, 2017. This dataset captures two-thirds of all Medicare beneficiaries, containing information on all beneficiaries enrolled in the Part D prescription drug program. Data were collected on provider characteristics, drug characteristics, claim counts (including refills), and total drug cost. Urban practice locations were defined as having >50,000 people collected from 2015 U.S. census data [4].

Inclusion criteria included dermatologists practicing in Ohio that prescribed biologic drugs during the study period. Data were confined to these characteristics to compare shares of cumulative Medicare cost per individual provider. The definition used to identify drugs as biologics was that the drug was produced from a living system and composed of an amino acid structure [5]. The biologic drugs included in this study were adalimumab, etanercept, secukinumab, and ustekinumab because of their relevance to dermatologic indications.

### Statistics

Continuous variables were reported as medians with interquartile ranges. Total number of claims and

cumulative costs were calculated per biologic drug and provider. Non-parametric tests were utilized including Mann-Whitney U tests for continuous variables and Friedman test to compare outcomes between calendar years. Chi-squared tests were used to compare categorical variables. A Gini coefficient was calculated from 2015 data for the share of cumulative costs per individual Ohio dermatologist. All calculations were performed with Graphpad prism v7 (La Jolla, CA) and Microsoft Excel (Redmond, WA).

### Results

Table 1 summarizes provider characteristics. A total of 394 records that met inclusion criteria were identified from the 17,278 records reported in the dataset. Median biologic drug claims per provider remained stable between 2013 and 2015 (P=0.64). Total number of claims for biologic drugs decreased slightly from 3,229 in 2013 to 2,973 in 2015 (Figure 1; P=0.78). The proportion of adalimumab claims increased from 46.0% (1,484/3,229) in 2013 to 50.1% (1,488/2,973) in 2015 (P<0.001). Etanercept claims decreased from 49.7% (1,604/3,229) of total claims in 2013 to 41.4% (1,231/2,973) in 2015 (P<0.001). Ustekinumab accounted for 4.4% (141/3,229) of total claims in 2013 and 6.2% (185/2,973) in 2015 (P=0.001). Claims for secukinumab made up 2.3% (69/2,973) of total claims in 2015. Secukinumab claims were not identified until 2015. Biologic costs per provider increased during the study period, however this did not reach statistical significance. Total drug costs increased by \$3 million during the study period (P<0.01).

Table 1. Trends in Ohio dermatologists prescribing biologics.

| Characteristic                       | 2013                             | 2014                             | 2015                             | P-value* |
|--------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------|
| Providers, N.                        | 93                               | 94                               | 91                               | NA       |
| Unique biologics prescribed, N.      | 3                                | 3                                | 4                                | NA       |
| Median claims per provider, N. (IQR) | 24 (16-39)                       | 24 (15-43.5)                     | 23 (14-46)                       | 0.64     |
| Median cost per provider, N. (IQR)   | \$78,514<br>(\$51,110-\$120,787) | \$75,448<br>(\$44,217-\$148,455) | \$83,305<br>(\$48,608-\$183,380) | 0.28     |
| Provider city population, N. (%)     |                                  |                                  |                                  | 0.75     |
| Non-urban ≤ 50,000                   | 49 (52.7)                        | 52 (55.3)                        | 53 (58.2)                        |          |
| Urban > 50,000                       | 44 (47.3)                        | 42 (44.7)                        | 38 (41.8)                        |          |

Abbreviations: IQR, interquartile range, N, number

\*P-value determined by Kruskal-Wallis test.

In 2015, 58.2% (53/91) of providers' practices were located in non-urban areas. Costs and claims patterns were not significantly different between 2013 and 2015 for urban and non-urban providers (Figure 2). Biologic costs for non-urban providers showed a trend to increase while urban providers showed a decreased trend. Moderate inequality, indicated by a Gini coefficient of 0.47, was identified between individual provider contributions to overall biologic costs (Figure 3). The top 5% of dermatologists who contributed the most to overall biologic costs each contributed more than \$375,000 in 2015.

The geographic distribution of Medicare Part D claims for biologics was similar to general population volume according to 2015 U.S. Census data (Figure 4). The highest number of claims were from Cleveland (N=437), followed by Dayton (N=190) and Cincinnati (N=176). Columbus, which has the highest population density in Ohio, was found to have 78 claims captured in the 2015 Medicare part D dataset.

