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Pharmacists' confidence in explaining biosimilars to patients before a nationwide medicine change: A cross-sectional study

Chiara Gasteiger [a,*], Norina Gasteiger [b], Keith J. Petrie [a]

[a] Department of Psychological Medicine, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand
[b] School of Health Sciences, Faculty of Biology, Medicine and Health, University of Manchester, Manchester, United Kingdom

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ABSTRACT

Background: Biosimilars can improve patient access to biological medicines. Although biosimilars have been shown to be equally effective and safe, some patients remain reluctant to transition to biosimilars. Pharmacists may support patients changing to biosimilars and are often at the frontline for dealing with queries and concerns, but their confidence and readiness for this role are unclear.

Objective: This study examines pharmacists' confidence in explaining biosimilars to patients and explores the information they would provide in response to common queries.

Methods: Practicing community, hospital, and primary care pharmacists ($N = 142$) in New Zealand completed an Internet-based survey on their experience and familiarity with bio-originators and biosimilars, attitudes and concerns towards biosimilars, confidence in explaining key concepts, and responses to common queries. A hierarchical linear regression was conducted to examine possible factors associated with confidence in explaining biosimilars, and a content synthesis was conducted to examine responses to common patient queries.

Results: Pharmacists were most confident in explaining how biosimilars are administered, their efficacy, and cost-saving, and least confident in describing manufacturing and testing. Respondents who had more positive attitudes ($B = 1.64$, $p < .001$) and more familiarity with biosimilars ($B = 27.15$, $p < .001$) were more confident in educating patients. Pharmacists' main concerns about biosimilars included reduced efficacy, safety, and a lack of knowledge and acceptance. Responses to common queries were diverse but further highlighted several gaps in knowledge. Gaps included being unable to define biosimilars, provide information on side effects, and believing that biosimilars undergo the same testing process as bio-originators. Pharmacists wanted resources (written and Internet-based) to improve their knowledge and ability to educate patients.

Conclusions: Pharmacists reported a lack of knowledge and confidence in explaining manufacturing processes and testing of biosimilars. Additional resources are needed to support their practice and may help improve patient and companion acceptance of biosimilars.

1. Introduction

Biosimilars have the potential to improve access to biological therapies for patients with chronic immune-mediated inflammatory diseases. These drugs are manufactured following patent expiry and are highly similar to a reference drug (bio-originator) that has previously gained regulatory approval.[1,2] The introduction of biosimilars can, therefore, induce price competition among biologics. This enables funders to choose the most competitive biological medicine, leading to cost savings for the healthcare system and the ability for more patients to access biological treatment. The successful uptake of biosimilars partially relies on patient acceptance. Effective patient-provider communication is important to build familiarity with biosimilars and transfer confidence to patients that the biosimilar has a comparable safety and efficacy profile.[3–5] Researchers have agreed that a multidisciplinary approach to educating patients is needed, as patients often seek information from numerous sources.[6–8] Therefore, it is essential that all sources provide homogenous information.[6,9] Healthcare providers, such as physicians, specialist nurses, and pharmacists, should be prepared to educate patients collaboratively to improve acceptance.[10]

To date, the literature has primarily focused on exploring communication strategies in physicians, with some research starting to explore the role of other healthcare providers, such as nurse-led education.[11–13] Pharmacists also play an important role in supporting physicians and educating patients, as the trusted experts on medicines.[14] Pharmacists may provide education on a variety of topics, including how biosimilars differ from the bio-originator, manufacturing and testing processes, injection techniques,

* Corresponding author at: Department of Psychological Medicine, Faculty of Medical and Health Sciences, University of Auckland, Auckland, New Zealand.
E-mail address: chiara.g@auckland.ac.nz (C. Gasteiger).

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and possible side effects. However, some pharmacists have reported lacking knowledge and feeling uncomfortable with changing patients to biosimilars.[14–18] A recent survey with Belgian community pharmacists demonstrated a unanimous need for information about biologics.[19] Of concern, 36% felt insufficiently trained to dispense and guide patients with biosimilars, and 25% felt insufficiently trained to answer questions. Evidently, it is important to identify pharmacists who may be less confident and require additional training. More research is also needed to assess hospital, community, and primary care pharmacists' confidence and readiness to educate patients, particularly as their experiences and knowledge differ across settings.[20]

Pharmacists are well placed to support educational attempts; however, a lack of knowledge can also escalate biosimilar hesitancy. In one study, two patients who had agreed to transition (primary acceptance rate of 92%) did not begin SB4 treatment (etanercept biosimilar) due to receiving negative and contradictory information from their regular pharmacist.[9] These patients had received positive information on biosimilars from their physician and written information previously used to improve acceptance of generic medicines. Unsatisfactory communication can also induce concerns and negative expectations about new treatments, leading to intentional non-adherence and increased side effect reporting.[21–23] However, emphasizing the similarities between the brands or discussing approval processes may improve perceptions about safety and efficacy.[24,25] Understanding how pharmacists specifically explain biosimilars to patients can help guide future educational attempts, as some information, such as cost-saving, may support negative beliefs about quality.[26]

Biosimilars have been relatively slow to penetrate the New Zealand pharmaceutical market, considering the first biosimilar Nivestim (for filgrastim) gained approval in 2012.[27] There are currently only eight biosimilars funded in New Zealand that require prescribers to seek special authority approval.[28] Pharmacists in New Zealand provide education and dispense some biosimilars, including Omnitrope (somatropin), Binocrit (epoetin alfa), and Riximyo (rituximab – in hospitals only). In New Zealand, the government agency known as Pharmac (Pharmaceutical Management Agency) is responsible for deciding which pharmaceuticals are publicly funded. As part of this process, Pharmac negotiates conditions of access and the price with drug companies while encouraging competition between suppliers.[29] In November 2021, Pharmac announced a funding change for adalimumab, which would require most patients to begin transitioning from bio-originator Humira to the biosimilar Amgevita in March 2022.[30] Given the importance of patient-provider communication to improve biosimilar hesitancy and the upcoming transition to Amgevita, this study examines community, hospital, and primary care pharmacists' confidence in explaining biosimilars. It also determines their concerns about biosimilars, the information pharmacists would provide in response to common queries, and which characteristics are associated with their confidence in explaining biosimilars.

