400: Utilization, user characteristics, and adverse outcomes of bevacizumab products in oncology in a distributed research network

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Background:

- Bevacizumab is an anti-angiogenic agent approved in 2004 for treating various oncologic indications. Biosimilars bevacizumab-awwb and bevacizumab-bvzr were launched in July and December 2019
- Real-world data on adverse events for bevacizumab biosimilars is limited

Objective:

- To evaluate utilization patterns, patient characteristics, and prespecified adverse events of interest for the originator bevacizumab relative to its biosimilars in oncology

Methods:

- Retrospective cohort study using the Biologics and Biosimilars Collective Intelligence Consortium (BBCIC) distributed database from January 1, 2010, to December 31, 2020
- The data captured users 21 years of age and older
- Oncology indications: colon, lung, and gynecologic (cervical, uterine, and ovarian) cancers
- Pre-specified adverse events (AE): arterial thromboembolism (ATE), congestive heart failure (CHF), gastrointestinal perforation, stroke, acute myocardial infarction (AMI), and venous thromboembolism (VTE)
- Biosimilars data was analyzed collectively due to limited data availability

Results:

- Across all indications, bevacizumab users had a mean age of 62.9 years, were primarily women, and had a Charlson/Elixhauser Combined Comorbidity Score of 7.4
- The most common comorbidity for bevacizumab users was hypertension (14,404 patients; 59.9%)
- Biosimilar utilization began in mid-2019 and full year data was only available for 2020; there were 41 new users of biosimilars in 2019 (1,063 users of all bevacizumab products) and 490 new users in 2020 (1,137 users)
- Most adverse event rates were higher for the originator and biosimilars compared to rates reported in randomized clinical trials (RCTs) and observational studies

References:

- Garcia, J., Hurwitz, H., Sandler, A., 2020
- Dreyfus, B., Kawabata, H., Gomez, A., 2013
- Oza, A., Dubois, F., Hegg, R., 2021
- Shankaran, V., Mummy, D., Koepl, L., et al., 2013
- Spence, M., Hui, R., Chang, J., et al., 2017
- US Food and Drug Administration, Avastin Prescribing Information, 2004

- **Biosimilar utilization made up 43.1% of all bevacizumab product use in 2020**
- **Arterial/venous thromboembolism and gastrointestinal perforation were the most found pre-specified adverse events**

Table 1. Patient characteristics of bevacizumab product users from 2010 to 2020

	Number/Mean	Percent/Standard Deviation
Unique patients	23,066	--
Episodes	24,044	--
Age (years)	62.9	12.2
Women	14,261	61.8%
Baseline (365 days) clinical characteristics		
Charlson/Elixhauser Combined Comorbidity Score	7.4	3.0
Chronic kidney disease	5,437	22.6%
Diabetes	5,464	22.7%
Hypertension	14,404	59.9%
Proteinuria	905	3.8%
Smoking History	7,914	32.9%
Surgical Procedure	6,572	27.3%

Table 2. Adverse events of bevacizumab product users compared to selected studies from literature (RCTs and observational studies)

Pre-Specified Adverse Event	Current Study (N = 23,066)		Literature Results
	Number	Percent	Percent
Arterial thromboembolism	2,560	10.6	2.5 - 5.0
Congestive heart failure	2,092	8.7	1.2 – 19.0
Gastrointestinal perforation	2,858	11.9	1.9 – 5.0
Stroke/Acute myocardial infarction	399	1.7	1.1 - 6.3
Venous thromboembolism	4,447	18.5	6.7 - 16.0

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Figure 1. Percentage of bevacizumab biosimilar utilization from 2019 to 2020 by indication

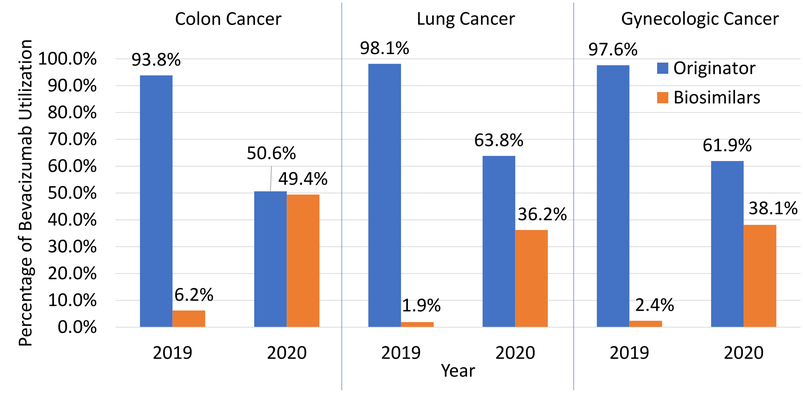
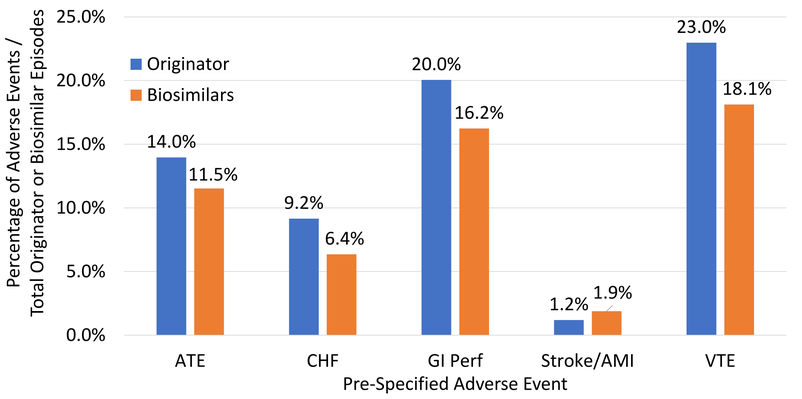


Figure 2. Percentage of pre-specified adverse events for bevacizumab originator and biosimilars



Discussion:

- Adverse event rates for this study were defined using an exhaustive list of ICD-09-CM diagnosis and procedure codes, ICD-10-CM diagnosis and procedure codes, and HCPCS codes captured up to 183 days after bevacizumab initiation which may account for a higher prevalence of adverse events compared to rates in literature
- Biosimilar utilization represented a large proportion of all bevacizumab use and is expected to increase in the future
- Future direction for research should focus on bevacizumab biosimilar utilization and algorithms for defining adverse events

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