Health Affairs Scholar, 2024, **2**(6), qxae067
https://doi.org/10.1093/haschl/qxae067
Advance access publication: May 15, 2024
Research Article

Health Affairs Scholar
EMERGING & GLOBAL HEALTH POLICY
OXFORD

Role of supply chain intermediaries in steering hospital product choice: Group Purchasing Organizations and biosimilars

Emma Boswell Dean[1,*], Reekarl Pierre[2], Samuel Carter[2], Amelia M. Bond[2]

[1]Miami Herbert Business School, Coral Gables, FL 33146, United States
[2]Department of Population Health Sciences, Weill Cornell Medical College, New York, NY 10065, United States

*Corresponding author: Department of Health Management and Policy, Miami Herbert Business School, University of Miami, Coral Gables, FL 33146, United States. Email: edean@bus.miami.edu

Abstract

Over 95% of hospitals in the United States use pooling alliances, known as Group Purchasing Organizations (GPOs), to purchase medications, devices, and supplies. While GPOs create savings for hospitals through lowered prices and reduced administrative burden, critics allege that these supply chain intermediaries reduce competition, particularly if GPOs concentrate purchasing from larger, dominant manufacturers. Using a mixed-methods design, we studied whether GPOs influence hospital purchasing behavior and explored the contracting mechanisms used by GPOs. Focusing on 4 high-cost biologic molecules that face competition from generic-like biosimilars between 2015 and 2019, we found that biosimilar uptake was 16%–23% higher among Traditional Medicare patients in hospitals associated with 2 of the 3 top GPOs as compared with smaller GPOs. The increase in biosimilar use was driven by single biosimilar brands that varied by GPO. Based on qualitative interviews, these 2 GPOs used more aggressive contracting strategies to steer member hospitals to specific biosimilar brands. To date, the use of GPOs and these aggressive contracting strategies appear to have increased biosimilar use, suggesting savings for payers and patients. However, single-source GPO contracting could inhibit competition or create shortages in the long term. Transparency on GPO practices and pricing strategies is needed for further GPO evaluations.

Key words: Group Purchasing Organizations; hospital supply chain; hospital purchasing; pharmaceuticals.

Introduction

Supply expenses rank as the second highest expenditure category after staffing among US hospitals, and their costs are rising rapidly.[1,2] In an attempt to lower supply costs, over 95% of US hospitals use pooling alliances, known as Group Purchasing Organizations (GPOs), to purchase medications, devices, and supplies used within their facilities.[3,4] The GPOs can create savings for hospitals through reduced administrative burden and lower negotiated prices.[3,4] Prior literature suggests that hospital managers have largely positive views of GPOs, believing that GPOs behave ethically, reduce prices, and generate administrative savings.[3,5,6]

Despite purported benefits, GPOs have faced criticism over their contracting practices and growing market share. Due to an exemption from the Medicare Anti-Kickback statute, GPOs collect contract fees. Higher contract fees for single-source contracts can lead to lower prices in the short term but could inadvertently lead to supply shortages and inhibit long-run competition. Recent Senate hearings have addressed this concern, while the Federal Trade Commission and US Department of Health and Human Services are investigating the role of GPOs in generic drug shortages.[7,8] The use of bundled contracts—contracts with deeper discounts when a hospital purchases multiple products from a single manufacturer—is also controversial. Senate hearings between 2002 and 2010 investigated GPO use of bundled contracts and highlighted that GPO contracts with large, established manufacturers could limit market entry and restrict access to innovative new products, particularly from smaller manufacturers.[3,5,9] Finally, the GPO market has become increasingly concentrated, raising concerns of insufficient competition between GPOs.[10,11]

Despite their importance in the US supply chain, little research exists on GPOs and the role they play in steering product choice for affiliated hospitals. This is largely due to a lack of data transparency as contracts between hospitals, GPOs, and manufacturers are considered trade secrets. However, understanding whether GPOs influence or restrict product choice is important to the policy debate on the impacts of pharmaceutical intermediaries.

In this study, we combine novel data on hospitals' GPO affiliations with medication utilization to examine the association of GPO affiliation with product choice. We then conduct qualitative interviews to gain insight into the quantitative findings.

Our analysis focuses on physician-administered biologic medicines—expensive, complex medications that face competition from generic-like biosimilars. Biosimilars are medically equivalent but nonidentical substitutes to reference biologics and generally not interchangeable like traditional generic drugs. Biosimilars compete on both price as well as brand

Received: March 1, 2024; Revised: May 10, 2024; Accepted: May 14, 2024

names, with past evidence indicating loyalty to specific brands.[12] We focus on this setting for 2 reasons. First, biologic medicines allow for the direct evaluation of whether GPOs steer hospitals towards lower-cost medications without observing the actual contracts between hospitals, GPOs, and manufacturers. The average sales prices of biosimilars are generally less than originator biologics while offering the same clinical benefit.[13,14] Second, biologic medicines are economically important, accounting for 46% of US prescription drug spending.[15,16]