2. Methods

2.1. Study design

This study was a cross-sectional survey completed over the Internet by a national sample of practicing hospital, community, and primary care pharmacists in New Zealand. Ethics approval was obtained from the Auckland Health Research Ethics Committee (AH23564). The study was performed in accordance with the ethical standards of the Declaration of Helsinki. All participants provided informed consent. Data collection began on 10th February 2022 and ended on 15th May 2022.

2.2. Participants and procedure

Participants were practicing pharmacists based in New Zealand, working either full (≥30 h per week) or part-time (≤29 h per week) in a hospital, community, or primary care setting at the time of data collection. Pharmacists had to be fluent in the English language and able to complete the survey over the Internet to participate.

The survey was designed by two health psychology researchers who have previously researched patient acceptance of biosimilars. Consultation on the survey and study design was sought from two representatives from the Pharmaceutical Management Agency (Pharmac), one of whom was an experienced pharmacist. The survey was pilot tested by three postgraduate researchers independent of the study. Pharmacists were recruited through newsletter and email communications by Pharmac, social media, and email notices by relevant organizations. In 2021, there were 4062 practicing pharmacists in New Zealand, of which most were based in Auckland (1471), Canterbury (518), or Wellington (465).[31] Based on the data received from the annual practicing certificates application period, most pharmacists (78%) worked in the community. Additionally, 14% worked in the hospital, and 2% worked in either a general practice or primary health organization. Relevant organizations included the national Pharmaceutical Society of New Zealand, which represents approximately 3700 pharmacists and pharmacy technicians through advocacy, education, and advisory services. The study was also shared by a national newspaper for pharmacists (Pharmacy Today), an educational website (He Ako Hiringa), local pharmacy groups and a national primary care network.

Interested participants followed a hyperlink to Qualtrics to access a participant information sheet and completed two questions assessing their eligibility (e.g., if currently practicing in New Zealand and working full or part-time). After providing informed consent, participants completed one brief (10 to 15 min) anonymous questionnaire assessing their demographic characteristics, familiarity with and attitudes towards biosimilars, and confidence in their ability to answer questions. Open-ended questions were used to assess concerns about biosimilars and gather the different information pharmacists would provide in response to patient questions. The survey is available as supplementary information. Upon completing the questionnaire, participants could enter the draw to win a pharmacy staff morning tea for their workplace. Findings were disseminated to interested participants upon study completion, along with various reputable resources on biosimilars and educating patients.

2.3. Measures

2.3.1. Background information

Participant characteristics included age, ethnicity, gender, educational attainment, years working as a pharmacist, work setting, employment status, and other countries pharmacists have worked in. The background information was captured last due to the nature of the study (i.e., assessing gaps in knowledge). This ensured that pharmacists could participate without the need to provide personal information.

2.3.2. Familiarity

Participants rated their familiarity with bio-originators and biosimilars on a 4-point scale ("very familiar, I have complete understanding" to "I have never heard of them") that have been previously used.[32] Two items assessed their experience with working with bio-originators and biosimilars on 4-point scales ranging from "a lot of experience" to "no experience." Experience with dispensing bio-originators and biosimilars was assessed with two items with three response choices (Yes, No, or Not Applicable). Participants also reported how often they dispense bio-originators and biosimilars and their confidence in dispensing them on an 11-point Likert scale (0 = not at all to 10 = extremely).

2.3.3. Attitudes towards biosimilars

Participants completed seven items with five response options (strongly agree to strongly disagree) to assess their perceptions towards biosimilars. Items assessed perceptions of effectiveness, safety, side effects, quality of the manufacturing process, interchangeability, pharmacist-led substitution, and transitioning patients to save costs. Items were adapted from a study that measured physicians' perceptions towards biosimilars.[32] Higher scores indicated more positive perceptions.

2.3.4. Explaining key concepts

Two items with three response options (Yes, No, or Not Applicable) were used to assess whether pharmacists have previously answered patients' questions about bio-originators and biosimilars. Participants also reported the average number of times they provide education on bio-originators and biosimilars per week. Nine 11-point Likert scales ranging from 0 (not at all confident) to 10 (extremely confident) were used to assess confidence in providing education in the following domains: safety, side effects, efficacy, manufacturing process, regulatory approval processes, drug administration, the process of immune modulation, cost-savings, and testing of biosimilars. Items include, "how confident do you feel answering patients' questions about the efficacy of biosimilars?" Higher scores indicated more confidence. These domains were identified using previous research that explores patients' and companions' questions about biosimilars and information needs.[24,33]

2.3.5. Responses to common questions

Four open-ended questions were used to assess how pharmacists would respond to common questions about biosimilars. Participants were briefly informed about the brand change from Humira to Amjevita (biosimilar adalimumab) and asked to imagine that they were answering patients' questions about changing. Questions included explaining what a biosimilar is and if there are any differences to the reference drug, queries about efficacy and safety/side effects, and the reason for the transition (i.e., benefits of taking biosimilars). For example, one question asked, "will the biosimilar work the same as my current drug?" The development of these questions was informed by a systematic literature review, which identified common information about biosimilars provided in communication strategies globally.[26] An additional four open-ended questions were used to assess pharmacists' concerns about biosimilars in general, the information they perceive important for patients and companions to know, and which resources or information would help them provide better education.

