

Real-world Usage of Bevacizumab-bvzr Biosimilar in US Oncology Practice

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Biosimilars are biologic products that are highly similar to the corresponding FDA-approved biologic reference medications in terms of efficacy, safety, and immunogenicity.¹ The rising cost of cancer treatment and expiration of patents for many of these biologics highlighted the need for biosimilars.² Biosimilar uptake can bring important economic benefits in the health care market, as they are commercialized at an expected lower cost than the respective reference medicine.²⁻⁴ Biosimilar monoclonal antibodies may facilitate greater access to oncology biologics and help to reduce costs.²⁻⁴ Biosimilars were projected to save more than \$100 billion from 2020 to 2024 in the United States,⁵ and, according to a RAND report, biosimilars were estimated to save approximately 3% of total estimated biologic spending in the United States from 2017 to 2026.⁶ In the next few years, savings are expected to increase more dramatically, given newly approved biosimilars entering the market. However, biosimilars will be considered as a cost-effective alternative only with the support of long-term efficacy and safety data that will help solidify physician confidence to adopt biosimilars.⁷

As of 2017, global clinical experience with biosimilars reached more than 700 million patient-days, and the global approval and availability of therapeutic biosimilar medicines in oncology practice followed in the subsequent years.⁸ To facilitate market access, encourage competition, and thus directly reduce spending on biologic products, the implementation of the Biologics Price Competition and Innovation Act in 2010 has allowed the FDA to establish an abbreviated regulatory pathway for biosimilars based on comparative analytical and clinical data for their characterization and demonstration of no clinically meaningful differences from their reference products. The FDA may allow extrapolation of safety and efficacy data from one biosimilar indication to another if rigorous and predefined requirements are established.⁹ However, the initial adoption of biosimilars in the United States was slower than in the European Union and other developed countries. More than 33 biosimilars have been approved in the United States thus far, with biosimilars now available for 7 reference biologic drugs.¹⁰

Among these is the recently introduced biosimilar bevacizumab-bvzr, which is indicated for the first-line treatment of unresectable,

ABSTRACT

OBJECTIVES: Bevacizumab is commonly used to treat solid tumors. However, little is known about the manner and the extent to which bevacizumab biosimilars are utilized in real-world oncology practice in the United States. The objective of this study was to describe patient and provider characteristics and treatment patterns associated with the recently introduced bevacizumab-bvzr biosimilar.

STUDY DESIGN: Retrospective cohort study.

METHODS: A retrospective analysis of medical and pharmacy claims between January 24, 2019, and July 31, 2020, was performed. Adult patients with at least 1 claim indicating usage of bevacizumab-bvzr were included. Patients who could not be assigned to an applicable diagnosis group were excluded. Index treatment date was defined as the date of the first claim for bevacizumab-bvzr. Descriptive analysis was conducted for all study variables.

RESULTS: A total of 206 patients were included; patients most often were 65 years or older (49.5%), were female (62.6%), and resided in the West (45.1%). The most common indications observed for bevacizumab-bvzr were metastatic colorectal cancer (mCRC; 51.0%), cancer of the female genital organs (CFG0; 27.2%), glioblastoma (11.2%), and non-small cell lung cancer (8.7%). Overall, 72.4% and 48.2% of patients with mCRC and CFG0, respectively, had switched to bevacizumab-bvzr from the reference drug or another bevacizumab biosimilar. Bevacizumab-bvzr was used in chemotherapy combination regimens for patients with mCRC and CFG0.

CONCLUSIONS: Utilization was observed in extrapolated indications. Findings suggest that both switching between reference product and bevacizumab biosimilars and using bevacizumab-bvzr as part of chemotherapy combination regimens have been adopted in US oncology practice.

