

Oncologists' Perceptions and Utilization of US Therapeutic Oncology Biosimilars

SONIA TADJALLI OSKOUEI, PHARMD, BCMAS; STEPHANIE FORTIER, PHD;
YOLAINE JEUNE-SMITH, PHD; AND AJEET GAJRA, MD

ABSTRACT

Objectives: Biosimilars are highly similar to FDA-approved biologics, with no meaningful clinical difference between them. However, biosimilars provide significant cost savings compared with reference biologics. Although oncologists play a key role in adopting biosimilars into clinical practice, little research has addressed US oncologists' views on oncologic biosimilars. Our study assessed these perceptions.

Study Design: Data were collected regarding oncologists' perceptions of biosimilars and their current and projected prescribing habits.

Methods: Medical oncologists/hematologists attended live meetings from September 2020 to February 2021 and completed an online survey.

Results: Among the 323 participants surveyed across community and noncommunity practice settings, most reported being very (55%) or somewhat (39%) familiar with biosimilars. Overall, willingness to prescribe biosimilars was higher in noncommunity than community settings (28% vs 20%). Approximately 67% had prescribed biosimilars and would prescribe them to new patients or those responding to reference biologics. Most were comfortable switching to biosimilars for curative or palliative care, at 67% and 83%, respectively, and 73% were comfortable switching between biosimilars. More were comfortable starting new patients on biosimilars for curative care (25%) than for palliative care (16%). Most participants (85%) would prescribe biosimilars based on extrapolation of data from other indications, and many were comfortable with automatic substitution by a pharmacy or insurance company.

Conclusions: Most community oncologists are familiar with biosimilars and have prescribed them in the past. Oncologists are more likely to prescribe oncologic biosimilars in the noncurative/palliative care vs curative setting, and willingness to prescribe these with palliative intent was nearly double in nonprivately owned vs privately owned community practices.

The American Journal of Accountable Care. 2022;10(4):6-14

Biologic therapies, such as monoclonal antibodies, hematopoietic cell growth factors, and other targeted agents, have dramatically improved outcomes in cancer over the past 3 decades. However, the high cost of these treatments can limit patients' ability to access them. Biosimilars, which are products that have no clinically meaningful difference from existing FDA-approved biologics, have the potential to provide equally effective treatment at a lower cost due to less reliance on expensive clinical trials and increased price competition.¹⁻³ Yet despite the potential of biosimilars for increasing access and reducing costs, their initial adoption in oncologic indications was not as rapid as initially anticipated.⁴⁻⁶

In 2015, filgrastim-sndz (Zarxio), a filgrastim biosimilar, was the first biosimilar with an oncologic indication to receive FDA approval; since then, more than a dozen biosimilars for common biologics have been approved for oncologic indications (eg, erythropoietin, pegfilgrastim, trastuzumab, bevacizumab, rituximab).⁷ However, knowledge gaps among health care providers including oncologists may contribute to the lack of uptake of therapeutic biosimilars across indications. A 2016 study of health care providers in various disciplines, including dermatologists, oncologists, and rheumatologists, identified that many were not aware of the definitions of biologics and biosimilars or the regulatory pathway for FDA approval.⁸ Moreover, a 2020 commercial claims-based study compared uptake of the reference biologic (Neupogen) and the Zarxio biosimilar by practice setting and prescribing exclusivity.⁹⁻¹¹ Increased uptake was associated with office-based vs hospital settings, larger practice sizes, higher proportions of patients insured by health maintenance organizations, more non-White patients, and more younger patients.⁹⁻¹¹ Additionally, providers almost exclusively prescribed either the biologic or biosimilar across practice settings.⁹

Although substantial opportunities remain to maximize the impact of biosimilars in improving cancer care, variable gaps in knowledge among oncologists may contribute to their low uptake in the specialty. Unlike biologics or generics, biosimilars gain FDA approval through an abbreviated Biologics License Application pathway, in which the greatest regulatory weight is placed on analytic data (eg, structural and biological characterization). Through this rigorous process, a biosimilar must be proven to not have any meaningful differences in safety, purity, and potency (safety and effectiveness) from the reference biologic.² In addition to the FDA approval process, other complex issues surrounding biosimilars (eg, switching, interchangeability, extrapolation) may create confusion or hesitancy among health care providers, whose levels of familiarity or comfort remain unclear. Recognizing the need for increased awareness of and support for biosimilars, the American Society of Clinical Oncology released a statement in 2018 offering guidance and committing to increasing awareness and education on biosimilars.¹² Increased education notwithstanding, the adoption of biosimilars depends additionally on oncologists' perceptions of their utility and financial implications, which can be influenced by practice type and/or site of care. A retrospective study comparing adoption of biosimilar infliximab showed great variability in its use between an academic medical center and a Veterans Affairs Medical Center; likely driven by centralized price negotiations at the Veterans Affairs Medical Center, the biosimilar's use resulted in large discounts.¹³