2.4. Analysis

Data were checked for parametric assumptions before being analyzed in IBM SPSS Statistics (v.27). A significance level of $p < .05$ was maintained for all analyses, and bootstrapping or non-parametric tests were used when necessary. Participant characteristics, and confidence in explaining biosimilars are presented using descriptive statistics. Attitudes towards biosimilars and confidence in explaining biosimilars were individually totaled to create sum scores. An analysis of variance (ANOVA) with a Bonferroni correction was conducted to examine differences in confidence in explaining key concepts between pharmacists working in the hospital, community, and primary care setting. A two-step hierarchical linear regression was conducted to examine possible factors associated with confidence in explaining biosimilars. Demographics (gender, age (coded 0 = ≤30 and 31–40 and 1 = 41+), educational attainment, and years working) were added in the first step. Attitudes towards biosimilars, and familiarity with biosimilars and bio-originators (dummy coded 'familiar'/'very familiar' = 1 and 'had heard of them but could not define'/'had not heard of them' = 0) added in the second. Data pertaining to the open-ended questions were downloaded from Qualtrics and exported to Excel for analysis. The data were analyzed using an inductive content synthesis approach, whereby the content of the data informed the findings (rather than a pre-existing framework). Each open-ended question was analyzed independently, with the researchers first applying codes that described the key concepts within the content. They then determined how many times each concept had been reported and identified supporting quotes. One researcher coded all the data, with a second researcher independently double coding a subset (27%) of the data. Inter-coder reliability was calculated to assess the agreement rate. The results are presented in the form of descriptions, supporting quotes, and frequencies.

3. Results

Responses were received from 142 pharmacists, of which 74 also provided complete demographic information (Fig. 1). The sample constituted 3.5% of eligible pharmacists in New Zealand when considering the practicing pharmacist workforce.[31] These pharmacists were primarily female (70%) and worked in the community (64%) (Table 1). Of the wider sample (N = 142), 25% of pharmacists were 'very familiar' with bio-originators,

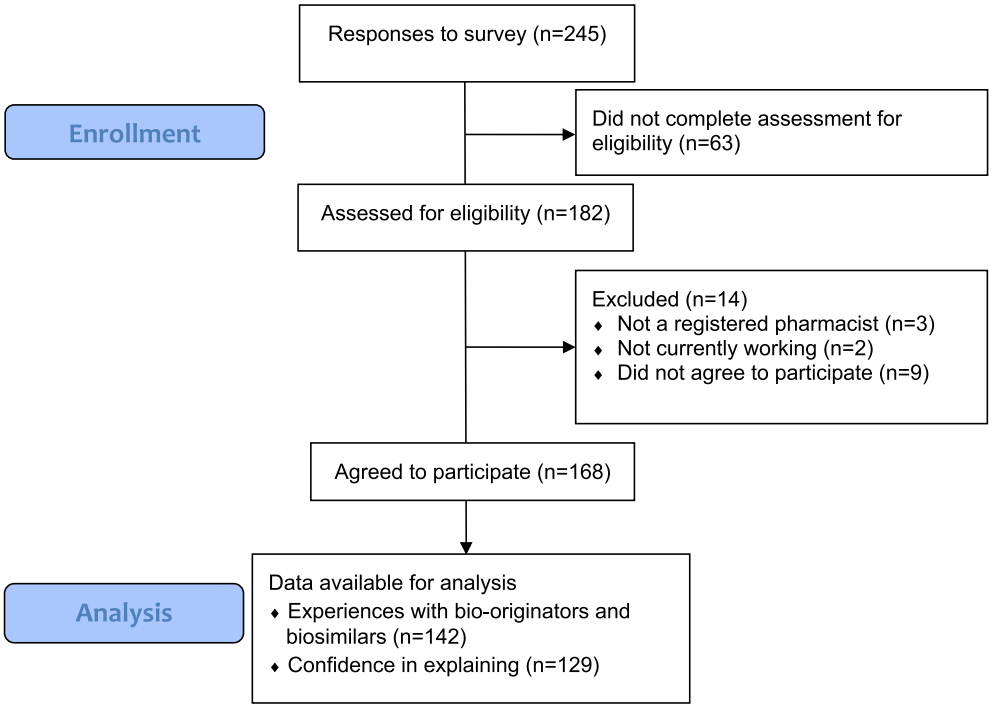

Fig. 1. Study flow.
Note. The data available for analysis differs from the number who agreed to participate due to dropout during the survey or incomplete responses.

Table 1
Demographic characteristics of the sample.

	Community	Hospital	Primary Care	All Settings
	(*n* = 47)	(*n* = 16)	(*n* = 11)	(*n* = 74)
Age category				
<30	18 (38)	6 (38)	1 (9)	25 (34)
31–40	10 (21)	4 (25)	3 (27)	17 (23)
41–50	6 (13)	2 (13)	4 (36)	12 (16)
51–60	8 (17)	4 (25)	2 (18)	14 (19)
61–65+	5 (11)	–	1 (9)	6 (8)
Gender				
Male	17 (36)	4 (25)	1 (9)	22 (30)
Female	30 (64)	12 (75)	10 (91)	52 (70)
Ethnicity				
NZ European	29 (62)	11 (69)	8 (73)	48 (65)
Other	9 (19)	4 (25)	3 (27)	16 (22)
Chinese	4 (9)	1 (6)	–	5 (7)
Indian	5 (11)	–	–	5 (7)
Education				
Undergraduate	40 (85)	4 (25)	3 (27)	47 (64)
Postgraduate	7 (15)	12 (75)	8 (73)	27 (37)
Employment status				
Part-time (≤29 h)	1 (2)	4 (25)	4 (36)	9 (12)
Full-time (≥30 h)	46 (98)	12 (75)	7 (64)	65 (88)
Years Working, mean (SD)	16.3 (14.4)	16.3 (12.2)	23.3 (9.7)	17.4 (13.4)
Worked overseas				
UK	6 (50)	4 (50)	6 (75)	16 (57)
Other	3 (25)	–	1 (13)	4 (14)
Australia and UK	–	2 (25)	1 (13)	3 (11)
Southern Africa	2 (17)	1 (13)	–	3 (11)
Australia	1 (8)	1 (13)	–	2 (7)