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locally advanced, recurrent, or metastatic nonsquamous non–small cell lung cancer (NSCLC)¹¹; metastatic renal cell carcinoma (mRCC)¹²; recurrent glioblastoma (GBM)¹³; and persistent, recurrent, or metastatic cervical cancer¹⁴; and for first-line or second-line treatment of metastatic colorectal cancer (mCRC).¹⁵ Equivalent pharmacokinetics, safety, and efficacy profiles have been demonstrated for bevacizumab biosimilars relative to the bevacizumab reference medication.^{16–18} The FDA

and the European Medicines Agency have authorized bevacizumab biosimilars for the eligible indications of originator bevacizumab, with extrapolation based on the totality of evidence generated in the development program, including data from a comparative clinical trial in patients with NSCLC, as well as what is known about the bevacizumab reference drug after demonstrating biosimilarity in a single indication.^{19,20} However, concerns around extrapolation of indications are often raised among clinicians and other key stakeholders and are considered to be a key hurdle to biosimilar usage.^{21–23} Hence, accumulation of real-world experience may promote clinicians' universal acceptance of extrapolation for bevacizumab biosimilars to indications other than NSCLC, including mCRC.^{8,24}

Potential barriers to the use of biosimilars include limited knowledge of biosimilars and lack of confidence in their quality and efficacy compared with those of reference medications.⁸ In a prior international survey of physicians, respondents reported several key barriers to prescribing bevacizumab reference medication, including access difficulties.²⁵ The physician respondents were more likely to indicate that they would prescribe a bevacizumab biosimilar when equivalent safety and efficacy and lower costs were demonstrated. Additional factors can affect the broader adoption of biosimilars in the United States, such as extrapolation of indications and switching patterns, manufacturer reputation, and the reliability of the supply chain, as well as the understanding among prescribers and payers about biosimilars.^{26,27} Therefore, greater elucidation of how and to what extent bevacizumab biosimilars are being used in real-world US oncology practice is needed.

This retrospective study sought to describe the patient and provider characteristic profiles and patterns of utilization associated with bevacizumab biosimilars in US oncology practice, with a specific focus on bevacizumab-bvzr.

METHODS

Study Design and Data Source

This retrospective study was conducted using both open and closed medical and prescription claims data covering the period January 24, 2019, to July 31, 2020, which was the time period between the first identified claim for bevacizumab-bvzr and the time the data were extracted. Claims data were sourced from Komodo Health, a health care technology company whose databases contain

TAKEAWAY POINTS

Our real-world data have shown that bevacizumab-bvzr biosimilar has been well adopted in US oncology practice following its recent launch.

- ▶ Bevacizumab-bvzr has been used in all FDA-approved indications, including extrapolated indications.
- ▶ We observed switching from the reference product to bevacizumab-bvzr and between different bevacizumab biosimilars.
- ▶ Use of bevacizumab-bvzr as part of chemotherapy combination regimens has been adopted in clinical practice.

prescription and medical claims of more than 320 million individuals, including more than 140 million patients with complete medical and prescription claims information from more than 150 private insurers in the United States. Closed claims come directly from the insurer and therefore tend to have more accurate and complete information in all data fields, but they tend to have a delay due to the process of insurer adjudication. Open claims, which are claims that have been submitted for adjudication to insurers (and not from insurers themselves), tend to have less complete information but are essentially available immediately. The use of both open and closed claims allows us to both maximize sample size and capture the most recent claims for bevacizumab-bvzr. Provider characteristics for those who prescribed bevacizumab-bvzr (or bevacizumab reference medication in the sensitivity analysis) to the patients included in the sample were determined using National Provider Identifier codes.

All deidentified medical and pharmacy claims data included in this study were Health Insurance Portability and Accountability Act compliant. The study protocol was determined to be exempt from expedited or full ethics review by Pearl IRB (Indianapolis, IN; protocol: 20-KANT-236).

