United European Gastroenterology Journal

WILEY | ueg journal

ORIGINAL ARTICLE OPEN ACCESS

Understanding Patient and Gastroenterologist Preferences at the Time of Treatment Escalation to First-Line Advanced Therapy in Ulcerative Colitis: A Discrete Choice Experiment in Five European Countries

Stefan Schreiber[1] | Alissa Walsh[2] | Peter Hur[3] | Laura Panattoni[4] | Brett Hauber[3] | Natalie Land[4] | Josh Coulter[3] | Grace Gahlon[4] | Karolina Wosik[5] | Joseph C. Cappelleri[6] | Melissa Culhane Maravic[4] | Xiang Guo[7] | Anthony Buisson[8,9]

[1]Department of Internal Medicine I, University Hospital Schleswig-Holstein, Kiel University, Kiel, Germany | [2]Translational Gastroenterology and Hepatology Unit, Oxford University Hospital, Oxford, UK | [3]Pfizer Inc, New York, New York, USA | [4]Precision AQ, New York, New York, USA | [5]Pfizer Canada, Kirkland, Quebec City, Canada | [6]Pfizer Inc, Groton, Connecticut, USA | [7]Pfizer Inc, Collegeville, Pennsylvania, USA | [8]Université Clermont Auvergne, Inserm, 3iHP, CHU Clermont-Ferrand, Service d'Hépato-Gastroentérologie, Clermont-Ferrand, France | [9]Université Clermont Auvergne, Inserm U1071, M2iSH, USC-INRA 2018, Clermont-Ferrand, France

Correspondence: Peter Hur (Peter.Hur@pfizer.com)

Received: 17 October 2025 | **Revised:** 9 February 2026 | **Accepted:** 25 April 2026

Keywords: advanced therapy | discrete choice experiment | gastroenterologist preference | inflammatory bowel disease | patient preference | ulcerative colitis

ABSTRACT

Background: With guidelines recommending earlier advanced therapy (AT) use after 5-ASA failure for patients with moderately-to-severely active ulcerative colitis (UC), it is important to explore treatment preferences at the point of escalation to first-line AT.

Methods: A web-based discrete choice experiment (DCE) survey was administered to AT-naïve patients with moderately-to-severely active UC and gastroenterologists in 5 European countries. Treatment attributes included time until symptom improvement, probability of remission and corticosteroid-free remission, risks of cancer, serious infection, and major adverse cardiovascular events (MACE), and mode of administration. Preference weights, relative attribute importance (RAI), and maximum acceptable risk were estimated. A latent class analysis explored preference heterogeneity.

Results: Probability of remission at 1 year was the most important attribute for patients ($N = 514$; RAI = 45.3%) and gastroenterologists ($N = 397$; RAI = 48.5%). Five-year cancer risk was the second most important attribute for patients (RAI = 11.8%) and third for gastroenterologists (RAI = 10.9%). RAI of MACE was higher for patients than gastroenterologists (10.6% vs. 6.8%). Both were willing to accept risks for increased probability of remission. Latent class analysis identified 4 groups of patients and 2 groups of gastroenterologists with distinct preferences. The relative importance of efficacy was higher compared with safety in latent classes representing 80% of patients.

Conclusion: Clinical remission was most important to patients and gastroenterologists, and both were willing to accept some risk in exchange for the benefits of AT. However, some heterogeneity in preferences was observed. To support patient-centered, guideline-concordant care, gastroenterologists should discuss escalation to AT with patients not well-controlled on conventional therapy, incorporating individual preferences through shared decision-making.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2026 Pfizer Inc. *United European Gastroenterology Journal* published by Wiley Periodicals LLC on behalf of United European Gastroenterology.

Key Summary

- Summarize the established knowledge on this subject.
  - While guidelines recommend earlier use of advanced therapy (AT) after 5-ASA failure for patients with moderately-to-severely active ulcerative colitis (UC), evidence suggests that escalation to AT may often be delayed.
  - Factors including treatment-related characteristics and patient-specific characteristics may influence AT treatment decisions.
  - Current evidence on AT treatment preferences in UC is limited, specifically in the context of first-line AT.
- What are the significant and/or new findings of this study?
  - Using a discrete choice experiment, we found that both patients and gastroenterologists were willing to accept some risk in exchange for the benefits of AT.
  - Efficacy, specifically clinical remission, was the primary factor in treatment decision-making for 80% of patients, while 20% prioritized risks.
  - Variation in preferences within and between patients and gastroenterologists was observed.
  - Shared decision-making should be utilized in clinical practice to understand individual-level preferences and risk tolerances, personalize treatment choices, and support patient-centered, guideline-concordant care.