Given that many patients are seen in the community practice setting, it is important for further studies to improve understanding of community physicians' use of biosimilars. Many biosimilars with oncologic indications are expected to come to market in the coming years, highlighting the need to understand how and whether oncologists intend to incorporate biosimilars into their practice in the future. The aims of this study were to assess oncologists' views on the role of biosimilars in cancer care and to understand the current and projected utilization patterns of biosimilars in either curative or palliative settings.

METHODS

Licensed medical oncologists/hematologists from the Cardinal Health Oncology Provider Extended Network (OPEN) were invited to attend 1 of 5 virtual meetings held between September 2020 and February 2021. OPEN is a network of more than 7000 oncologists and hematologists from all 4 US geographic regions who engage with Cardinal Health in clinical research, market research, or real-world research opportunities with varying frequency. OPEN is agnostic to health care system affiliation, electronic health

record used, and group purchasing organization utilization or membership, and participation by individual physicians is voluntary. To be eligible to participate in these meetings, physicians must not have participated in a Cardinal Health-sponsored meeting in the previous 9 months. Physicians were compensated for their participation about 6 weeks following completion of the program. The goal of the meeting was to collect information on treatment decision-making in various clinical scenarios and to address practice-based challenges and initiatives among community oncologists.

Participants were queried about their perceptions of biosimilars in cancer management, including their current use of biosimilars and how they expect their use of biosimilars to change in the near future. Questions (in the [eAppendix](#) available at [ajmc.com](#)) were fielded to participants via a web-based premeeting survey and during the virtual meeting. All participants were instructed to complete the web-based premeeting survey prior to attending the virtual meeting. Participants were aware that results would be presented in aggregate and that the intent was not to use or reproduce individual data. During the virtual meetings, the participants responded to survey questions, which were captured using an audience response system. The participants were not aware that they would be asked questions pertaining to biosimilars as part of their participation in the meetings. Responses are summarized using descriptive statistics and central tendency.

RESULTS

A total of 323 oncologists/hematologists representing all 4 US geographic regions participated in this research study. Most participants (84%) were in community practices, nearly half (48%) of which were privately owned, whereas 36% worked at nonprivately owned community practices or medical centers ([Table 1](#)). The participants had a mean of 18 years of clinical experience, spent a mean of 86% of their working time in direct patient care, and saw a mean of 20 patients per day on clinic days. Participation in either the Oncology Care Model or Merit-based Incentive Payment System value-based care payment models was 37% each.

Most of the participants reported that they were either very (55%) or somewhat (39%) familiar with biosimilars, with only 6% indicating that they were not familiar with biosimilars ([Table 2](#)). The proportions of respondents reporting being very familiar with biosimilars were almost equal in community (55%) and noncommunity (57%) settings. Of the 270 respondents in community practice (84%), familiarity was highest in privately owned (61%) vs nonprivately owned (47%) settings. Overall, 65% of participants reported that they would prescribe a biosimilar to new/existing patients starting a biologic or patients stable on the reference biologic

Table 1. Practice Characteristics and Participant Demographics

Characteristic	N = 323
Region, n (%) ^a	
South	68 (21%)
Midwest	69 (21%)
West	111 (34%)
Northeast	75 (23%)
Practice type, n (%) ^a	
Privately owned, community	154 (48%)
Nonprivately owned community practice or medical center	116 (36%)
Academic center or affiliated teaching hospital	51 (16%)
Other	2 (1%)
Medical specialty, n (%) ^a	
Medical oncology	125 (39%)
Hematology oncology	189 (59%)
Other (pediatric hematology/oncology, radiation oncology)	9 (3%)
Age in years, n (%)	
≤ 40	31 (10%)
40-49	97 (30%)
50-59	103 (32%)
≥ 60	92 (28%)
Proportion (%) of time spent in direct patient care, mean (range), median ^b	86 (0-100), 90
Years of clinical experience, mean (range), median	18 (1-44), 17
Patient volume per day, mean (range), median	20 (2-90), 20
OCM participation, n (%)	121 (37%)
MIPS participation, n (%)	121 (37%)

MIPS, Merit-based Incentive Payment System; OCM, Oncology Care Model.

^aSum may not equal 100 due to rounding.

^bOne participant reported that they spend 0% of their time in direct patient care.