Study Population

Patients 18 years or older, residing in the United States, who had a billable National Drug Code (NDC) indicating at least 1 use of bevacizumab-bvzr within the claims database and had adequate claims-based information to assign an applicable diagnosis cohort (approved indication, oncologic, or other off-label) using all medical and prescription claims from 360 days preindex through the end of the study observation period (July 31, 2020) were included in the analysis. Index treatment date was defined as the date of the first claim for bevacizumab-bvzr. Additionally, patients who had a billable NDC indicating at least 1 use of bevacizumab reference medication within the claims database on or after the first identified index date for bevacizumab-bvzr were included for the sensitivity analysis. Classification of cancer type was performed using *International Classification of Diseases, Tenth Revision (ICD-10)* codes according to the following: mCRC (C18.xxx–C20.xxx), cancer of the female genital organs (CFGO; including cervical and ovarian cancer) (C51.xxx–C58.xxx), GBM (C71.xxx), NSCLC (C34.xxx), and mRCC (C64.xxx).

TABLE 1. Patient and Provider Characteristics of Bevacizumab-bvzr Users

Total patients (N = 206)	
Variables	n (%)
Age in years	
< 40	11 (5.3)
40-49	15 (7.3)
50-59	55 (26.7)
60-64	23 (11.2)
≥ 65	102 (49.5)
Gender	
Female	129 (62.6)
Male	77 (37.4)
Region	
Midwest	54 (26.2)
Northeast	^a
South	49 (23.8)
West	93 (45.1)
Insurance	
Commercial	58 (28.2)
Medicare	31 (15.0)
Medicaid	40 (19.4)
Other	^a
Missing ^b	69 (33.5)
Provider type (index)	
Internal medicine	^a
Oncology, hematology	47 (22.8)
Oncology, medical	48 (23.3)
Other	16 (7.8)
Missing	90 (43.7)
Provider region (index)	
Midwest	38 (18.5)
Northeast	^a
South	31 (15.0)
West	41 (19.9)
Missing	90 (43.7)
Diagnoses	
Metastatic colorectal cancer	105 (51.0)
Cancer of the female genital organs	56 (27.2)
Glioblastoma	23 (11.2)
Non-small cell lung cancer	18 (8.7)
Metastatic renal cell carcinoma	^a
Other diagnosis	^a

^aCounts were 10 or fewer patients and could not be reported.

^bMissing insurance type primarily due to incomplete information associated with open claims.

Measures

Patient characteristics included age (patient age at index treatment event), gender, region of residence, insurance type, and treatment-related diagnosis (oncology diagnosis related to treatment medication). Provider characteristics included provider

type and provider region of practice (Northeast, South, Midwest, and West). Treatment utilization patterns, which were assessed for the most common indications observed for bevacizumab-bvzr, included index dose amount, median overall dose amount, dosing schedule, duration of therapy, time to biosimilar initiation, time to therapy initiation, and treatment switching, which consisted of patients who had switched to bevacizumab-bvzr from either the reference product or another bevacizumab biosimilar. Additionally, data on treatments received prior to receiving bevacizumab-bvzr and treatments used concurrently with bevacizumab-bvzr were collected.

Statistical Analysis

Descriptive analysis was used to report all study variables, including mean and SD for normally distributed continuous variables, median and interquartile range for non-normally distributed continuous variables, and frequency for categorical variables. Descriptive analysis was reported for patient and provider characteristic variables for the aggregate sample of bevacizumab-bvzr users. Descriptive statistics were also reported for the treatment utilization pattern variables separately for the subsets of patients with the most common indications observed for bevacizumab-bvzr.

Sensitivity analyses were performed to compare bevacizumab-bvzr and its corresponding reference medication (bevacizumab) on patient and provider characteristic variables for the aggregate subset of patients with the most common indications observed for bevacizumab-bvzr. Chi-square tests were used for this analysis. P values less than .05, 2-tailed, were considered statistically significant for these bivariate comparisons. Data analysis was performed using SAS version 9.4 statistical software.

RESULTS

Patient and Provider Characteristics

A total of 206 patients who met all eligibility criteria were included in the main analysis. Patients who used bevacizumab-bvzr were most often 65 years or older (49.5%) and female (62.6%) and resided in the West (45.1%) (Table 1). Providers who prescribed bevacizumab-bvzr were most often practicing in the West (19.9%) or Midwest (18.5%). The most common diagnoses associated with bevacizumab-bvzr use were mCRC (105 patients; 51.0%), CFGO (56 patients; 27.2%), GBM (23 patients; 11.2%), and NSCLC (18 patients; 8.7%).