Note. NZ = New Zealand; UK = United Kingdom. *n* = 28 reported working overseas and answered this question. Values are counts (%) unless otherwise noted.

most (66%) had a basic understanding, and only 9% could not define or had not heard of them. Most (82%) also had a lot or some experience with bio-originators, with 93% having previously dispensed bio-originators. On average, bio-originators were dispensed 8.7 (SD = 12.9) times a week. For biosimilars, only 11% of pharmacists were 'very familiar,' 70% had a basic understanding, and 19% could not define or had not heard of them. Over half had a lot or some experience with biosimilars (66%), with 80% having previously dispensed biosimilars. On average, biosimilars were dispensed 4.8 (SD = 11.7) times a week. Pharmacists were more confident dispensing bio-originators than biosimilars (mean = 7.6, *SD* = 1.9 versus mean = 6.8, *SD* = 2.2).

3.1. Concerns about biosimilars

Of the pharmacists who responded (*n* = 100), most were concerned about reduced efficacy (44%) (e.g., loss of disease control) and safety (26%), including side effects and risk for adverse reactions (immunogenicity) (Fig. 2). Some (17%) had concerns about their lack of knowledge, particularly when educating patients and providing support during the transition. Similarly, 16% had concerns about patients and providers not accepting the change. This included anticipating resistance due to cost driving the transition and the originator being life-changing.

3.2. Confidence in educating patients

Around half (*n* = 72, 51%) of the sample (*n* = 142) reported previously answering patients' questions about bio-originators. From those who responded (*n* = 54), pharmacists educated patients on bio-originators on average 1.8 (*SD* = 2.8, range 0.2–20) times a week. A smaller group had answered questions about biosimilars (*n* = 60, 42%). From those who responded (*n* = 46), pharmacists educated patients on biosimilars on average 1.7 (*SD* = 1.6, range 0.5–10) times a week. Pharmacists were most confident in explaining the process of administering biosimilars, the cost-saving potential of biosimilars, and efficacy (Table 2). The least confidence was reported in relation to explaining the manufacturing process and testing (e.g., non-clinical assessments and clinical trials).

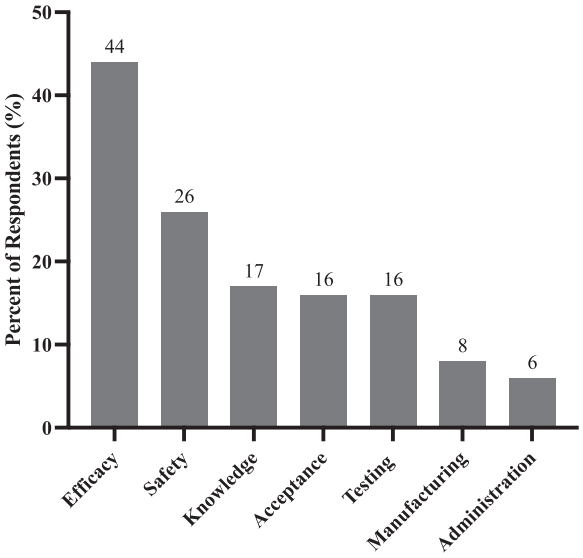

Fig. 2. Common concerns that pharmacists reported about biosimilars (*n* = 100).

A hierarchical multiple linear regression was conducted to identify whether pharmacist characteristics are associated with more confidence in educating patients on biosimilars. The first model with pharmacist demographics was non-significant ($F(4, 67) = 1.40$, $p = .24$, $R^2 = 0.08$). Only educational attainment was a significant predictor, with pharmacists who had completed a postgraduate study (e.g., Masters or Ph.D.) reporting more confidence than those without a postgraduate degree (B = 9.32, $p = .030$). Years working, age and gender were not significant (all *p*'s > 0.05). The fully adjusted model was significant ($F(7, 64) = 9.00$, $p < .001$, $R^2 = 0.50$). Having more positive attitudes towards biosimilars (B = 1.64, $p < .001$) and being more familiar with biosimilars (B = 27.15, $p < .001$) were significantly associated with more confidence. Years working, educational attainment, gender, age, and experience with answering questions about biosimilars were not significant (all *p*'s > 0.05).

3.3. Educating patients and companions about biosimilars

Pharmacists responded to various open-ended questions assessing the information they would provide in response to common queries from patients and their companions and resources that they may require to support their practice. When coding the open-ended data, the two coders reached a raw agreement rate of 87.7%. For those who responded (*n* = 102), most

Table 2
Pharmacists' confidence in explaining key concepts.