(66% privately owned and 67% nonprivately owned community practice; 79% noncommunity practice). Additionally, 23% would prescribe biosimilars only to existing patients responding to the reference biologic (25% privately owned and 20% nonprivately owned community practice; 23% noncommunity practice), and 5% would prescribe only the reference biologic (3% privately owned and 7% nonprivately owned community practice; 8% noncommunity practice).

In terms of prescribing habits, many participants indicated they had prescribed biosimilars in the past year, including

trastuzumab (68%), bevacizumab (62%), and rituximab (67%) biosimilars; other biosimilars had been prescribed by 11% of participants, and 6% had not prescribed any (Table 3). Eighty-five percent of participants would prescribe a biosimilar based on extrapolation for both supportive and curative care (84% privately owned and 89% nonprivately owned community practice; 79% noncommunity practice). Additionally, 7% would prescribe biosimilars only for supportive care, 3% only for curative care, and 5% would not prescribe without data demonstrating safety

Table 2. Oncologists' Familiarity With and Use of Biosimilars

Response, n (%)	All participants N=323	Practice type		
		Community, privately owned n=154	Community, nonprivately owned n=116	Noncommunity n=53
How would you describe your familiarity with biosimilars? ^a				
Very familiar; I understand how the FDA defines and evaluates them.	178 (55.1%)	94 (61.0%)	54 (46.6%)	30 (56.6%)
Somewhat familiar; I have read research about them, but I am not familiar with specifics, such as the manufacturing and approval processes.	127 (39.3%)	51 (33.1%)	55 (47.4%)	21 (39.6%)
Not very familiar; I understand that they are like generics and that some are approved for use.	18 (5.5%)	9 (5.8%)	7 (6.0%)	2 (3.8%)
For which patients would you likely prescribe biosimilars for cancer therapy? ^a				
New patients and existing patients	65 (20.1%)	36 (23.4%)	14 (12.1%)	15 (28.3%)
New patients and existing patients having success on reference biologic	77 (23.8%)	33 (21.4%)	35 (30.2%)	19 (35.8%)
New patients and existing patients having limited success on reference biologic	5 (1.5%)	2 (1.3%)	3 (2.6%)	0 (0%)
Only new patients	69 (21.4%)	32 (20.8%)	29 (25.0%)	8 (15.1%)
Existing patients having success on reference biologic	74 (22.9%)	39 (25.3%)	23 (19.8%)	12 (22.6%)
Existing patients having limited success on reference biologic	16 (5.0%)	7 (4.5%)	4 (3.4%)	5 (9.4%)
Existing patients having success and existing patients having limited success on reference biologic	0 (0%)	0 (0%)	0 (0%)	0 (0%)
I would only prescribe the reference biologic.	17 (5.3%)	5 (3.2%)	8 (6.9%)	4 (7.5%)

^aSum may not equal 100 due to rounding.

and efficacy for the specific condition. Most participants reported that they were comfortable with automatic substitution by a pharmacy or payer: 36% were very comfortable, 39% were moderately comfortable, and 16% were somewhat comfortable. Regarding potential use of fourth- or fifth-to-market biosimilars, participants reported that robust data (39%), price discounts (28%), and payer coverage (21%) were the top influencing factors in adopting these biosimilars (Table 4). By practice type, having robust data was reported as the most influential factor by 32% of participants in privately owned and 47% of nonprivately owned community practice and by 43% of those in noncommunity practice; price discount was reported by 36%, 17%, and 26%, respectively.

When queried on their perceptions of switching a patient from a reference biologic to its biosimilar, 67% and 83% indicated that they were comfortable switching for curative or palliative care, respectively (Table 5). By practice type, comfort with curative switching was cited by 71% of privately owned and 61% of nonprivately owned community practice and 70% of noncommunity practice participants; comfort with palliative switching was cited by 86%, 78%, and 85%, respectively. Twenty-five percent and 16% reported that they were comfortable starting new patients on a biosimilar for curative or palliative care, respectively. Seventy-three percent were comfortable switching between biosimilars, and 20% were comfortable switching only for palliative care.