1 | Introduction

Ulcerative colitis (UC) is characterized by chronic inflammation of the intestinal mucosa leading to increased stool frequency, rectal bleeding, impaired quality of life, and increased risk of colorectal cancer [1]. Primary therapeutic targets in UC include induction and maintenance of remission and corticosteroid (CS)-free remission to prevent disease progression and reduce dependence on steroids [2]. For patients with moderately-to-severely active UC, guidelines recommend early introduction of advanced therapies (ATs) rather than gradual prolonged step-up therapy with repeated rounds of CS after 5-aminosalicylate (5-ASA) failure [3]. However, safety warnings associated with certain ATs, including infection, major adverse cardiovascular events (MACE), and cancers, need to be considered [4].

While the expanding AT landscape with multiple mechanisms of action, and varying efficacy, safety, and administration profiles allows for more personalized treatment plans that incorporate individual needs, responses, and preferences, evidence suggests that escalation to AT may often be delayed [5]. Factors including treatment-related characteristics and patient-specific characteristics such as disease severity, comorbidities, and treatment history may influence AT treatment decisions [3].

Current evidence on AT treatment preferences in UC is limited, specifically in the context of first-line AT for patients with moderately-to-severely active UC. Further, few studies have assessed gastroenterologist preferences in UC [6, 7] or compared them with patient preferences [7]. In light of guideline recommendations for earlier use of AT, and as more treatment options are approved, a better understanding of the factors driving treatment choice when patients transition to AT is needed to help facilitate shared decision-making and strengthen patient compliance [8]. This is especially true for key therapeutic endpoints including remission and CS-free remission and critical adverse events related to AT treatment, including infection, MACE, and cancers.

To further explore preferences for AT initiation in UC, this study utilized a discrete choice experiment (DCE) survey in 5 European countries to assess patients' and gastroenterologists' preferences for AT attributes and to quantify benefit-risk trade-offs.

2 | Methods

2.1 | Survey Development

The DCE was designed following the International Society for Pharmacoeconomics and Outcomes Research guidelines [9]. Supporting Information S1: Appendix 1 details the DCE attribute (i.e., treatment characteristic) and level selection process informed by UC treatments and available clinical data (Supporting Information S1: Appendix Table 1) [26–36]. A total of 7 attributes were included: (1) Time until symptom improvement; (2) Probability of remission after 1 year; (3) Probability of CS-free remission after 1 year; (4) 5-year risk of cancer; (5) Annual risk of serious infection; (6) Annual risk of MACE; and (7) Mode and frequency of administration (Figure 1). Use of the term remission specifically refers to clinical remission. Appendix 2 includes a description of the DCE decision context.

The D-efficiency criterion determined 36 choice tasks was optimal [9]. To reduce respondent burden, respondents were randomly assigned to one of 3 blocks of 12 choice tasks. Attribute levels were varied across choice tasks according to a fractional factorial design generated using `AlgDesign' [10].

The survey included additional questions to capture respondent background characteristics. The survey was professionally translated and offered in each country's respective language. Survey pretesting was conducted with 8 patients and 8 gastroenterologists (Supporting Information S1: Appendix 3). No major changes were made to the survey instrument based on feedback from the pretests. Prior to recruitment, all study materials were reviewed and granted exemption from full review by the Advarra Institutional Review Board (Pro00072349). This study was sponsored by Pfizer Inc.