Confidence	Community	Hospital	Primary Care	Full Sample
	(*n* = 47)	(*n* = 16)	(*n* = 11)	(*n* = 129)
Safety	6.0 (2.6)	7.3 (2.3)	7.2 (2.2)	6.3 (2.4)
Side effects	6.1 (2.3)	6.8 (2.1)	6.9 (2.1)	6.0 (2.3)
Efficacy	5.9 (2.4)	7.2 (2.3)	7.3 (2.1)	6.4 (2.4)
Manufacturing	4.2 (2.8)	5.9 (2.7)	5.3 (2.6)	4.6 (2.7)
Regulatory and approval	6.1 (2.9)	6.6 (2.8)	6.3 (2.8)	5.7 (2.9)
Drug administration	6.6 (3.1)	7.3 (2.5)	7.3 (2.2)	6.6 (2.9)
Process of immune modulation	5.8 (2.8)	6.1 (2.2)	6.5 (2.4)	5.7 (2.6)
Cost-saving	5.8 (2.8)*	7.8 (2.4)*	7.0 (2.5)	6.4 (2.8)
Testing	4.8 (3.0)	5.4 (2.8)	6.5 (3.7)	4.9 (2.9)
Total score	51.3 (21.6)	60.4 (16.5)	60.1 (18.4)	52.6 (19.9)

* Denotes significant difference ($p < .05$). Values are mean (SD).

reported that safety information (e.g., side effects) (67%) and outcomes in relation to disease control (60%) were the most important for patients and their companions to know. Practical information, including the process of administering biosimilars, using the new device, storage, and disposal, were also important (38%), along with the biosimilar's mechanism of action (14%). Pharmacists (15%) also noted that companions should be advised to monitor patients by watching for disease destabilization or adverse drug reactions.

3.3.1. Defining biosimilars

Pharmacists were asked to define a biosimilar and whether there are any differences to the bio-originator (Table 3). Of those who responded (n = 72), some emphasized that the biosimilar was the same (22%) or similar (31%) to the bio-originator. A small group (6%) acknowledged not having enough knowledge. Pharmacists provided reassurance that the biosimilar has the same or similar effects (47%), active ingredients (35%), safety and side effects (19%), and mechanism of action (17%). However, some (42%) noted the change in brand, discussed the manufacturing process (28%), or stated that the device might not look identical (11%). Two pharmacists (3%) provided an analogy, with one stating, "*Think the same OLED TV with same functions, but one is made by Panasonic and the other Samsung.*"

3.3.2. Benefits of biosimilars

Of the pharmacists who reported the benefits of biosimilars (n = 75), the majority (88%) mentioned that cost-savings could be enabled for Pharmac and the healthcare system, with no changes to efficacy and safety (Table 4). This was expected to improve access to biosimilars and other/new medications (67%). Some (9%) mentioned improved drug administration as the new device could be easier to use and less painful as it has a citrate-free buffer. A minority (4%) also explained that administrative processes would be simplified for doctors, given that there would be no need for as frequent special authority renewals.

3.3.3. Efficacy

Pharmacists were asked to respond to a question on whether the biosimilar would work the same. Of the pharmacists who responded (n = 70), most (80%) would reassure patients that the biosimilar works in the same way as the bio-originator. A small group reported they were uncertain (11%), the biosimilar would work in a similar way (7%), and one (1%) stated the biosimilar might work better. Some pharmacists also reported information about the biosimilar's extensive testing (24%) or warned about possible side effects (e.g., immune reactions) (6%). Some respondents asked patients to monitor for new responses and requested they contact them if concerned (11%).

3.3.4. Safety

Seventy pharmacists responded to the question about experiencing new side effects and biosimilar testing and clinical trials. Over half (60%) stated that the biosimilar's side effects would be the same or similar to the bio-originator. Smaller groups also stated that there would be new side effects (14%), all patients respond differently (13%), or they were unsure (6%). While most pharmacists provided reassurance that biosimilars had been tested before use (70%), some incorrectly stated the tests conducted were the same for bio-originators and biosimilars (19%). Other common information included that biosimilars had gained regulatory approval (21%), who to contact if side effects occurred (19%), and to monitor for side effects (10%).

Table 3
The information that pharmacists would provide when asked to define biosimilars (n = 72).

Content	N (%)	Example quotes
Same effects	34 (47)	It has been produced to have very similar effects.
Different brand	30 (42)	Amgevita is a biosimilar, which is essentially another brand of your Humira.
Ingredients	25 (35)	The active ingredient is the same.
Manufacturing	20 (28)	They are not exactly same, because the original medicine is naturally sourced, it is very big and complex, which makes it hard to copy exactly.
Safety (side effects)	14 (19)	Will likely have the same side effects.
Action	12 (17)	It does the same job in the same way.
Look and feel	8 (11)	Change in presentation (e.g., the device, colors).

Table 4
Information pharmacists would provide when asked to describe the benefits of taking biosimilars (n = 75).

Benefit	N (%)	Example quotes
Cost-savings	66 (88)	It means that Pharmac has some savings and can allocate extra costs to other medicines that may be newer or more effective for other conditions and other cancers to increase access to medicines for other patients.
Access to medication	50 (67)	Changing to this medication will mean more patients can access this treatment.
Improved drug administration	7 (9)	In the case of Amgevita, unlike Humira, it is citrate-free, so we expect it to be more comfortable to inject.
Simplified administrative processes	3 (4)	It will also mean that you no longer have to harass your Dr. for renewing the Special Authority as frequently and having to wait for renewal.

3.4. Resources

Pharmacists reported which resources or information would help them better provide education on biosimilars. Of those who responded (n = 92), most (82%) wanted written documents such as brochures, booklets, information sheets, or pamphlets to help them educate patients and their companions (Fig. 3). Documents were suggested to provide basic, jargon-free information about biosimilars, a comparison of both brands, and responses to common questions. Other resources included websites (27%) and brief videos (10%) for pharmacists and patients (e.g., demonstrating drug administration). Pharmacists also wanted a demo device to show patients (4%) and to refer patients to other support, including Patient Support Programs from the manufacturer (4%). Lastly, some (3%) wanted pharmacist-specific training, such as webinars. Pharmacists (26%) wanted information from reputable sources, including Pharmac, Medsafe, Best Practice Advocacy Centre New Zealand (BPAC), New Zealand Formulary (NZF), Health Navigator, or MIMS.