Table 3. Oncologists' Familiarity and Comfort Level With Biosimilar Use

Response, n (%)	All participants N = 323	Practice type		
		Community, privately owned n = 154	Community, nonprivately owned n = 116	Noncommunity n = 53
Which therapeutic biosimilars have you prescribed in the past year? Please select all that apply.				
Trastuzumab biosimilars	219 (67.8%)	122 (79.2%)	78 (67.2%)	19 (35.8%)
Bevacizumab biosimilars	201 (62.2%)	111 (72.1%)	70 (60.3%)	20 (37.7%)
Rituximab biosimilars	217 (67.2%)	119 (77.3%)	70 (60.3%)	28 (52.8%)
Other	36 (11.1%)	13 (8.4%)	17 (14.7%)	6 (11.3%)
None of the above	20 (6.2%)	8 (5.2%)	5 (4.3%)	7 (13.2%)
Would you prescribe a biosimilar in indications that have been granted FDA approval based on extrapolation? ^a				
Yes.	274 (84.8%)	129 (83.8%)	103 (88.8%)	42 (79.2%)
Yes, but only for biosimilars that provide supportive care.	24 (7.4%)	15 (9.7%)	5 (4.3%)	4 (7.5%)
Yes, but only for biosimilars that provide curative treatment.	9 (2.8%)	7 (4.5%)	0 (0%)	2 (3.8%)
No, I would not prescribe biosimilars without clinical data to demonstrate its safety and efficacy for a specific indication.	16 (5.0%)	3 (1.9%)	8 (6.9%)	5 (9.4%)
I would not prescribe a biosimilar.	0 (0%)	0 (0%)	0 (0%)	0 (0%)
What is your comfort level with automatic substitution of a biosimilar for its reference product (biologic brand product) by a pharmacy or an insurance company? ^a				
Very comfortable	115 (35.6%)	60 (39.0%)	39 (33.6%)	16 (30.2%)
Moderately comfortable	127 (39.3%)	55 (35.7%)	52 (44.8%)	20 (37.7%)
Somewhat comfortable	53 (16.4%)	26 (16.9%)	15 (12.9%)	12 (22.6%)
Not very comfortable	24 (7.4%)	12 (7.8%)	9 (7.8%)	3 (5.7%)
Not at all comfortable	4 (1.2%)	1 (0.6%)	1 (0.9%)	2 (3.8%)

^aSum may not equal 100 due to rounding.

DISCUSSION

In this study, we queried a sample of 323 oncologists/hematologists practicing primarily in the community setting to assess their comfort level with and use of biosimilars. Most providers were familiar with and had experience prescribing therapeutic biosimilars, and nearly equal proportions in community and noncommunity practice considered themselves very familiar with biosimilars (55% and 57%, respectively). However, subgroup differences

by practice type were found when comparing providers at privately owned community practices with those in the nonprivately owned community setting; nearly 15% more from privately owned community practices considered themselves very familiar. Willingness to prescribe biosimilars to new and existing patients followed that trend; nearly twice the proportion of participants from privately owned community practices reported that they would prescribe biosimilars to both kinds of patients (23% vs 12%). Overall,

Table 4. Oncologists' Driving Factors in Adopting Fourth- and Fifth-to-Market Biosimilars

Response, n (%)	All participants N = 323	Practice type		
		Community, privately owned n = 154	Community, nonprivately owned n = 116	Noncommunity n = 53
What would be the most influential consideration for adopting a biosimilar that is fourth or fifth to the market within its class (eg, bevacizumab biosimilars)? ^a				
Robust clinical studies and evidence (international or domestic clinical trials)	126 (39.0%)	49 (31.8%)	54 (46.6%)	23 (43.4%)
Price discount	90 (27.9%)	56 (36.4%)	20 (17.2%)	14 (26.4%)
Payer coverage	67 (20.7%)	35 (22.7%)	23 (19.8%)	9 (17.0%)
Route of administration	6 (1.9%)	0 (0%)	2 (1.7%)	4 (7.5%)
Dosage frequency	5 (1.5%)	4 (2.6%)	1 (0.9%)	0 (0%)
Manufacturer historic supply stability	2 (0.6%)	2 (1.3%)	0 (0%)	0 (0%)
Practice pathway	23 (7.1%)	6 (3.9%)	15 (12.9%)	2 (3.8%)
Other (please specify)	2 (0.6%)	0 (0%)	1 (0.9%)	1 (1.9%)
I will not prescribe a biosimilar to any of my patients	2 (0.6%)	2 (1.3%)	0 (0%)	0 (0%)

^aSum may not equal 100 due to rounding.

the willingness to prescribe biosimilars was higher in noncommunity than community settings (28% vs 20%).

The most commonly prescribed biosimilars were for trastuzumab, bevacizumab, and rituximab, and substantial differences were found across practice types. Compared with providers in the noncommunity setting, from one-quarter to twice as many in community practice had used these biosimilars within the past year (with use lower in the nonprivately owned community setting). Irrespective of practice type, the majority of oncologists would prescribe a biosimilar that was granted FDA approval based on extrapolation, and 75% were very or somewhat comfortable with automatic substitution. These results suggest oncologists' overall familiarity and comfort with biosimilars for oncologic indications and that they do not differ substantially by practice type.