2.2 | Data Collection

The web-based survey was administered to patients and gastroenterologists between January and April 2024. Recruitment was conducted by a third-party survey vendor (SurveyEngine) using patient and clinician databases maintained for research. Patients and gastroenterologists were recruited independently. Recruitment was double-blinded such that the study sponsor and research team did not know the identities of the participants, and the identity of the study sponsor was not provided to the

a

Patient-Facing Label	Gastroenterologist-Facing Label	Levels
Time until your symptoms begin to improve	Time until the patient's symptoms begin to improve	2 weeks 4 weeks 8 weeks 12 weeks
Chance that your UC will be in remission after 1 year of treatment	Probability of remission after 1 year of treatment	20% 35% 45%
Chance that your UC will be in remission after 1 year of treatment, without needing to use steroids to stay in remission	Probability of corticosteroid-free remission after 1 year of treatment	No difference from probability of remission 5% less than probability of remission 15% less than probability of remission
Risk of developing a cancer within 5 years after starting the treatment	5-year risk of malignancy	1 out of 1,000 3 out of 1,000 5 out of 1,000
Risk of serious infection each year while on treatment	Annual risk of serious infection	1 out of 100 3 out of 100 5 out of 100
Risk of having a major cardiovascular event each year after starting the treatment	Annual risk of a major cardiovascular event	1 out of 1,000 3 out of 1,000 5 out of 1,000
How and when you take the treatment	Mode and frequency of administration	*Patients*: Oral pill, once or twice daily, with potential for change in dose after initial phase of treatment *Gastroenterologists*: Oral pill, once or twice daily, with potential for change in dose after induction period *Patients*: Oral pill, once or twice daily, with the same dose throughout your treatment *Gastroenterologists*: Oral pill, once or twice daily, with the same dose throughout treatment Injection every 1-2 weeks, at home Infusion every 4-8 weeks, at a treatment center

FIGURE 1 | (a) Attributes and levels for the DCE. Risks represent the total risk of each event. (b) Example patient choice question. Supporting Information S1: Appendix 2 includes the specific decision context that patients and gastroenterologists were asked to consider when making treatment choices.