4. Discussion

Pharmacists play an essential role in educating patients and their companions about biosimilars. In the present study, pharmacists had less experience and knowledge with biosimilars than bio-originators. While

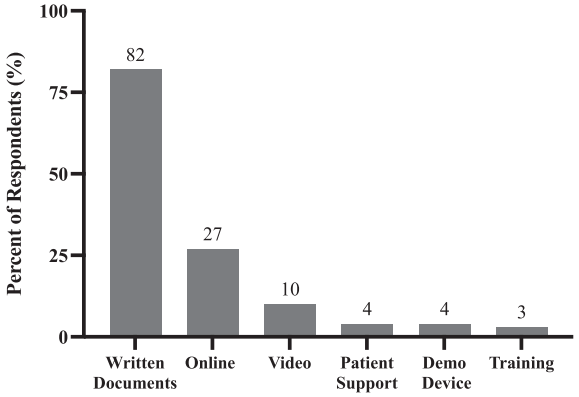

Fig. 3. Resources pharmacists want to improve their knowledge and ability to educate patients (n = 92).

common concerns included reduced efficacy and safety, some were worried about their lack of knowledge and patients and providers resisting the brand change. Pharmacists were most confident in explaining the process of administering biosimilars, cost-savings, and efficacy. The lowest confidence was in relation to the manufacturing processes and testing. Pharmacists who were confident in explaining key concepts were more familiar with and had more positive attitudes towards biosimilars. Varying confidence and levels of knowledge were also identified in how pharmacists would explain key concepts. Pharmacists reported wanting more resources from reputable sources to educate themselves and patients, including written (e.g., pamphlets, information sheets) and web-based resources.

Results from this study are consistent with previous research demonstrating that pharmacists globally require continued education on biosimilars.[14,17–20,34] However, the findings also contribute to the existing literature by demonstrating which resources pharmacists prefer to support their practice. As evident in our sample, pharmacists were generally less familiar with biosimilars, lacked knowledge about development and manufacturing processes, and some did not feel sufficiently trained to counsel patients.[14,19,20,35] Similar findings are evident among prescribers, including in New Zealand, where medical specialists have expressed uncertainty about biosimilar quality and manufacturing processes.[32,36] A lack of knowledge and uncertainty may unintentionally convey low confidence in the biosimilar to patients but can also negatively influence prescribing behaviors.[19] Findings also build on existing research by demonstrating that various characteristics (familiarity and positive perceptions) are associated with more confidence in communicating key concepts. It is likely that pharmacists with more knowledge about biosimilars hold more positive perceptions and are, therefore, more confident in providing education.[37] Similarly, more experiences with biosimilars, such as those who regularly educate patients, are likely to translate to more confidence. These findings should be considered when developing future biosimilar transitioning programs, as a lack of knowledge and confidence can unintentionally promote misinformation and disparagement about biosimilars and increase patient hesitancy.[7,10]

Responses to the open-ended questions illustrated variance in how pharmacists would explain key concepts to patients. While some pharmacists focused on providing reassurance on comparable safety and efficacy, other responses confirmed gaps in knowledge or common misunderstandings. For example, some incorrectly stated that the biosimilar was the same as the bio-originator (rather than similar), may work better, and the tests conducted were the same as for the bio-originator. Incomplete and incorrect information should be countered by the provision of additional education that is easily assessable.[7] Some pharmacists also noted the importance of patients monitoring for adverse effects and indicated that companions should be advised on which side effects to look for. This information may unintentionally increase negative expectations and awareness of new symptoms.[23] Ultimately, symptom reporting may be exacerbated, and non-specific symptoms may be misattributed to the new drug.[38]

The study findings have important clinical implications. It is evident that pharmacists would benefit from more resources and guidance in educating patients and their companions on biosimilars. This is particularly important as a high portion of pharmacists had already dispensed and answered questions about biosimilars, but a large group also lacked familiarity or could not define them. Educating pharmacists is important as some patients transitioning to Amgevita in the United Kingdom reported dissatisfaction with the information, and this was associated with more side effects, difficulty in using the new device, and negative perceptions about symptom control.[39] The results also pose an important question of where the responsibility falls to ensure pharmacists are sufficiently informed. A coordinated approach to sharing information is essential before a medicine brand changes to ensure pharmacists and other healthcare providers obtain up-to-date and balanced information on newly funded pharmaceuticals. However, the responsibility of sharing information about biosimilars should not be restricted to healthcare providers (e.g., physicians, nurses, and pharmacists). Instead, regulatory and pharmaceutical funding agencies, professional medical organizations, patient advocacy associations, and formal educational institutions (including continued professional development) should also play a role in upskilling providers. Nonetheless, pharmacists also have some degree of individual responsibility to identify and seek to fill their gaps in knowledge.

This study had several strengths, including the high intercoder reliability. Open-ended questions demonstrated how pharmacists would explain key concepts about biosimilars while further highlighting gaps in knowledge and attitudes towards biosimilars beyond self-report items. The data were also collected before and during the early months of the transition to Amgevita. During these stages, pharmacists were still largely inexperienced with Amgevita, but it allowed them to identify their information needs. An evaluation study is needed following the completion of the transition to Amgevita to identify areas for improvement.