Considering sequence to market, the influences of robust data, price discounts, and payer coverage were most important for using fourth- or fifth-to-market biosimilars, and these also do not differ substantially by practice type. The proportions of providers reporting these differed, however, in that having robust clinical trial data or evidence was more salient in the nonprivately owned (47%) than in the privately owned (32%) community setting. Accordingly, price discount was less salient in the nonprivately owned

(17%) vs privately owned (36%) community setting. These findings may indicate that policies/practices of nonprivately owned community practices more closely reflect those of academic or government-owned institutions.

Biosimilars can improve patient access to potentially life-saving medication and reduce burdens on the overall health care system; the average sales price of biosimilars ranges from 3% to 24% lower than that of their reference drugs.¹⁴ Although biosimilars with oncologic indications have begun to slow the growth of oncology spending in the United States, considerable opportunities remain to reduce the costs of cancer care.⁶ Given that FDA-approved biosimilars are required to not have any meaningful difference compared with their reference biologic, biosimilar utilization is most appropriate for new patients or for those responding to a reference biologic. A few knowledge gaps regarding oncologists' biosimilar use were observed in our study.

About a quarter of oncologists in community practice reported that they would prescribe a biosimilar for new and existing patients responding to a reference biologic; this was higher (36%) in noncommunity practice. For existing patients not responding to a reference biologic (having limited success), willingness to prescribe a biosimilar was more than twice as frequent in providers at noncommunity practices (9%

Table 5. Oncologists' Perceptions of Biosimilar Use and Switching in Curative and Noncurative Settings

Response, n (%)	All participants N = 323	Practice type		
		Community, privately owned n = 154	Community, nonprivately owned n = 116	Noncommunity n = 53
Which of the following best aligns with your perspective on biosimilars with curative intent (eg, trastuzumab in adjuvant setting)? ^a				
I only feel comfortable starting new patients on biosimilars with the intent to cure.	81 (25.1%)	35 (22.7%)	34 (29.3%)	12 (22.6%)
I feel comfortable switching patients from a reference biologic to a biosimilar with the intent to cure.	217 (67.2%)	109 (70.8%)	71 (61.2%)	37 (69.8%)
I will not prescribe biosimilars with curative intent to any of my patients.	25 (7.7%)	10 (6.5%)	11 (9.5%)	4 (7.5%)
Which of the following best aligns with your perspective on biosimilars administered with palliative intent (eg, trastuzumab or bevacizumab in the noncurative setting for long-term tumor suppression)? ^a				
I only feel comfortable starting new patients on biosimilars in the palliative setting.	51 (15.8%)	19 (12.3%)	26 (22.4%)	6 (11.3%)
I feel comfortable switching patients from a reference biologic to a biosimilar in the palliative setting.	267 (82.7%)	132 (85.7%)	90 (77.6%)	45 (84.9%)
I will not prescribe biosimilars with palliative intent to any of my patients.	5 (1.5%)	3 (1.9%)	0 (0%)	2 (3.8%)
Which of the following best aligns with your perspective on switching from one biosimilar to another biosimilar? ^a				
I feel comfortable with the science behind biosimilars and therefore feel comfortable switching between biosimilars.	237 (73.4%)	114 (74.0%)	83 (71.6%)	40 (75.5%)
I only feel comfortable switching between biosimilars if they are for supportive care (ie, filgrastim and pegfilgrastim).	66 (20.4%)	33 (21.4%)	22 (19.0%)	11 (20.8%)
I do not feel comfortable switching between biosimilars.	18 (5.6%)	5 (3.2%)	11 (9.5%)	2 (3.8%)
I will not prescribe a biosimilar to any of my patients.	2 (0.6%)	2 (1.3%)	0 (0%)	0 (0%)

^aSum may not equal 100 due to rounding.

vs 4%). The oncologists' perceptions of biosimilars for curative and palliative intent also differed. More reported being comfortable starting a new patient on a biosimilar for curative care (25%) than palliative/supportive care (16%), the latter of which showed the largest difference between providers in the privately owned (12%) vs nonprivately owned (22%) community setting. Additionally, more oncologists across practice types were comfortable switching a patient from a biologic to a biosimilar for curative intent (eg, trastuzumab in the adjuvant setting)

than for palliative/supportive care use. Therefore, despite the reported comfort level with and prescribing history of biosimilars, these results suggest some hesitancy around the efficacy of therapeutic biosimilars. Given that previously published data from clinical trials and postmarketing surveillance suggest that switching between biosimilars and their corresponding reference products is safe and does not affect immunogenicity,¹⁵⁻¹⁷ increased awareness regarding these specific issues is needed to increase the use of therapeutic biosimilars.