Treatment Utilization Patterns

Median index dose (900 mg), median overall dose (900 mg), and median duration of therapy (33 days) were highest among patients with CFGO (Table 2). Median time to biosimilar initiation (339 days) and time to therapy initiation (149 days) (360-day preindex period) were longest among patients with mCRC and GBM, respectively.

mCRC. Prior to index treatment with bevacizumab-bvzr, 12.4% of the patients with mCRC had undergone surgery, and 85.7% were receiving pharmacological treatment (Table 3). Specifically, 80.0%

and 72.4% of patients with mCRC received chemotherapy and another form of bevacizumab (reference product [61.0%] or bevacizumab-awwb [17.1%]), respectively. Most patients with mCRC (84.8%) were concurrently treated with bevacizumab-bvzr and chemotherapy. The most common combination regimens observed were bevacizumab-bvzr + leucovorin + fluorouracil + oxaliplatin (28.6%) and bevacizumab-bvzr + leucovorin + fluorouracil + irinotecan (21.9%).

CFGO. Prior to bevacizumab-bvzr index treatment, 73.2% of patients with CFGO were receiving pharmacological treatment, of whom 67.9% and 42.9% received chemotherapy and another form of bevacizumab (reference product [42.9%] or bevacizumab-awwb [10.7%]), respectively (Table 4). A majority of patients with CFGO (58.9%) were concurrently treated with bevacizumab-bvzr and chemotherapy. The most frequently observed combination regimen was bevacizumab-bvzr + paclitaxel + carboplatin (30.4%).

GBM. Before initiation of index treatment with bevacizumab-bvzr, most patients with GBM had received radiation therapy (60.9%). Additional data on treatment prior to initiating bevacizumab-bvzr and treatment used concurrently with bevacizumab-bvzr cannot be reported for patients with GBM due to small sample sizes (patient count < 10).

NSCLC. Prior to index treatment with bevacizumab-bvzr, a majority of patients with NSCLC had received chemotherapy (61.1%). Likewise, a majority of patients with NSCLC (61.1%) were concurrently treated with bevacizumab-bvzr and chemotherapy. Additional data on treatment prior to initiating bevacizumab-bvzr and treatment used concurrently with bevacizumab-bvzr cannot be reported for patients with NSCLC due to small sample sizes (patient count < 10).

Sensitivity Analysis

Statistically significant differences were observed between the bevacizumab-bvzr and reference bevacizumab cohorts in patient gender, region of residence, and provider characteristics, including provider type and provider region (all *P* < .001) (Table 5). For instance, bevacizumab-bvzr users resided in the West more often (45.3% vs 20.2%) and resided in the South less often (23.6% vs 37.8%) than reference medication users. Bevacizumab-bvzr

TABLE 2. Treatment Characteristics of Bevacizumab-bvzr^a

	Index dose (mg)	Median overall dose (mg)	Dose schedule (days)	Duration of therapy (days)	Time to biosimilar initiation (days) ^b	Time to therapy initiation (days) ^b
mCRC	400 (105)	400 (84)	14 (71)	21 (71)	339 (105)	49 (105)
CFGO	900 (56)	900 (47)	21 (32)	33 (32)	348 (55)	77 (55)
GBM	600 (23)	700 (16)	c	c	250 (23)	149 (23)
NSCLC	850 (14)	850 (14)	21 (11)	21 (11)	223 (18)	114 (18)
mRCC	c	c	c	c	c	c

CFGO, cancer of the female genital organs; GBM, glioblastoma; mCRC, metastatic colorectal cancer; mRCC, metastatic renal cell carcinoma; NSCLC, non-small cell lung cancer.

^aData are represented as median (number of patients).

^bIdentified during the 360-day period prior to the first biosimilar claim.

^cCounts were 10 or fewer patients and could not be reported.