## Discussion

This study describes trends for claims and costs of biologics used in the Ohio Medicare Part D consumer population. We found that the total number of claims slightly decreased while costs significantly increased during the study period. The moderate variation identified between individual provider contributions to overall biologic costs may be

affected by providers who specialize in autoimmune and inflammatory disorders and the location of their practices within tertiary referral centers.

Our findings that Cleveland had a higher number of biologic claims than Columbus, despite a large difference in population density, may be attributed to the higher median age of residents in Cleveland compared to Columbus. The consumers captured in this database may be more representative of the elderly population that are likely to be consumers of Medicare Part D. Location of dermatology clinics specializing in immune disorders may also play a role.

The decreased number of etanercept claims during the study period contributed to the overall decrease in total claims. This could reflect a biased representation of decreased total overall claims on biologics as etanercept held the second highest proportion of overall claims in our study, which included only 4 biologic drugs. Other factors contributing to the decrease in etanercept claims could relate to changes in practice utilizing the other biologics present in the study. Secukinumab was introduced during the study period in 2015.

Secukinumab has been associated with faster onset of efficacy when compared to etanercept and has been proposed to be a cost-effective agent [6, 7]. In addition, the number of claims for ustekinumab increased, likely owing to FDA approval for the use of ustekinumab for psoriatic arthritis in 2013.

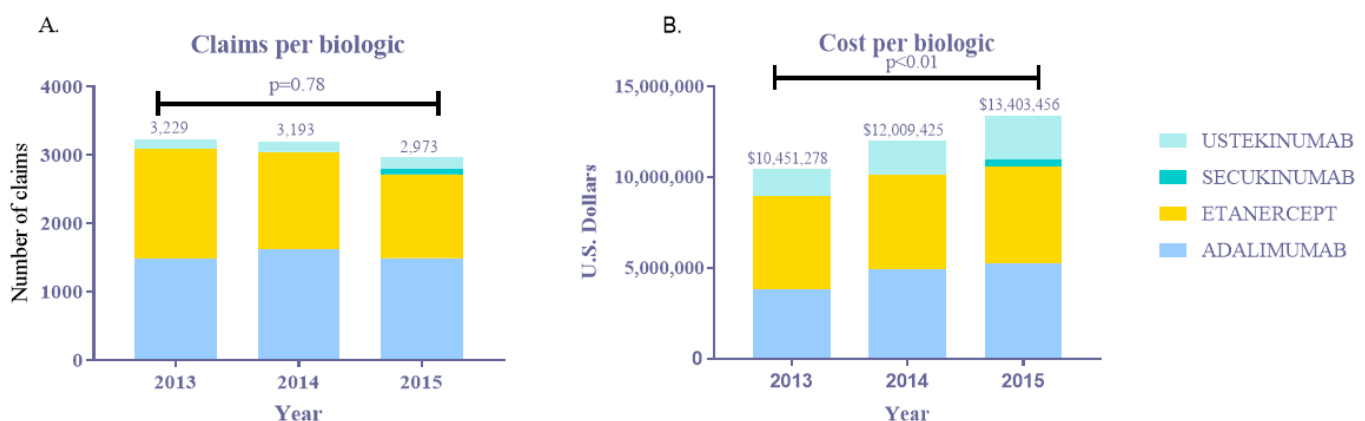


Figure 1. A) Claims decreased from 3,229 to 2,973 between 2013 and 2015. Etanercept and adalimumab accounted for the majority of claims, 41.4% (1,231/2,973) and 50.1% (1,488/2,973), respectively. B) Total costs increased from \$10,451,278 to \$13,403,456 from 2013 to 2015.

Biosimilars are copies of original biologic agents whose data protections have expired. Many have predicted that biosimilars have the potential to provide cost savings, although estimates on the extent are varied [8]. Characterization of biologic prescribing patterns will be important to monitor effects biosimilars have on patient outcomes.

This study is limited by the data captured in the Medicare Provider Utilization and Payment: Part D Prescriber dataset. This comprehensive dataset is likely generalizable to the overall Medicare consumer population as it captures two-thirds of Part D subscribers. Linkage of prescription drug events to physicians' identifiers including National

Provider Identifier (NPI) numbers has been reported to be a problematic task and this dataset may include erroneous transactions [9].