Data and methods

Quantitative analysis

Setting

Our setting was hospital outpatient departments that administer at least 1 of 4 physician-administered biologic molecules—filgrastim (brand name Neupogen, Amgen), infliximab (brand name Remicade, Johnson & Johnson Innovative Medicine), epoetin alfa (brand names Epogen, Amgen, and Procrit, Johnson & Johnson Innovative Medicine), and pegfilgrastim (brand name Neulasta, Amgen). We focused on these 4 molecules as they are dispensed in the hospital outpatient setting and are the first molecules with biosimilars launched through the Biologics Price Competition and Innovation Act of 2009 pathway, allowing us to measure biosimilar usage across multiple years (see Appendix Section 1 for details). We excluded hospitals unaffiliated with a GPO due to small sample size and hospitals that participate in the 340B Drug Pricing Program as these hospitals cannot purchase qualifying products from GPOs.[17]

Data

To measure hospital-level utilization of biosimilars, we used outpatient claims and the beneficiary summary file for a 20% random sample of fee-for-service Medicare Part B beneficiaries for the years 2015 to 2019. Data on hospital characteristics were obtained from the 2015–2019 American Hospital Association Annual Survey Database. Hospital 340B participation was identified using the 340B Office of Pharmacy Affairs Information System. Data on hospitals' 2010 commuting zones were pulled from Fowler and colleagues[18,19] and approximate the geographic boundaries of commercial health insurance markets.

We identified annual hospital GPO and pharmaceutical formulary type using the 2015–2019 Health Care Organizations (HCOs) data from IQVIA. As hospitals may contract with multiple GPOs, an advantage to these data is that IQVIA includes information on the GPO most used for pharmaceutical purchasing as defined by hospital ownership and executives.

Study outcomes

Our primary outcome was quarterly hospital-level biosimilar market share by molecule. We also considered quarterly market share separately by biosimilar brand at the hospital level to understand whether a specific biosimilar brand was driving biosimilar uptake.

Explanatory variables

Our primary explanatory variable was a hospital's GPO affiliation. As hospitals may be affiliated with multiple GPOs, we assigned them to the GPO most used for pharmaceutical purchasing each year. We focused primarily on the 3 largest GPOs by volume during the years of our study, which represent over 75% of the market: Vizient, HealthTrust, and Premier. Smaller GPOs were categorized together as "Small GPOs."

In marketing, HealthTrust differentiates itself from Vizient and Premier by identifying as a committed model, meaning that affiliated facilities must purchase a certain percentage of product volume from HealthTrust's covered brands. Vizient and Premier both advertise optional committed programs. Additional background information on the GPOs can be found in Appendix Section 2.

Secondary explanatory variables were hospital-level controls expected to influence a hospital's negotiating power. The variables included quartile of administration volume for each molecule of interest, annual hospital pharmacy expenses, staffed hospital beds, hospital ownership category (not-for-profit, for-profit, and government), indicators for an academic medical center or a satellite outpatient center, hospital geographic indicators (metropolitan, micropolitan, or rural location), and hospital formulary type (open, closed, or none). Closed hospital formularies limit physicians' choice to products included on the hospital formulary, whereas open hospital formularies allow physicians to order and use products not included on the hospital formulary. Finally, we included indicators for a hospital's commuting zone, which approximate health insurance market boundaries, to account for commercial formularies that may restrict hospital reimbursement.

Quantitative analyses

We compared hospital characteristics for each of our secondary explanatory variables by GPO affiliation in 2019 to understand whether hospital characteristics differ across GPOs. To compare biosimilar utilization across GPOs, we plotted the mean unadjusted hospital-level biosimilar market share by GPO affiliation over time for each molecule. As hospital characteristics vary across GPOs, we also adjusted for hospital-level characteristics using a logistic regression. The dependent variable was a hospital's quarterly biosimilar market share for each molecule of interest. Covariates included all hospital characteristics, including commuting zone. Results from the logit models were reported as the percentage-point change in receiving a biosimilar for large GPO affiliation relative to small GPO affiliation, calculated using the average marginal effect of biosimilar administration.

To ensure our results were robust to functional form, we ran 2 robustness tests. First, we used a linear probability model instead of a logit model. Second, while previous work suggested patient characteristics were not meaningfully associated with biosimilar use, we controlled for patient characteristics by running logit models at the administration level.[20] We clustered our standard errors at the hospital level in all regressions.

To examine whether GPO affiliation was associated with the use of specific biosimilar brands, we graphed hospital-level market share for each biosimilar brand over time. For this analysis, we focused on the filgrastim and infliximab molecules as these molecules each had multiple biosimilar competitors available across multiple years of our sample.

Differences in biosimilar utilization across GPOs may have been due to unobservable hospital characteristics that were also correlated with a hospital's choice of GPO. To examine whether this may have been the case, we ran 2 robustness tests. First, we examined whether hospitals that switched GPO affiliation changed purchasing behavior in an event study. Second, as a falsification test, we ran our main regressions with

hospitals that participated in the 340B Drug Pricing Program and were not part of a system. These hospitals were not able to purchase qualifying drugs through a GPO and therefore GPO affiliation should not have an impact on these hospitals' purchasing decisions. We excluded hospitals that were part of a system as these hospitals may have shared a hospital formulary and/or order entry software with a non-340B campus.