Whereas earlier reports have highlighted that providers were unaware of and unfamiliar with several aspects of biosimilars,^{8,18} our study adds to other recent reports of oncologists' increasing awareness and changing perceptions of biosimilars. For instance, a study of 75 hospital-affiliated and community-based oncologists in July 2019 reported that 70% of providers perceived biosimilars as identical or nearly equivalent to their reference biologics.¹⁹ Additionally, 60% of providers believed they would often or always prescribe a biosimilar in the future.¹⁹ Although our study did not ask specifically whether individuals would always prescribe a biosimilar, 67% of oncologists said that they would prescribe a biosimilar for patients starting a new biologic therapy and for patients who were receiving a reference biologic.

Our study also addressed factors that would influence oncologists' adoption of late-entrant biosimilars (ie, drugs entering the market as the fourth or fifth biosimilar for a given reference biologic). As many oncology biosimilars are expected to gain FDA approval in the coming years, selecting among them will likely be a prominent issue facing oncologists, particularly for indications such as breast cancer (eg, trastuzumab), in which the large number of patients needing treatment has driven development of biosimilars. Notably, oncologists have reported that both robust clinical evidence and price discounts were major drivers of adoption in this setting. Although cost-saving has traditionally been considered a main driving factor for the use of biosimilars, these results suggest that for late-to-market biosimilars, it may not be enough to drive adoption. Additional clinical evidence will be needed to persuade physicians to adopt these later biosimilars. Postmarketing studies on biosimilar use and associated safety and efficacy will likely be important going forward.

Limitations

This study has a few limitations. Given its survey-based design, oncologists may have overstated their levels of familiarity or comfort with biosimilars. Additionally, the sample size of 323 oncologists may not represent all US oncologists, despite efforts to include providers from diverse regions and practice types. Lastly, we did not specifically assess barriers to adoption of biosimilars. Therefore, despite observing favorable views of biosimilars and a willingness to prescribe them among oncologists, we recognize that addressing other factors influencing the real-world use of biosimilars among oncologists will be an important area of ongoing research.

Strengths of this study include the high response rate (nearly 100% due to the nature of the survey design) and the participants' unawareness that their views of biosimilars

would be assessed. This was intended to prevent selection bias, wherein providers with poor awareness of biosimilars may have declined to participate.

CONCLUSIONS

Overall, these data highlight considerable levels of comfort with biosimilars in the oncology space, with many providers having prescribed them in the past and being willing to prescribe them in the future. Oncologists are more likely to prescribe oncologic biosimilars in the noncurative/palliative care vs curative setting, and willingness with palliative intent was nearly double in nonprivately owned vs privately owned community practice. In preparation for the additional oncologic biosimilars anticipated to enter the US market, this enhanced provider awareness and uptake of biosimilars compared with earlier studies can help inform multiple stakeholders (eg, manufacturers/commercial partners, payers, and providers) about current perceptions and practices regarding their development and adoption.

Acknowledgments

The authors thank Abigail A. Zalenski, PhD, of Cardinal Health, for medical writing support and Alexandrina Balanean, MPH, for support in revising the manuscript per the reviewers' feedback.

Author Affiliations: Cardinal Health Specialty Solutions (STO, SF, YJ-S, AG), Dublin, OH.

Source of Funding: None.

Author Disclosures: Drs Oskouei, Jeune-Smith, and Gajra are employees of Cardinal Health, whose clients include pharmaceutical companies, including those that manufacture or market biosimilars, and health care providers who purchase pharmaceuticals. Dr Fortier was an employee of Cardinal Health at the time this study was conducted and is now an employee of the Lockwood Group.

Authorship Information: Concept and design (STO, YJ-S, AG); acquisition of data (STO, YJ-S, AG); analysis and interpretation of data (STO, YJ-S, AG); drafting of the manuscript (STO, SF, YJ-S, AG); critical revision of the manuscript for important intellectual content (STO, SF, YJ-S, AG); statistical analysis (YJ-S, AG); provision of study materials or patients (YJ-S, AG); administrative, technical, or logistic support (SF); and supervision (YJ-S, AG).

Send Correspondence to: Sonia Tadjalli Oskouei, PharmD, BCMAS, Cardinal Health Specialty Solutions, 7000 Cardinal Pl, Dublin, OH 43017. Email: Sonia.oskouei@cardinalhealth.com.