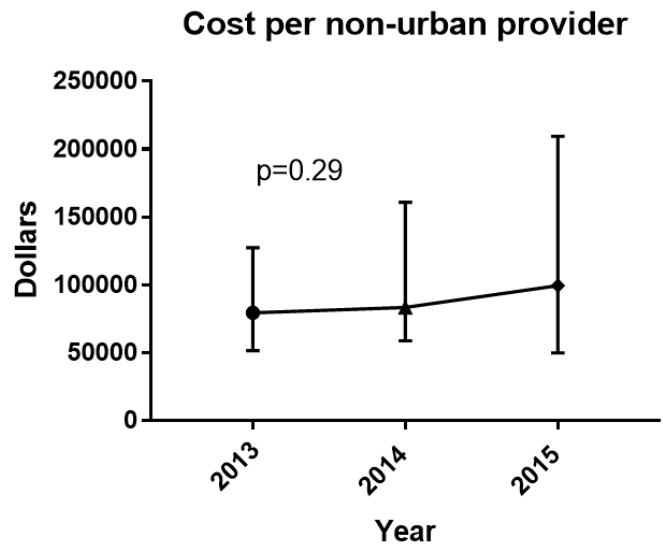
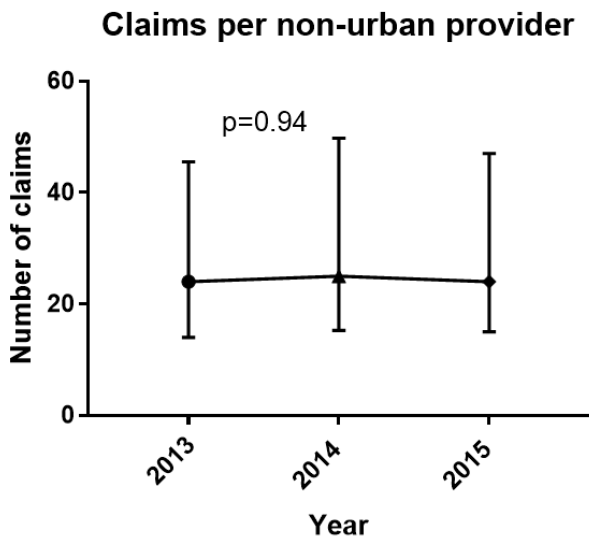
## Conclusion

Our study showed that costs for Medicare Part D claims for biologics are increasing. New, costly therapies may be contributing to increased overall costs. In Ohio, there is variation among individual dermatologist contribution to overall costs for biologics. Further studies should be conducted to investigate biologic drug use in other payer systems and the upcoming effects of biosimilars on prescribing patterns.

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A.



B.

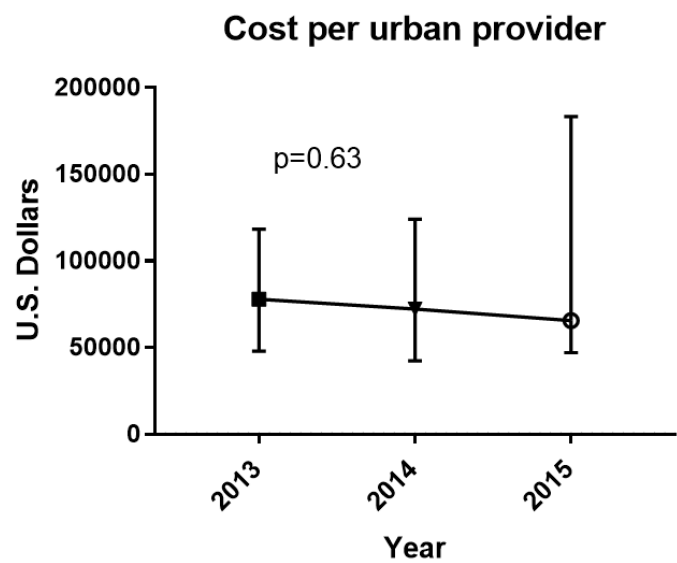
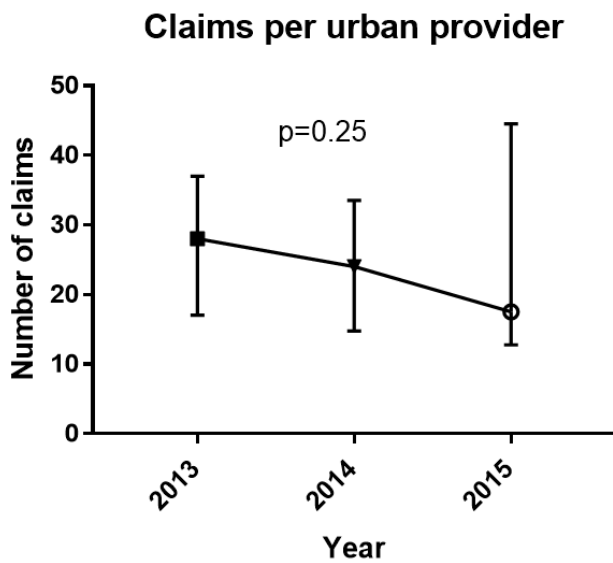