Qualitative analysis

To contextualize our quantitative findings, we conducted 14 semi-structured interviews with 15 participants between December 2021 and August 2022. The interview protocol (Appendix Section 7) was developed through a literature review on GPOs and hospital purchasing processes as well as a pilot interview with an expert on hospital purchasing. It included open-ended questions about how hospitals chose and worked with GPOs, GPO contracting practices, and biologic-specific pricing and contracting. Each interview was approximately 45 minutes and conducted by 2 study team members via video-conferencing or telephone. Transcripts were generated from detailed notes taken by team members. We used a convenience sampling approach, ensuring a range of hospital types, GPO memberships, and interviewee roles. Our interviewees included 11 chief pharmacists involved in their facilities' pharmaceutical and therapeutics committees, 1 head of hospital purchasing, 2 biosimilar experts employed by GPOs, and 1 executive of a firm that manufactures biosimilar medications (details in Appendix Section 7).

We analyzed qualitative data using a constant comparison approach, in which all study members reviewed the transcripts. We used a framework analysis methodology to identify main themes, deciding on our final list key themes through discussion and consensus.[21]

Limitations

Our study has several limitations. First, our study was limited to biologic utilization in the hospital outpatient setting; pooled purchasing and contracting mechanisms may have different impacts in physician offices, in the inpatient setting, or in other drug classes. Second, our quantitative analysis was limited to the Medicare fee-for-service setting and results may differ for commercially insured patients, for whom insurance formularies may restrict product choice. Third, our analysis was descriptive—unobserved hospital characteristics may be correlated both with the decision to administer biosimilars and with the choice of which GPO to contract with. Fourth, as biosimilar competition increased after our time frame, GPO impact and hospital formulary restrictions may have shifted. Finally, we used a convenience sample in our qualitative analysis; thus, our qualitative results may not apply to all hospitals.

Results

Quantitative results

GPO composition by hospital characteristics

In our sample, 98% of hospitals (997 of 1019 in 2019) contracted with a GPO for pharmaceutical purchasing, with 76% of sample hospitals contracting with a large GPO (Premier, Vizient, and HealthTrust) (Table 1).

Hospital characteristics differed by GPO affiliation (Table 1 and Appendix Section 4A). Relative to hospitals affiliated with the 3 large GPOs, hospitals affiliated with a small GPO were more likely to be not-for-profit (75.7% vs 59.2%; $P < .001$), have a satellite outpatient department (64.6% vs 51.7%; $P = .004$), be in the Northeast (31.3% vs 15.8%; $P < .001$), and have an open formulary (16.4% vs 9.6%; $P < .001$). Hospitals contracting with Vizient and Premier were similar, although hospitals affiliated with Vizient were less likely to be in metropolitan areas (77.3% vs 85.1%; $P = .03$). Compared with hospitals contracting with Vizient and Premier, hospitals contracting with HealthTrust had lower average pharmacy expenses ($14 million vs $30 million and $25 million; $P = .04$ and $P = .08$, respectively) and were more likely to be for-profit (75.6% vs 7.2% and 9.0%; both $P < .001$) and affiliated with a system (93.4% vs 71.3% and 75.1%; both $P < .001$), but were less likely to have a satellite outpatient center (33.4% vs 60.4% and 66.7%; both $P < .001$), and an open hospital formulary (4.3% vs 12.6% and 13.3%; both $P < .001$). Hospital characteristics by GPO affiliation for years 2015 through 2019 in Appendix 4B show similar results.

Association of GPO affiliation with biosimilar use

Figure 1 graphs biosimilar market share by hospital GPO affiliation for each molecule. Rates of biosimilar utilization were higher among hospitals affiliated with HealthTrust by the end of 2019 as compared with hospitals affiliated with other GPOs. Across molecules and quarters, hospitals affiliated with Premier and Vizient inconsistently had higher rates of biosimilar utilization as compared with hospitals affiliated with small GPOs.

Table 2 presents our regression results. In unadjusted analyses, Vizient and HealthTrust had 4.4-percentage-point (pp) (12.4%; $P = .022$) and 14.8-pp (41.6%; $P = .023$) higher rates of biosimilar utilization, respectively, as compared with hospitals affiliated with a small GPO. After controlling for hospital characteristics, hospitals affiliated with Vizient and HealthTrust had 5.6-pp (15.7%; $P = .022$) and 8.1-pp (22.8%; $P = .025$) higher rates of biosimilar utilization, respectively. Changes in coefficients after controlling for hospital characteristics suggest that hospital composition of GPOs influenced biosimilar adoption.

Our regression results were robust to different specifications. Regressions using linear probability models, administration-level regressions including patient-characteristic controls, and regressions using 2019 data only were qualitatively similar (Appendix 6A–6C). Further, we did not find differences in our outcomes among hospitals that participated in the 340B Drug Pricing Program (Appendix 6D), consistent with our expectation as 340B hospitals were not able to purchase qualifying drugs through a GPO.