REFERENCES

- Mulcahy AW, Hlavka JP, Case SR. Biosimilar cost savings in the United States: initial experience and future potential. *Rand Health Q.* 2018;7(4):3.
- Scientific considerations in demonstrating biosimilarity to a reference product: guidance for industry. FDA. April 2015. Accessed September 14, 2021. <https://www.fda.gov/media/82647/download>
- Grewal S, Ramsey S, Balu S, Carlson JJ. Cost-savings for biosimilars in the United States: a theoretical framework and budget impact case study application using filgrastim. *Expert Rev Pharmacoecon Outcomes Res.* 2018;18(4):447-454. doi:10.1080/14737167.2018.1476142
- Sarpatwari A, Barenie R, Curfman G, Darrow JJ, Kesselheim AS. The US biosimilar market: stunted growth and possible reforms. *Clin Pharmacol Ther.* 2019;105(1):92-100. doi:10.1002/cpt.1285
- Udpa N, Million RP. Monoclonal antibody biosimilars. *Nat Rev Drug Discov.* 2016;15(1):13-14. doi:10.1038/nrd.2015.12
- The use of medicines in the U.S.: spending and usage trends and outlook to 2025. IQVIA. May 27, 2021. Accessed September 14, 2021. <https://www.iqvia.com/insights/the-iqvia-institute/reports/the-use-of-medicines-in-the-us>
- Biosimilar product information. FDA. Updated September 28, 2022. Accessed September 28, 2022. <https://www.fda.gov/drugs/biosimilars/biosimilar-product-information>
- Cohen H, Beydoun D, Chien D, et al. Awareness, knowledge, and perceptions of biosimilars among specialty physicians. *Adv Ther.* 2017;33(12):2160-2172. doi:10.1007/s12325-016-0431-5
- Chen AJ, Ribero R, Van Nuys K. Provider differences in biosimilar uptake in the filgrastim market. *Am J Manag Care.* 2020;26(5):208-213. doi:10.37765/ajmc.2020.42786
- Socal MP, Anderson KE, Sen A, Bai G, Anderson GF. Biosimilar uptake in Medicare Part B varied across hospital outpatient departments and physician practices: the case of filgrastim. *Value Health.* 2020;23(4):481-486. doi:10.1016/j.jval.2019.12.007
- Dean EB, Johnson P, Bond AM. Physician, practice, and patient characteristics associated with biosimilar use in Medicare recipients. *JAMA Netw Open.* 2021;4(1):e2034776. doi:10.1001/jamanetworkopen.2020.34776
- Lyman GH, Balaban E, Diaz M, et al. American Society of Clinical Oncology statement: biosimilars in oncology. *J Clin Oncol.* 2018;36(12):1260-1265. doi:10.1200/JCO.2017.77.4893
- Baker JF, Leonard CE, Lo Re V III, Weisman MH, George MD, Kay J. Biosimilar uptake in academic and Veterans Health Administration settings: influence of institutional incentives. *Arthritis Rheumatol.* 2020;72(7):1067-1071. doi:10.1002/art.41277
- Tallent A. Oncology biosimilars: cost savings offset by challenges. *OBR Oncology.* April 18, 2021. Accessed September 21, 2022. <https://www.obroncology.com/article/oncology-biosimilars-cost-savings-offset-by-challenges>
- Ebbers HC, Crow SA, Vulto AG, Schellekens H. Interchangeability, immunogenicity and biosimilars. *Nat Biotechnol.* 2012;30(12):1186-1190. doi:10.1038/nbt.2438
- Blackwell K, Semiglazov V, Krasnozhan D, et al. Comparison of EP2006, a filgrastim biosimilar, to the reference: a phase III, randomized, double-blind clinical study in the prevention of severe neutropenia in patients with breast cancer receiving myelosuppressive chemotherapy. *Ann Oncol.* 2015;26(9):1948-1953. doi:10.1093/annonc/mdv281
- Cohen HP, Blauvelt A, Rifkin RM, Danese S, Gokhale SB, Woollett G. Switching reference medicines to biosimilars: a systematic literature review of clinical outcomes. *Drugs.* 2018;78(4):463-478. doi:10.1007/s40265-018-0881-y
- Molinari AL, Gewanter HL, Loaiza-Bonilla A, Reilly M, Kennedy B, Charles D. Global survey of physicians' attitudes toward biologic and biosimilar therapies. *J Clin Oncol.* 2016;34(suppl 15):e18025. doi:10.1200/JCO.2016.34.15_suppl.e18025
- Galan C, Johnson KA, Avalos-Reyes E. US oncologists' perception of the efficacy, safety, and willingness to prescribe biosimilar cancer therapies. *J Clin Oncol.* 2020;38(suppl 15):e15213. doi:10.1200/JCO.2020.38.15_suppl.e15213

eAppendix. Survey questions

P4. Which of the following best describes your practice?