Figure 2. A) Median claims remained stable for non-urban providers while total Medicare cost of biologics showed an increased trend,  $P=0.29$ . B) Claims per urban provider showed a decreased trend overtime along with a slight decrease in cost.

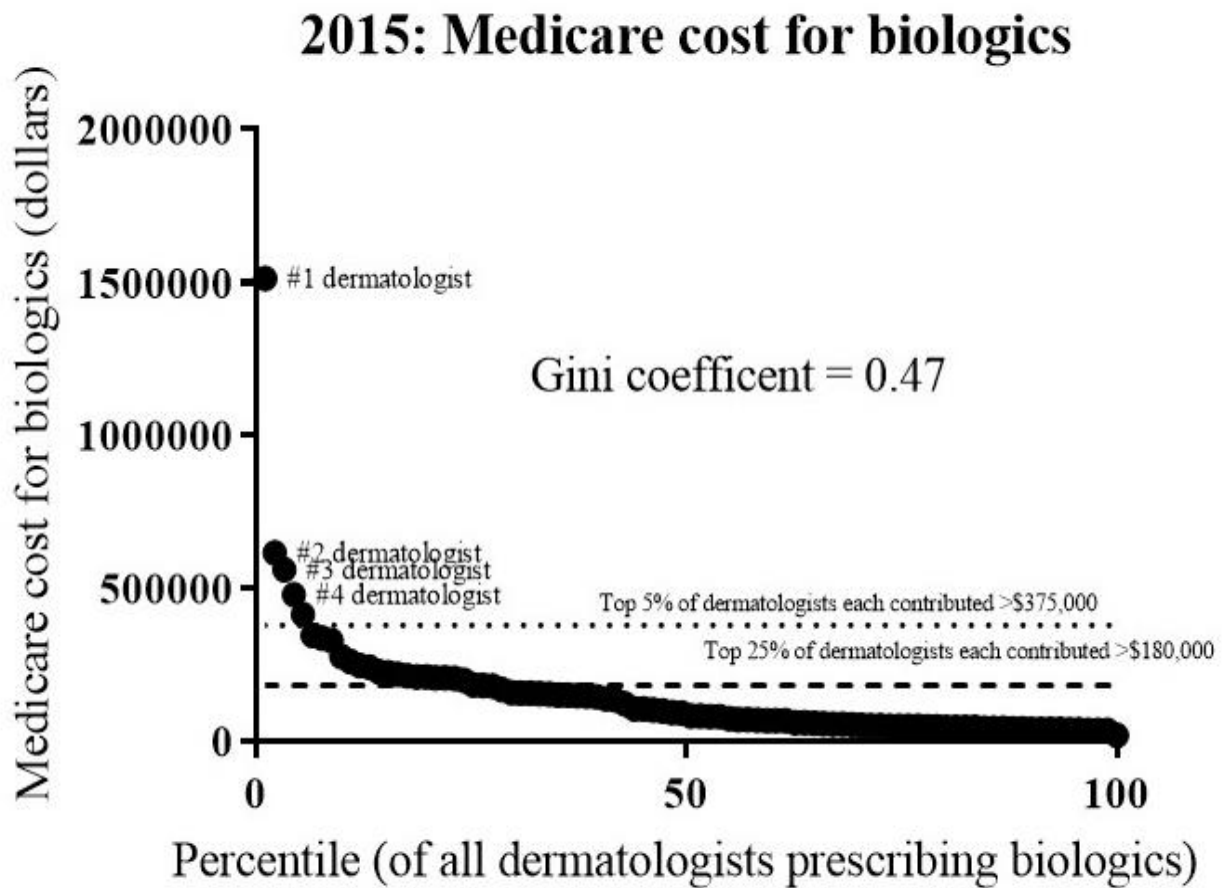


Figure 3. The Gini coefficient was calculated to be 0.47 indicating presence of variability among share of total Medicare cost for biologic prescriptions among Ohio dermatologists (N=91) in 2015. The