Association of GPO affiliation with biosimilar brand

To examine whether biosimilar utilization was driven by a specific biosimilar brand for each GPO, Figure 2 presents brand-specific biosimilar market shares for filgrastim and infliximab molecules. Panel A shows that high biosimilar market share for filgrastim products among HealthTrust-affiliated hospitals was driven by the biosimilar brand Granix (tbo-filgrastim). This trend was not shared for hospitals affiliated with Premier, where increases in biosimilar market share were largely driven by the biosimilar brand Zarxio (filgrastim-sndz), or Vizient, where the leading biosimilar brand varied over time. Panel B shows that, by the end of the study period, over two-thirds of infliximab's biosimilar market share was attributed to the brand Inflectra (infliximab-dyyb) for HealthTrust and Premier-affiliated hospitals. Premier-affiliated hospitals had particularly low utilization

Table 1. Hospital characteristics by GPO affiliation, 2019.

	Vizient	HealthTrust	Premier	Small GPO
No. of hospitals, 2019	325	323	203	146
No. of hospitals, 2015–2019	1463	1577	1073	1201
Product administrations per year				
Filgrastim	18.5	9.6	23.9	14.8
Infliximab	20.9	9.5	14.4	18.5
Pegfilgrastim	28.6	9.5	22.6	15.2
Epoetin alpha	32.0	24.3	29.9	37.3
Pharmacy expenses per year, million	30.1	13.7	25.3	22.5
Staffed hospital beds	198.4	218.8	214.4	209.3
Hospital ownership, %				
Non-for-profit	81.6%	22.2%	82.1%	75.7%
For-profit	7.2%	75.6%	9.0%	13.9%
Government	11.2%	2.2%	9.0%	10.4%
Academic medical center, %	6.2%	1.6%	3.5%	4.9%
System affiliation, %	71.3%	93.4%	75.1%	84.7%
Satellite outpatient department, %	60.4%	33.4%	66.7%	64.6%
Region, %				
Northeast	21.2%	10.0%	16.4%	31.3%
Midwest	37.4%	18.8%	33.3%	29.9%
South	29.0%	50.9%	37.8%	26.4%
West	12.5%	20.3%	12.4%	12.5%
Location, %				
Metropolitan	77.3%	76.9%	85.1%	79.9%
Micropolitan	13.1%	19.7%	9.5%	11.8%
Rural	9.7%	3.4%	5.5%	8.3%
Hospital formulary, %				
Open formulary	12.6%	4.3%	13.3%	16.4%
Closed formulary	78.8%	90.7%	80.3%	78.8%
No formulary	4.6%	3.1%	6.4%	2.7%

Abbreviations: GPO, Group Purchasing Organization; HCOs, Health Care Organizations.
Source: Authors' analysis of data from 20% of 2019 Medicare fee-for-service claims, American Hospital Association Annual Survey Database, 340B Office of Pharmacy Affairs Information System, and HCOs data from IQVIA. Our sample included hospitals that administered 1 of the following molecules: filgrastim, infliximab, epoetin alfa, and pegfilgrastim. GPO affiliation is based on HCO data. Fifty-five hospitals not affiliated with a GPO in 2019 are not included in this table. *P* values from pairwise unadjusted-mean comparison (*t*) test or 2-group test of proportions are found in Appendix Section 4A.

of the competing biosimilar brand, Renflexis (infliximab-abda), while Vizient-affiliated hospitals saw a rapid increase in Renflexis market share in 2019. The results were supported by our event study analysis of hospitals that change GPO. After changing GPO affiliation, hospitals increased the use of their new GPO's preferred brand (Appendix 6E).

Key themes from qualitative interviews

Stakeholder interviews produced 5 key themes, outlined below with additional details in Appendix Section 7D.

(1) Hospitals had medium to high satisfaction with GPOs, and varying levels of engagement

Hospital stakeholders expressed medium to high levels of satisfaction with their contracted GPO. In addition to reducing administrative costs and lowering product prices, stakeholders reported that GPOs offered an increasing array of services outside of direct contracting and product sourcing, consistent with prior literature.[4] These services included reports on insurance coverage, reimbursement rates, and projected revenue for drug brands, clinical comparisons of drugs, regional data-sharing and benchmarking services, and information on supply chain shortages. Some GPOs offered biosimilar transition toolboxes, including order forms, formulary policies, and best practices.

All hospitals surveyed purchased some products outside of their contracted GPOs. Large hospitals and academic medical centers were most likely to negotiate high-spend drugs directly with manufacturers for deeper discounts.

(2) GPOs use different strategies to bring down prices for reference brand and biosimilar products

The GPOs were not equally aggressive with respect to sourcing and contracting. Some GPOs contracted with all biosimilar brands, providing hospitals freedom of choice. HealthTrust was more aggressive and operated as a fully committed model, where participants must buy a certain brand share from the limited list of products offered by the GPO. Vizient was considered the second most aggressive GPO, although most GPOs offered optional commitment programs. Commitment programs generally carried 1 biosimilar brand but offered that brand at a deep discount.

Biosimilar contracts through GPOs took different forms. Some hospitals purchased biosimilars through GPOs at a fixed price regardless of volume. However, most hospitals said they received percentage-based contracts through GPOs, which gave them deeper discounts for ordering a certain percentage of total molecule purchases from a preferred biosimilar or reference brand. These contracts are similar to commitment models, but product-specific and optional. Percentage-based contracts were also common in direct-from-manufacturer purchases. No hospitals mentioned purchasing biosimilars from GPOs through bundled contracts.