- 1= Solo, privately owned, community
- 2= Small, privately owned, community (2-5 physicians)
- 3= Medium-sized, privately owned, community (6-10 physicians)
- 4= Large, privately owned, community (>10 physicians)
- 5= Community practice, owned by a larger entity (e.g., hospital or academic center)
- 6= Community-based hospital
- 7= Medical center or cancer center
- 8= Academic center or affiliated teaching hospital (defined as having a large teaching system)
- 9= Other, please specify:

P5. What proportion of your working time is spent in the following?

- 1= Direct patient care
- 2= Teaching
- 3= Research
- 4= Administration

P6. What is your primary medical specialty?

- 1= Medical oncology
- 2= Hematology oncology
- 3= Other, please specify:

P7. How many years have you been in practice?

P9. On the days you see patients, how many do you see on average?

PR2. Is your practice participating in the Oncology Care Model (OCM)?

- 1= Yes
- 2= No

PR2-2. Is your practice participating in the Merit-based Incentive Payment System (MIPS)?

- 1= Yes
- 2= No

Bio1. How would you describe your familiarity with biosimilars?

- 1= Very familiar. I understand how the FDA defines and evaluates them.
- 2= Somewhat familiar. I have read research about them, but I am not familiar with specifics, such as the manufacturing and approval processes.
- 3= Not very familiar. I understand that they are like generics and that some are approved for use.

Bio2. Would you prescribe a biosimilar in indications that have been granted FDA approval based on extrapolation?

- 1= Yes.
- 2= Yes, but only for biosimilars that provide supportive care.
- 3= Yes, but only for biosimilars that provide curative treatment.

- 4= No, I would not prescribe biosimilars without clinical data to demonstrate its safety and efficacy for a specific indication.
- 5= I would not prescribe a biosimilar.

Bio3. What is your comfort level with automatic substitution of a biosimilar for its reference product (biologic brand product) by a pharmacy or an insurance company?

- 1= Very comfortable
- 2= Moderately comfortable
- 3= Somewhat comfortable
- 4= Not very comfortable
- 5= Not at all comfortable

Bio4. For which patients would you likely prescribe biosimilars for cancer therapy?

Please select all that apply.

- 1= New patients
- 2= Existing patients having success on reference biologic
- 3= Existing patients having limited success on reference biologic
- 4= I would only prescribe the reference biologic

Bio5. Which of the following best aligns with your perspective on biosimilars with curative intent (e.g., trastuzumab in adjuvant setting)?

- 1= I only feel comfortable starting new patients on biosimilars with the intent to cure.
- 2= I feel comfortable switching patients from a reference biologic to a biosimilar with the intent to cure.
- 3= I will not prescribe biosimilars with curative intent to any of my patients.

Bio6. Which of the following best aligns with your perspective on biosimilars administered with palliative intent (e.g., trastuzumab or bevacizumab in the non-curative setting for long-term tumor suppression)?

- 1= I only feel comfortable starting new patients on biosimilars in the palliative setting.
- 2= I feel comfortable switching patients from a reference biologic to a biosimilar in the palliative setting.
- 3= I will not prescribe biosimilars with palliative intent to any of my patients.

Bio7. Which of the following best aligns with your perspective on switching from one biosimilar to another biosimilar?

- 1= I feel comfortable with the science behind biosimilars and therefore feel comfortable switching between biosimilars.
- 2= I only feel comfortable switching between biosimilars if they are for supportive (i.e., filgrastim and pegfilgrastim) care.
- 3= I do not feel comfortable switching between biosimilars.
- 4= I will not prescribe a biosimilar to any of my patients.

Bio8. What would be the most influential consideration for adopting a biosimilar that is fourth or fifth to the market within its class (e.g., bevacizumab biosimilars)?

- 1= Robust clinical studies and evidence (international or domestic clinical trials)
- 2= Price discount
- 3= Payer coverage

- 4= Route of administration
- 5= Dosage frequency
- 6= Manufacturer historic supply stability
- 7= Practice pathway
- 8= Other, please specify:
- 9= I will not prescribe a biosimilar to any of my patients.

Bio9. Which therapeutic biosimilars have you prescribed in the past year?

Please select all that apply.

- 1= Trastuzumab biosimilars
- 2= Bevacizumab biosimilars
- 3= Rituximab biosimilars
- 4= Other, please specify:
- 5= None of the above

Bio10. How likely are you to adopt a pegfilgrastim biosimilar with an on-body delivery device, if it were FDA approved and commercially available?

- 1= Very likely
- 2= Somewhat likely
- 3= Not very likely
- 4= Not at all likely