b

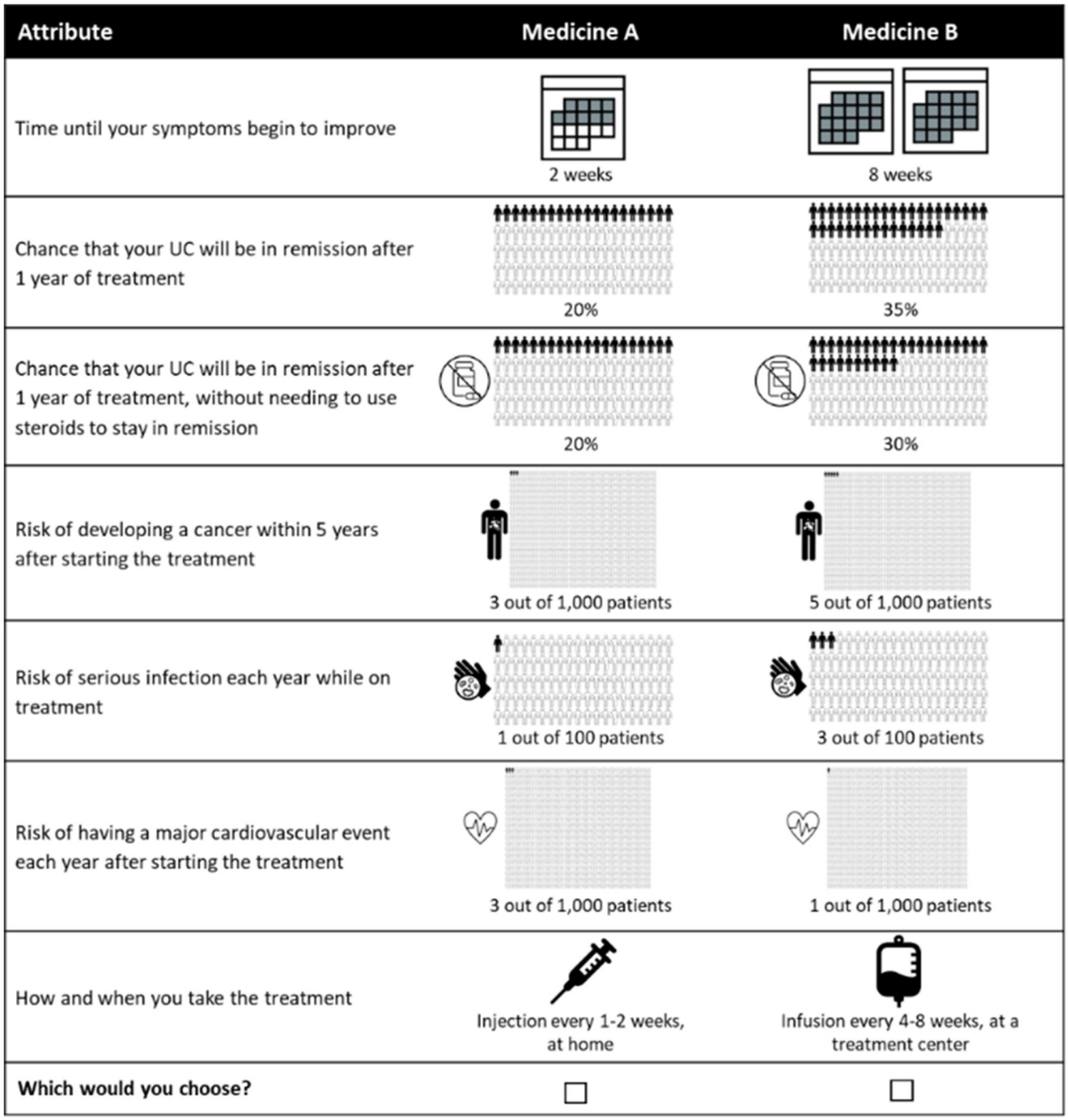


FIGURE 1 | (Continued)

participants. The target sample included 450 patients and 450 gastroenterologists (Supporting Information S1: Appendix 4) [11].

Patient inclusion criteria were: (1) aged ≥ 18 years; (2) self-reported UC diagnosis ≥ 3 months prior; (3) self-reported history of moderate or severe UC when disease was at its worst; (4) denied history of colectomy, Crohn's disease, and cancer; (5) self-reported receipt of 5-ASAs, oral corticosteroids, or immunomodulators but AT-naïve; (6) reported receipt of ≥ 1 course of oral corticosteroids if that was their only treatment; (7) was a resident of the UK, France, Germany, Italy, or Spain; and (8) provided consent. Gastroenterologist inclusion criteria were: (1) medical degree with a gastroenterology specialty; (2) ≥ 5 years of post-residency experience; (3) treatment of an average of ≥ 10 patients each month with moderately-to-severely active UC; (4) spent ≥ 50% of the time providing patient care; (5) currently practicing in the UK, France, Germany, Italy, or Spain; and (6) providing consent.

2.3 | Statistical Analysis

A random-parameter logit regression model with effects coding was used to analyze the treatment choice data and generate preference weights (i.e., latent construct quantifying the utility of each attribute level relative to all other attribute levels) for all attribute levels [12]. The remission and CS-free remission attributes were joined into a 'combined remission' attribute for analysis as CS-free remission is an added benefit to clinical remission (Supporting Information S1: Appendix 5). Relative attribute importance (RAI) was calculated as the difference in mean preference weights between the most and least preferred

level of each attribute divided by the sum of the differences such that the sum of RAI across all attributes equals 100%. Confidence intervals were bootstrapped with 10,000 replications.

The maximum acceptable level of risk (MAR) for 5-year risk of cancer, annual risk of serious infection, and annual risk of MACE was calculated to quantify acceptable benefit-risk tradeoffs and infer risk tolerance. MAR measures the largest risk of an adverse event a respondent would be willing to accept to achieve a specified improvement in efficacy. A 10 percentage-point increase in the probability of remission at 1 year was selected as the efficacy improvement based on differences seen in clinical trials (Supporting Information S1: Appendix 1). Each MAR was calculated from the linearized difference in mean preference weights across the full range of levels divided by a 1 percentage-point increase in the stated risk, assuming that all other risks are zero. Confidence intervals were estimated using the Krinsky-Robb method [13].