(3) Pharmacists saw financial savings from biosimilars and were primarily responsible for adding biosimilars to hospital formularies

The decision to stock a biosimilar was driven initially by pharmacists, as opposed to physicians. Pharmacists saw the opportunity

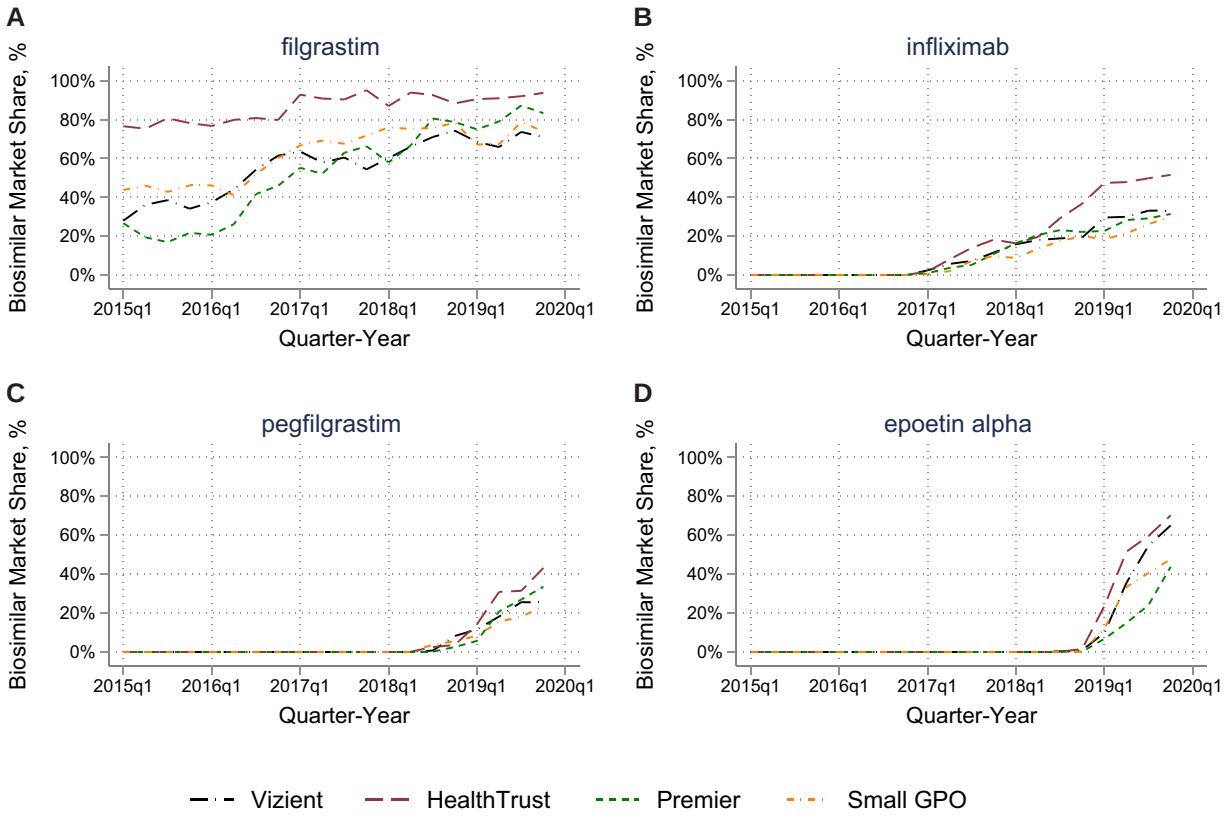

Figure 1. (A–D) Average hospital biosimilar market share by Group Purchasing Organization (GPO) affiliation, 2015–2019. Source: Authors' analysis of data from 20% of Medicare fee-for-service claims and Health Care Organizations (HCOs) data from IQVIA. Unadjusted quarterly hospital biosimilar market shares for all GPOs are shown. For each plot, hospitals must administer at least 1 molecule between 2015 and 2019 for inclusion.

Table 2. Association of GPO affiliation on US hospital biosimilar market share, 2015–2019.

	Differences in Biosimilar Market Share	
	Unadjusted	**Adjusted**
Vizient	0.044*	0.056*
	(0.022)	(0.022)
HealthTrust	0.148***	0.081**
	(0.023)	(0.025)
Premier	0.011	0.015
	(0.024)	(0.023)
Small GPOs	—	—
Observations	14 574	14 574
R^2	0.327	0.342
Mean biosimilar market share	35.6%	35.6%

Abbreviations: GPO, Group Purchasing Organization; HCOs, Health Care Organizations
Source: Authors' analysis of data from 20% of Medicare fee-for-service claims, American Hospital Association Annual Survey Database, 340B Office of Pharmacy Affairs Information System, commuting zone data from Fowler and colleagues,[19] and HCOs data from IQVIA. Coefficients represent the percentage-point change in the likelihood of receiving a biosimilar for a given GPO affiliation relative to small GPO affiliation. Numbers in parentheses are standard errors. Coefficients and standard errors come from logistic regression. The outcome was a hospital's biosimilar market share for a given molecule. In adjusted analyses, covariates included hospital characteristics in Table 1 and commuting zone. Standard errors were clustered at the hospital level and coefficients converted to percentage-point change using the average marginal effect. $^{*}P < .10$; $^{**}P < .05$; $^{***}P < .01$.

for savings on biosimilars offered through their GPO and pushed preferred biosimilar brands to the hospital's pharmacy and therapeutics committee and onto the hospital formulary. Despite some initial hesitation, physician and patient acceptance was no longer a major barrier to biosimilar usage. Pharmacists spent time educating clinicians, nurses, and patients before switching to biosimilars, but physician and patient acceptance was, by and large, not preventing biosimilar uptake as of 2022.