top 5<sup>th</sup> percentile (N=5) of dermatologists each contributed >\$375,000. The top 25<sup>th</sup> percentile (N=25) of dermatologists each contributed > \$180,000.

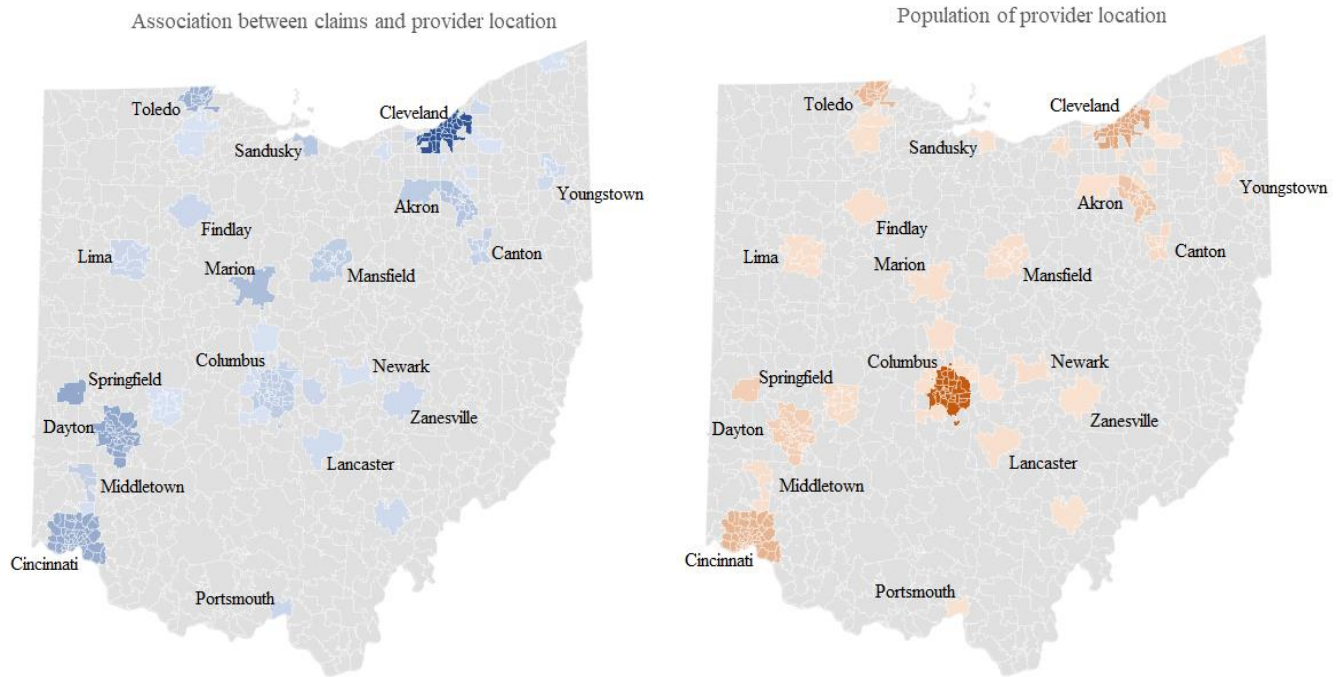


Figure 4. Geographic distribution of number of claims in 2015 were similar to population volume of provider location according to U.S. 2015 census data. The highest number of claims were from Cleveland, OH (N=437), followed by Dayton (N=190) and Cincinnati (N=176).