A key limitation was the modest sample, which may not have been representative and limited the reliability of the hierarchical regression. The low response was likely due to the increased workload from the COVID-19 pandemic, as pharmacists were required to administer COVID-19 tests and vaccinations. This may also explain the high dropout rate throughout the survey, as the questionnaire was relatively short. While an effort was made to distribute the survey to all pharmacists in New Zealand, it is also not possible to identify the exact reach of the survey, such as how many saw the social media posts or read the email. This would be useful for future research to identify effective recruitment methods and ensure a representative sample. A lack of general knowledge and experience with biosimilars may have impacted the response rate, as those without much knowledge might have elected not to participate. However, it was not possible to continue collecting data, as pharmacists would have gained more experience during further stages of the transition to Amgevita. Further, not all participants reported their demographic information, possibly due to the nature of the topic. More research, especially with larger samples, is needed following the transition to Amgevita to identify whether pharmacists still require additional training. A focus is also needed on the development and assessment of educational initiatives.

The present study is the first to specifically explore pharmacists' confidence in educating patients and their companions on biosimilars, with previous research primarily focusing on identifying gaps in knowledge. Findings demonstrate that pharmacists have concerns about their lack of knowledge, along with reductions in efficacy and safety. Pharmacists are least confident in explaining the testing and manufacturing of biosimilars, and the most confident in explaining how biosimilars are administered, their efficacy, and cost-saving. Those who were more familiar with biosimilars and had positive attitudes were more confident in educating patients. Pharmacists provided varying explanations about biosimilars, but responses also demonstrated gaps in understanding. Pharmacists would benefit from additional resources to support their practice. Resources should include written and web-based information developed by reputable sources covering the testing of biosimilars and manufacturing processes.

Availability of data and materials

The data and materials that support the findings of this study are available from the corresponding author upon reasonable request.

Ethics approval

Ethics approval was obtained from the Auckland Health Research Ethics Committee (AH23564). The study was performed in accordance with the ethical standards of the Declaration of Helsinki.

Consent to participate and publish

All participants provided informed consent.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rcsop.2022.100199.