(4) Hospitals preferred to stock only 1 biosimilar brand

Hospitals, universally in our sample, preferred to stock only 1 biosimilar or reference brand, ideally determined by the product's profitability to the hospital. Stocking 1 brand brought economies of scale that lowered purchasing costs, simplified inventory management, lowered storage costs, simplified electronic health record data and ordering processes, and helped prevent medical errors. Given that many products, including biosimilars, required prior authorization, it was difficult to switch patients to other brands, creating inertia.

(5) The decision of which biosimilar or reference product to stock was restricted by payer formularies

Hospitals were restricted on brands they could dispense to patients by commercial payers, which often excluded individual brands from coverage. Given hospital preferences to limit the number of products stocked, if a certain percentage of insurers did not cover a brand then the hospital did not add that product to their formulary even if it was the most profitable. This was a binding constraint for multiple surveyed hospitals. Multiple hospitals reported that they would have preferred to only stock 1 biosimilar brand but needed to stock multiple brands to satisfy different commercial insurance formularies.

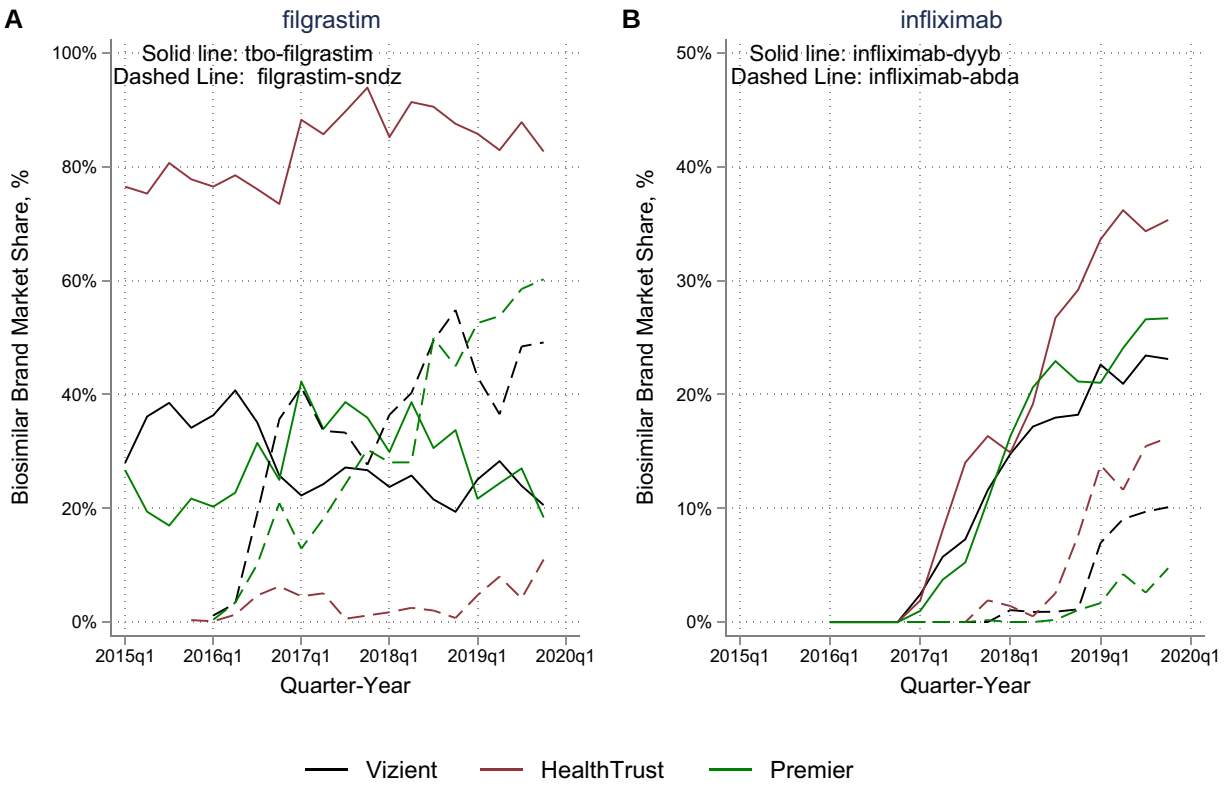

Figure 2. (A and B) Average unadjusted hospital biosimilar brand market share by Group Purchasing Organization (GPO) affiliation for the 3 largest GPOs, 2015–2019. Source: Authors' analysis of data from 20% of Medicare fee-for-service claims and Health Care Organizations (HCOs) data from IQVIA. Unadjusted quarterly hospital biosimilar brand market shares for all GPOs are shown. For each plot, hospitals must administer at least 1 molecule between 2015 and 2019 for inclusion. A version of the graph including Nivestym (Pfizer) market share and small-GPO hospitals is available in Appendix Section 5.