TABLE 3. Preindex and Concurrent Patterns of Utilization in Patients With mCRC

Treatment	Treatment pre-bevacizumab-bvzr n (%)	Concurrent treatment ^a n (%)
Pharmacological	90 (85.7)	89 (84.8)
Radiation	^b	N/A
Surgery	13 (12.4)	N/A
Pharmacological		
Chemotherapy	84 (80.0)	89 (84.8)
Immunotherapy	^b	N/A
Targeted therapy	^b	N/A
Any bevacizumab	76 (72.4)	^b
Avastin	64 (61.0)	^b
Mvasi	18 (17.1)	N/A
Chemotherapy		
Fluorouracil	73 (69.5)	69 (65.7)
Oxaliplatin	53 (50.5)	44 (41.9)
Irinotecan	34 (32.4)	33 (31.4)
Capecitabine	11 (10.5)	^b
Immunotherapy		
Nivolumab	^b	N/A
Targeted therapy		
Cetuximab	^b	N/A
Surgery		
Colectomy/proctotomy	12 (11.4)	N/A
Ablation	^b	N/A
Combination regimens		
Bevacizumab-bvzr + capecitabine + oxaliplatin	N/A	^b
Bevacizumab-bvzr + leucovorin + fluorouracil + oxaliplatin + irinotecan	N/A	^b
Bevacizumab-bvzr + leucovorin + fluorouracil + irinotecan	N/A	23 (21.9)
Bevacizumab-bvzr + leucovorin + fluorouracil + oxaliplatin	N/A	30 (28.6)

mCRC, metastatic colorectal cancer; N/A, not available.

^aFor concurrent treatment, claim for bevacizumab occurred on same date as index bevacizumab-bvzr claim.

^bCounts were 10 or fewer patients and could not be reported.

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TABLE 4. Preindex and Concurrent Patterns of Utilization in Patients With CFGO

Treatment	Treatment pre-bevacizumab-bvzr n (%)	Concurrent treatment ^a n (%)
Pharmacological	41 (73.2)	34 (60.7)
Radiation	^b	^b
Surgery	^b	N/A
Pharmacological		
Chemotherapy	38 (67.9)	33 (58.9)
Immunotherapy	^b	N/A
Any bevacizumab	27 (48.2)	^b
Avastin	24 (42.9)	^b
Mvasi	^b	N/A
Chemotherapy		
Carboplatin	31 (55.4)	22 (39.3)
Paclitaxel	22 (39.3)	22 (39.3)
Cisplatin	^b	^b
Topotecan	^b	^b
Immunotherapy		
Pembrolizumab	^b	N/A
Combination regimens		
Bevacizumab-bvzr + paclitaxel + carboplatin	N/A	17 (30.4)
Bevacizumab-bvzr + paclitaxel + topotecan	N/A	^b
Bevacizumab-bvzr + paclitaxel + cisplatin	N/A	^b

CFGO, cancer of the female genital organs; N/A, not available.

^aFor concurrent treatment, claim for bevacizumab occurred on same date as index bevacizumab-bvzr claim.

^bCounts were 10 or fewer patients and could not be reported.

prescribers were in practice in the West more often (19.7% vs 13.4%) and in practice in the South less often (14.8% vs 30.7%) than reference medication prescribers. Comparisons between bevacizumab-bvzr and the bevacizumab reference medication showed no significant differences in patient age and insurance type.

DISCUSSION

Clinical development of biosimilars is focused on the comparison of efficacy, safety, and immunogenicity with the reference product. An accurate understanding of treatment utilization in a real-world setting is important for decision-making. The present study described patient and provider characteristics and treatment utilization patterns associated with bevacizumab-bvzr in US oncology clinical practice. According to a survey conducted among 77 oncology clinicians, information on biosimilars is important to them before they are comfortable prescribing biosimilars.²³ Hence, the present study may address evidence gaps by providing additional insights for key stakeholders about the real-world adoption of bevacizumab-bvzr.