References

1. US Food and Drug Administration. Biosimilar and interchangeable products. https://www.fda.gov/drugs/biosimilars/biosimilar-and-interchangeable-products 2017.
2. European Medicines Agency. Biosimilar medicines: Overview. https://www.ema.europa.eu/en/human-regulatory/overview/biosimilar-medicines-overview.
3. Jacobs I, Singh E, Sewell KL, Al-Sabbagh A, Shane LG. Patient attitudes and understanding about biosimilars: an international cross-sectional survey. Patient Prefer Adherence 2016;10:937–948. https://doi.org/10.2147/PPA.S104891.
4. Peyrin-Biroulet L, Lonnfors S, Roblin X, Danese S, Avedano L. Patient perspectives on biosimilars: a survey by the European Federation of Crohn's and ulcerative colitis associations. J Crohns Colitis 2017;11:128–133. https://doi.org/10.1093/ecco-jcc/jjw138.
5. Kovitwanichkanont T, Raghunath S, Wang D, et al. Who is afraid of biosimilars? Openness to biosimilars in an Australian cohort of patients with rheumatoid arthritis. Intern Med J 2020;50:374–377. https://doi.org/10.1111/imj.14753.
6. Vandenplas Y, Simoens S, Van Wilder P, Vulto AG, Huys I. Informing patients about biosimilar medicines: the role of European patient associations. Pharmaceuticals (Basel) 2021:14. https://doi.org/10.3390/ph14020117.
7. Cohen HP, McCabe D. The importance of countering biosimilar disparagement and misinformation. BioDrugs 2020;34:407–414. https://doi.org/10.1007/s40259-020-00433-y.
8. Peyrin-Biroulet L, Danese S, Cummings F, et al. Anti-TNF biosimilars in Crohn's disease: a patient-centric interdisciplinary approach. Expert Rev Gastroenterol Hepatol 2019;13:731–738. https://doi.org/10.1080/17474124.2019.1645595.
9. Scherlinger M, Langlois E, Germain V, Schaeverbeke T. Acceptance rate and sociological factors involved in the switch from originator to biosimilar etanercept (SB4). Semin Arthritis Rheum 2019;48:927–932. https://doi.org/10.1016/j.semarthrit.2018.07.005.
10. Oskouei ST, Kusmierczyk AR. Biosimilar uptake: the importance of healthcare provider education. Pharmaceut Med 2021. https://doi.org/10.1007/s40290-021-00396-7.
11. Gall S, Kiltz U, Kobylinski T, et al. *What do patients know about biosimilars and how satisfied are they with the educational process? – A systematic comparison between rheumatologists and nurse specialists, including effects of multiswitching.* American College of Rheumatology. 2021.
12. Petit J, Antignac M, Poilverd RM, et al. Multidisciplinary team intervention to reduce the nocebo effect when switching from the originator infliximab to a biosimilar. RMD Open 2021:7. https://doi.org/10.1136/rmdopen-2020-001396.
13. Armuzzi A, Avedano L, Greveson K, Kang T. Nurses are critical in aiding patients transitioning to biosimilars in inflammatory bowel disease: education and communication strategies. J Crohns Colitis 2019;13:259–266. https://doi.org/10.1093/ecco-jcc/jjy150.
14. Arnet I, Verbeek M, Almarsdóttir Anna B, et al. Community pharmacists' preparedness for substituting biologics and dispensing biosimilars – lessons learned from a multinational survey. Explor Res Clin Soc Pharm 2021:4. https://doi.org/10.1016/j.rcsop.2021.100084.
15. Aladul MI, Fitzpatrick RW, Chapman SR. Differences in UK healthcare professionals' knowledge, attitude and practice towards infliximab and insulin glargine biosimilars. Int J Pharm Pract 2019;27:214–217. https://doi.org/10.1111/ijpp.12485.
16. Pawlowska I, Pawlowski L, Krzyzaniak N, Kocic I. Perspectives of hospital pharmacists towards biosimilar medicines: a survey of polish pharmacy practice in general hospitals. BioDrugs 2019;33:183–191. https://doi.org/10.1007/s40259-019-00341-w.
17. Okoro RN, Hedima EW, Aguiyi-Ikeanyi CN. Knowledge, attitudes, and practices of pharmacists toward biosimilar medicines in Nigeria. J Am Pharm Assoc 2021. https://doi.org/10.1016/j.japh.2021.09.014.
18. Sani NM, Aziz Z, Panickar R, Kamarulzaman A. Pharmacists' perspectives of biosimilars: a systematic review. BioDrugs 2022;36:489–508. https://doi.org/10.1007/s40259-022-00541-x.
19. Barbier L, Vandenplas Y, Simoens S, Declerck P, Vulto AG, Huys I. Knowledge and perception of biosimilars in ambulatory care: a survey among Belgian community pharmacists and physicians. J Pharm Pol Pract 2021;14:53. https://doi.org/10.1186/s40545-021-00330-x.
20. Beck M, Michel B, Rybarczyk-Vigouret MC, et al. Knowledge, behaviors and practices of community and hospital pharmacists towards biosimilar medicines: results of a French web-based survey. MAbs 2017;9:383–390. https://doi.org/10.1080/19420862.2016.1267087.
21. Smith LE, Webster RK, Rubin GJ. A systematic review of factors associated with side effect expectations from medical interventions. Health Expect 2020;23:731–758. https://doi.org/10.1111/hex.13059.
22. Nestoriuc Y, von Blanckenburg P, Schuricht F, et al. Is it best to expect the worst? Influence of patients' side effect expectations on endocrine treatment outcome in a 2-year prospective clinical cohort study. Ann Oncol 2016;27:1909–1915. https://doi.org/10.1093/annonc/mdw266.
23. Kravvariti E, Kitas GD, Mitsikostas DD, Sfikakis PP. Nocebos in rheumatology: emerging concepts and their implications for clinical practice. Nat Rev Rheumatol 2018;14:727–740. https://doi.org/10.1038/s41584-018-0110-9.
24. Gasteiger C, Jones ASK, Kleinstäuber M, et al. Effects of message framing on patients' perceptions and willingness to change to a biosimilar in a hypothetical drug switch. Arthritis Care Res 2020;72:1323–1330. https://doi.org/10.1002/acr.24012.
25. Kleinstauber M, Colgan S, Petrie KJ. Changing understanding, perceptions, pain relief of and preference for generic medicines with patient education: an experimental intervention study. Res Social Adm Pharm 2021;17:1288–1299. https://doi.org/10.1016/j.sapharm.2020.09.014.
26. Gasteiger C, den Broeder AA, Stewart S, et al. The mode of delivery and content of communication strategies used in mandatory and non-mandatory biosimilar transitions: a systematic review with meta-analysis. Health Psychol Rev 2021:1-21. https://doi.org/10.1080/17437199.2021.1970610.
27. Medsafe. *Medsafe position on biosimilars.* 2014.
28. New Zealand Formulary (NZF). New Zealand formulary NZF v123. http://www.nzf.org.nz.Accessed September, 2022.
29. Cumming J, Mays N, Daubé J. How New Zealand has contained expenditure on drugs. BMJ 2010:340. https://doi.org/10.1136/bmj.c2441.
30. PHARMAC. Decision to widen access to adalimumab and award Principal Supply. https://pharmac.govt.nz/news-and-resources/consultations-and-decisions/2021-11-17-decision-to-widen-access-to-adalimumab-and-award-principal-supply/.
31. Pharmacy Council. Workforce Demographic. https://pharmacycouncil.org.nz/ 2021.
32. Hemmington A, Dalbeth N, Jarrett P, et al. Medical specialists' attitudes to prescribing biosimilars. Pharmacoepidemiol Drug Saf 2017;26:570–577. https://doi.org/10.1002/pds.4186.
33. Gasteiger C, Scholz U, Petrie KJ, Dalbeth N. A bio-what? Medical companions' perceptions towards biosimilars and information needs in rheumatology. Rheumatol Int 2021. https://doi.org/10.1007/s00296-021-05037-5.
34. Pasina L, Casadei G, Nobili A. A survey among hospital specialists and pharmacists about biosimilars. Eur J Intern Med 2016;35:e31–e33. https://doi.org/10.1016/j.ejim.2016.07.010.
35. Adé A, Bourdon O, Bussières JF. A survey of pharmacists' knowledge and views of biosimilars in Quebec and France. Ann Pharm Fr 2017;75:267–275.
36. Sarnola K, Merikoski M, Jyrkka J, Hameen-Anttila K. Physicians' perceptions of the uptake of biosimilars: a systematic review. BMJ Open 2020;10, e034183. https://doi.org/10.1136/bmjopen-2019-034183.
37. Poon SY, Hsu JC, Ko Y, Chiang SC. Assessing knowledge and attitude of healthcare professionals on biosimilars: a national survey for pharmacists and physicians in Taiwan. Healthcare (Basel) 2021:9. https://doi.org/10.3390/healthcare9111600.
38. Petrie KJ, Rief W. Psychobiological mechanisms of placebo and nocebo effects: pathways to improve treatments and reduce side effects. Annu Rev Psychol 2019;70:599–625. https://doi.org/10.1146/annurev-psych-010418-102907.
39. Kaneko K, Prieto-Alhambra D, Jacklin C, et al. Influence of information provided prior to switching from Humira to biosimilar adalimumab on UK patients' satisfaction: a cross-sectional survey by patient organisations. BMJ Open 2022;12, e050949. https://doi.org/10.1136/bmjopen-2021-050949.