Discussion

In the first mixed-methods study on the association of GPO affiliation with hospital behavior, we found that hospitals affiliated with 2 of the 3 largest GPOs had substantially higher biosimilar uptake—16% to 23%—relative to hospitals associated with smaller GPOs. The GPO with the largest association —HealthTrust—is a committed contract GPO. For hospitals affiliated with HealthTrust, higher uptake was driven by increased usage of a single biosimilar brand. In hospitals affiliated with Vizient, the largest GPO in our sample, there was not a consistent preferred brand. Through qualitative interviews, we confirmed that GPOs vary in their contracting strategies and that the 2 GPOs with higher biosimilar uptake were more likely to use selective or percentage-based contracting, which are the most aggressive contracting strategies. Selective contracting effectively steers member hospitals to specific brands for deeper discounts. Qualitative interviews provided additional insight that the complexity of hospital purchasing can inhibit the uptake of new biosimilars and slow the decision to switch brands over time. Group Purchasing Organizations can increase biosimilar uptake by providing hospitals tools to make switching decisions easier.

These results provide broader insight into the role of the hospital supply chain, demonstrating that GPOs can influence hospital purchasing. Group Purchasing Organizations today do not simply offer a mechanism to purchase medications at bulk discounts, and instead play many other roles. Through offerings like biosimilar transition toolkits and projections of net savings, GPOs assisted hospital switching to biosimilars and encouraged their uptake.

Our qualitative interviews provided new insight into the types of contracts used by GPOs. While no hospitals we spoke to reported purchasing biosimilars through bundled contracts, we are the first, to our knowledge, to confirm that percentage-based or selective contracts were common in GPO purchasing. These contracts require hospitals to purchase a given molecule share from a specific brand in exchange for a deeper discount (eg, a deeper discount for brand X if it is at least 80% of the hospital's molecule Y purchases). These contracts were not exclusive to specific GPOs; however, HealthTrust is a committed model GPO, and therefore operates exclusively with this type of contract.

Although selective contracts are controversial, we found that hospitals affiliated with the 2 GPOs most likely to use these contracts—HealthTrust and Vizient—had the highest biosimilar uptake. This aligns with the European experience that more aggressive contracting practices contribute to faster biosimilar uptake and increased savings.[22-24] This has implications for the broader question of how to encourage biosimilar competition—if facilities benefit from cost-savings, more aggressive purchasing mechanisms can drive biosimilar uptake.[25] Assuming the switch to biosimilar brands creates savings that trickle down to patients and payers, these contracting practices may be broadly beneficial. Given that fee-for-service Medicare patients pay 20% coinsurance for Part B drugs, they stand to benefit financially from higher biosimilar use.

However, selective contracts offered through GPOs could be anticompetitive in the long run if they prevent entry or uptake of new products. While selective contracting may reduce

hospital expenses, it also can concentrate purchases among a small set of products and manufacturers, which can contribute to medication shortages if it leads to fewer generic competitors in the long run. Our study was not designed specifically to address this concern but did demonstrate that the presence of selective contracts did not fully block the use of competing brands.

Our results also had insights for another type of pharmaceutical intermediary—pharmaceutical benefit managers (PBMs). Pharmaceutical benefit managers work as intermediaries between manufacturers and insurance companies, helping to negotiate manufacturer rebates and design pharmaceutical formularies on behalf of insurance companies. In order to negotiate deeper rebates, PBMs often exclude specific brands from coverage or place brands on less preferred formulary tiers.[26-28] From our qualitative interviews, the exclusion of specific brands on insurance formularies inhibited hospitals' ability to shop around for the lowest priced brands. Some states have passed laws requiring insurance companies to reimburse all biosimilar brands.[28] While this supports hospitals in procuring the lowest priced brands, it inhibits insurers' ability to bargain for deeper rebates. This lack of incentive alignment between the different players in the pharmaceutical supply chain is likely to play a role in slowing savings and competition from biosimilars.

Overall, we found that hospitals affiliated with the 2 largest GPOs with the most aggressive contracting practices had higher biosimilar uptake relative to other GPOs, suggesting that aggressive contracting practices have, to date, increased the growth of more cost-efficient products. However, our study was limited to the hospital outpatient setting, fee-for-service Medicare population, and biologic medicines; future work should explore different settings, patient cohorts, and medications. Further, the role of supply chain intermediaries, including both GPOs and PBMs, remains controversial. Whether GPOs benefit consumers in the long run remains an open question and would require more transparency into negotiated prices between manufacturers, GPOs, and hospitals.

Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

Funding

This work was supported by a grant from the Arnold Foundation. This funding source did not play a role in the study design or execution, analysis of data, or decision to submit results.

Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as supplementary materials.