Approximately half of the bevacizumab-bvzr users in this study were 65 years or older, which is consistent with the findings of prior studies that reported higher use of bevacizumab among older patients with mCRC and NSCLC.²⁸⁻³¹ Sensitivity analysis revealed differences in patient region of residence and provider characteristics between bevacizumab-bvzr and the bevacizumab reference product, which may be due to variations in medication billing and reimbursement policies, among other external factors that can affect the wider adoption of biosimilars in the US oncology setting.^{2,32} Additional research studies are needed to confirm the underlying reasons for these observed differences, which might further help the adoption of biosimilars in the United States.

Clinical usage of bevacizumab-bvzr, including extrapolated indications, switching, and use in combination with chemotherapy, was observed. Bevacizumab-bvzr was used in both the clinically studied indication (NSCLC) and several extrapolated indications, including mCRC, CFGO, and GBM. The most common indication, which was mCRC in the present study, was consistent with the literature, given that bevacizumab remains a standard-of-care therapy in mCRC.³³ The second most common indication seen in the study was CFGO (including cervical cancer), which was supported by the total estimated number of patients exposed in the bevacizumab postmarketing setting by indication since 1997.³⁴ Further, a majority of the patients with mCRC, NSCLC, and CFGO were concurrently treated with bevacizumab-bvzr and chemotherapy, which is consistent with current treatment guidelines that report the use of bevacizumab reference product as part of a chemotherapy combination regimen.³⁵⁻³⁸ We also observed that at least half the patients with mCRC or CFGO had switched to bevacizumab-bvzr from either the reference product or another bevacizumab biosimilar, suggesting that physicians were comfortable with switching between the reference product and bevacizumab-bvzr or different bevacizumab biosimilars in these indications. However, further research studies are needed to evaluate physician prescribing behavior and attitudes, as well as cost-effectiveness, associated with bevacizumab-bvzr in extrapolated indications and combination therapies.

High cost and poor affordability may affect patient access to biologics. According to a survey of oncologists from the United States, Europe, and emerging markets, high out-of-pocket costs were a predominant barrier to accessing bevacizumab as treatment of advanced solid tumors.²⁵ Also, that study noted that more than 50% of physicians reported that they “definitely” or “probably” would prescribe a bevacizumab biosimilar, if available.²⁵ Prior research has indicated the potential for bevacizumab biosimilars to increase access to treatment in mCRC and gynecological cancers.^{25,39} Substantial cost savings attributable to biosimilars can drive market competition and potentially further improve patient access to biologic therapies.⁴⁰ A recent study estimated that the introduction of bevacizumab-bvzr was associated with a total annual cost savings of \$7 million over 5 years for a hypothetical 10-million-member commercial payer in the United States and

\$25 million savings from a full Medicare plan level.⁴¹ Furthermore, another study estimated that the potential annual per-patient cost savings of a bevacizumab biosimilar to the Italian health care system ranged from €5797 (in mCRC) to €11,595 (mRCC) compared with the bevacizumab reference drug, although these savings might not represent the US market.⁴² Future studies are needed to quantify the potential cost savings to patients due to broader adoption of bevacizumab biosimilars. In addition to implementing policies that encourage biosimilar use, acceptance among health care providers and patients will be key to facilitating the greater adoption of biosimilars in the United States.³² At the same time, these stakeholders should be provided with education about biosimilars, including data on approval requirements, clinical study regulations, and immunogenicity considerations, as well as evidence supporting the long-term safety and efficacy of these medications in clinical practice.²

Limitations

Potential limitations should be considered when interpreting the results of the current study. First, in an open claims database it is not guaranteed that all patient-event observations are captured because patients may have received treatment from a site of care that submits claims for adjudication via an intermediary processing company and/or physician network that is not captured in the Komodo Health data, so for patients with open claims there is the possibility of missing observations. If, however, patients receive all their oncology care from the same physician network then it is anticipated that their treatment information would be accurately captured.

Second, classification of cancer type in this study was performed using ICD-10 diagnosis codes that are present on claims, and there are limitations associated with both the specificity in classifying cancer diagnoses and the validity of the noted diagnosis code itself because of inconsistencies that may occur during medical claims coding. For all diagnoses, the relevant group of ICD-10 codes chosen included the indicated diagnosis of interest, but the codes themselves capture broader groupings of cancer types, and there is the possibility of misclassification. This potential for misclassification of a cervical cancer diagnosis was deemed probable, and we made the decision that utilizing a more comprehensive classification of CFGO (malignant neoplasms of female genital organs) would mitigate this potential, as well as capture additional real-world use in this population. Further, diagnosis codes in claims data do not have the specificity to identify the clinical nature associated with specific indications (eg, recurrent, unresectable, locally advanced), and the use of both open and closed claims data, in addition to the small sample sizes, prevented the implementation of other claims-based approaches that could serve as proxies for the identification of clinical characteristics such as recurrence. For diagnosis classification, it was assumed that providers treated patients with bevacizumab-bvzr in a manner consistent with the approved indications.

TABLE 5. Exploratory Analysis of Bevacizumab-bvzr and Bevacizumab Reference Medication^a

Variables	Bevacizumab-bvzr	Bevacizumab	P
	(n = 203)	(n = 6524)	
	n (%)	n (%)	
Age in years			
<40	11 (5.4)	332 (5.1)	.140
40-49	15 (7.4)	604 (9.3)	
50-59	54 (26.6)	1310 (20.1)	
60-64	22 (10.8)	954 (14.6)	
≥65	101 (49.8)	3324 (51.0)	
Gender			
Female	128 (63.1)	3620 (55.5)	.033
Male	75 (36.9)	2903 (44.5)	
Missing ^b	N/A	^c	
Region			
Midwest	53 (26.1)	1556 (23.9)	<.001
Northeast	^c	1140 (17.5)	
South	48 (23.6)	2464 (37.8)	
West	92 (45.3)	1321 (20.2)	
Missing ^b	N/A	43 (0.7)	
Insurance			
Commercial	57 (28.1)	1852 (28.4)	.138
Medicare	30 (14.8)	1172 (18.0)	
Medicaid	40 (19.7)	967 (14.8)	
Other	^c	160 (2.5)	
Missing ^b	68 (33.5)	2373 (36.4)	
Provider type (index)			
Internal medicine	^c	427 (6.5)	<.001
Oncology, hematology	46 (22.7)	1403 (21.5)	
Oncology, medical	47 (23.2)	1510 (23.1)	
Other	15 (7.4)	1768 (27.1)	
Missing ^b	90 (44.3)	1416 (21.7)	
Provider region (index)			
Midwest	37 (18.2)	1279 (19.6)	<.001
Northeast	^c	923 (14.1)	
South	30 (14.8)	2005 (30.7)	
West	40 (19.7)	875 (13.4)	
Missing ^b	90 (44.3)	1442 (22.1)	

N/A, not available.

^aAnalysis was restricted to patients with a diagnosis of metastatic colorectal cancer, cancer of the female genital organs, glioblastoma, or non-small cell lung cancer. Reference medication cohort was also restricted to patients newly indexing on/after the first claim date for bevacizumab-bvzr.

^bObservations with "missing" were excluded prior to significance testing.

^cCounts were 10 or fewer providers and could not be reported.

Third, claims data represent the insured population, which might not be generalizable to the uninsured population. It is likely that the actual adoption rate of bevacizumab biosimilars could be higher, given that only 1 of the 2 available bevacizumab biosimilars was included, and thus future studies are needed for

a more comprehensive assessment of patterns of utilization of bevacizumab biosimilars. Fourth, small sample sizes precluded the ability to report data for treatment utilization patterns after the bevacizumab-bvzr index date for all indications and therefore longer-term follow-up to allow for sufficient uptake will be needed.

CONCLUSIONS

Overall, results suggest that extrapolation of indications, switching from bevacizumab reference product or another bevacizumab biosimilar to bevacizumab-bvzr, and the usage of bevacizumab-bvzr in combination with chemotherapy are accepted in real-world oncology practice in the United States. However, our findings outside the indication of mCRC need to be interpreted with caution, given the limited sample size captured in the present study. Additional studies are warranted to explore the long-term outcomes of bevacizumab-bvzr use in various patient populations who may be prescribed bevacizumab-bvzr. ■

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