Notes

1. Abdulsalam Y, Schneller E. Hospital supply expenses: an important ingredient in health services research. *Med Care Res Rev*. 2019;76(2):240-252. Accessed February 29, 2024. https://journals.sagepub.com/doi/10.1177/1077558717719928
2. Fleron A, Krishna A, Singhal S. *Transformative Impact of Inflation on the Healthcare Sector*. McKinsey & Company; 2022. https://www.mckinsey.com/industries/healthcare/our-insights/the-gathering-storm-the-transformative-impact-of-inflation-on-the-healthcare-sector
3. Burns LR, Briggs AD. Hospital purchasing alliances: ten years after. *Health Care Manage Rev*. 2020;45(3):186-195.
4. Burns LR. Group Purchasing Organizations (GPOs): an overview. In: Burns LR, ed. *The Healthcare Value Chain: Demystifying the Role of GPOs and PBMs*. Springer International Publishing; 2022:45-110. https://doi.org/10.1007/978-3-031-10739-9_3
5. Burns LR, Lee JA. Hospital purchasing alliances: utilization, services, and performance. *Health Care Manage Rev*. 2008;33(3):203-215.
6. Schneller E, Abdulsalam Y, Conway K, Eckler J. *Strategic Management of the Health Care Supply Chain*. 2nd ed. John Wiley & Sons; 2023.
7. US Senate Committee on the Judiciary. Oversight of the Enforcement of the Antitrust Laws. Washington, DC; 2019. Accessed February 14, 2023. https://www.judiciary.senate.gov/meetings/09/17/2019/07/23/2019/oversight-of-the-enforcement-of-the-antitrust-laws
8. Bruhn WE, Fracica EA, Makary MA. Group purchasing organizations, health care costs, and drug shortages. *JAMA*. 2018;320(18):1859-1860.
9. Blair RD, Durrance CP. Group purchasing organizations, monopsony, and antitrust policy. *Manage Decis Econ*. 2014;35(7):433-443.
10. Hernandez I, Hershey TB, Donohue JM. Drug shortages in the United States: are some prices too low? *JAMA*. 2020;323(9):819-820.
11. Food and Drug Administration. *Drug Shortages: Root Causes and Potential Solutions*. FDA; 2019. https://www.fda.gov/media/131130/download
12. Chen AJ, Kaiser KM, Gascue L, Manetas M-A, Van Nuys K. Cancer drug trastuzumab and its biosimilars compete on price for market share. *Health Aff (Millwood)*. 2023;42(6):779-784.
13. Bond AM, Dean EB, Desai SM. The role of financial incentives in biosimilar uptake in Medicare: evidence from the 340B program. *Health Aff (Millwood)*. 2023;42(5):632-641.
14. Dean EB, Bond AM. Changes in Medicare part B spending for biologic drugs after biosimilar entry into the market. *JAMA Health Forum*. 2021;2(9):e212634.
15. IQVIA. *Biosimilars in the United States 2020–2024*. IQVIA; 2020. https://www.iqvia.com/insights/the-iqvia-institute/reports/biosimilars-in-the-united-states-2020-2024
16. IQVIA. Biosimilars in the United States 2023-2027. Durham, NC; 2023. Accessed February 13, 2023. https://www.iqvia.com/insights/the-iqvia-institute/reports/biosimilars-in-the-united-states-2023-2027
17. Department of Health & Human Services. Statutory prohibition on group purchasing organization participation; 2013. Accessed February 14, 2023. https://www.hrsa.gov/sites/default/files/hrsa/opa/prohibition-gpo-participation-02-07-13.pdf
18. Fowler C, Jensen L. Bridging the gap between geographic concept and the data we have: the case of labor markets in the USA. *Environ Plan A Econ Space*. 2022;52(7):1395-1414.
19. Fowler CS, Rhubart DC, Jensen L. Reassessing and revising commuting zones for 2010: history, assessment, and updates for U.S. "labor-sheds" 1990–2010. *Popul Res Policy Rev*. 2016;35(2):263-286.
20. 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.
21. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol*. 2013;13(1):117.
22. Scott Morton FM, Stern AD, Stern S. The impact of the entry of biosimilars: evidence from Europe. *Rev Ind Organ*. 2018;53(1):173-210.
23. Moorkens E, Godman B, Huys I, et al. The expiry of Humira® market exclusivity and the entry of Adalimumab biosimilars in Europe:

an overview of pricing and national policy measures. *Front Pharmacol*. 2021;11:591134.
24. Jensen TB, Kim SC, Jimenez-Solem E, Bartels D, Christensen HR, Andersen JT. Shift from adalimumab originator to biosimilars in Denmark. *JAMA Intern Med*. 2020;180(6):902-903.
25. Robinson JC, Jarrion Q. Competition from biosimilars drives price reductions for biologics in the French single-payer health system. *Health Aff (Millwood)*. 2021;40(8):1190-1197.
26. Socal MP, Bai G, Anderson GF. Favorable formulary placement of branded drugs in Medicare prescription drug plans when generics are available. *JAMA Intern Med*. 2019;179(6):832-833.
27. Brot-Goldberg ZC, Che C, Handel BR. *Pharmacy Benefit Managers and Vertical Relationships in Drug Supply: State of Current Research*. National Bureau of Economic Research; 2022. https://www.nber.org/papers/w29959
28. Boswell Dean E, Feng J, Maini L. Stocking under the influence: spillovers from commercial drug coverage to Medicare utilization. Rochester, NY; 2023. Accessed October 27, 2023. https://papers.ssrn.com/abstract=4578352