Preference heterogeneity was examined across country subgroups using latent class analysis. Separate latent class models were run for patients and gastroenterologists. The model identified specific classes of respondents within each sample exhibiting similar preferences. The number of latent classes was selected based on goodness of fit statistics and model interpretability (Supporting Information S1: Appendix 6). Each respondent was assigned to the class for which they had the highest probability of class membership (Supporting Information S1: Appendix 7). Preference weights and RAI were estimated for each class. Differences in characteristics across classes were examined using t-tests, chi-square tests, and Fisher exact tests [14]. All analysis was conducted in RStudio Version 4.1.1.

3 | Results

3.1 | Respondent Characteristics

Of 1824 patients and 1043 providers who responded to the study invitation, 514 patients and 397 gastroenterologists were eligible and completed the survey (Appendix 8). The majority of patients were male (56.8%) with an average age of 44 years (SD 11.6), held a university or graduate degree (73.0%), and self-reported moderately active (vs. severely active) UC when their disease was at its worst (63.2%) (Table 1). Patients reported currently taking 5-ASAs (55.1%), oral corticosteroids (35.8%), and/or immunomodulators (35.6%). Among patients who had ever taken oral corticosteroids (78.6%), half (50.2%) reported using them consistently for 3 months or more.

The majority of gastroenterologists were male (75.8%), had been in clinical practice for $>$ 10 years (76.3%), and primarily practiced in public teaching hospitals (61.2%) (Table 2). Characteristics by country subgroups are reported in Supporting Information S1: Appendices 9 and 10.

3.2 | Preference Weights and Relative Attribute Importance

There were statistically significant differences in the preference weights for nearly all attribute levels, with both patients and gastroenterologists preferring higher remission rates, faster time to symptom improvement, and lower risks of adverse events (Figure 2; Supporting Information S1: Appendix 11). The rank order of mode of administration levels was the same between patients and gastroenterologists, but the magnitude of the differences in preference weights between the levels differed. Patients preferred treatment to be administered as oral formulations when the same dose was used throughout. In contrast, preference for daily oral formulations with potential dose changes after induction was not significantly greater than that of injections every 1–2 weeks. Among gastroenterologists, preferences for daily oral formulations (same dose throughout or potential dose changes) were higher compared with injection and infusion options; however, the differences between oral formulation options and injections were not statistically significant.

While all attributes included in the DCE were important to treatment decision-making for both patients and gastroenterologists, the probability of remission (RAI = 45.3% and 48.5%, respectively) combined with CS-free remission (RAI = 8.0% and 7.9%, respectively) was most important (Figure 3). The second and third most important attributes were risks of cancer (RAI = 11.8%) and MACE (RAI = 10.6%) for patients compared with time to symptom improvement (RAI = 11.5%) and cancer risk (RAI = 10.9%) for gastroenterologists. Patients placed statistically significantly greater importance on MACE, which was the least important attribute to gastroenterologists (RAI = 10.6% vs. 6.8%, respectively). Mode of administration was the fourth most important attribute to both patients and gastroenterologists.

3.3 | Maximum Acceptable Risk

For all three adverse events, the MAR patients and gastroenterologists were willing to accept in exchange for a 10 percentage-point increase in probability of remission was greater than the highest level of risk tested in the DCE. Specifically, patients and gastroenterologists were willing to accept a 5-year risk of cancer of at least 0.5%, annual risk of MACE at least 0.5%, and annual risk of serious infection at least 5% for a 10 percentage-point increase in the probability of remission, with all other attributes were assumed to be held constant (Supporting Information S1: Appendix 12).

3.4 | Preference Heterogeneity

3.4.1 | Differences in Preferences Between Country Subgroups

Patient and gastroenterologist preferences were compared across country subgroups (Supporting Information S1: Appendices 13–18). The probability of combined remission remained the most important treatment attribute across all subgroups; however, there were differences in the RAI of time to symptom improvement and cancer risk. Among patients, oral formulations with the same dose throughout treatment was the most preferred option across all subgroups. However, gastroenterologists from the UK preferred oral formulations and injections over infusions, while the others did not have distinct preferences for any of the mode of administration levels.

TABLE 1 | Patient background characteristics.

	Patients ($N = 514$)
Age, mean (SD)	44.0 (11.6)
Country, n (%)	
UK	174 (33.9)
France	156 (30.4)
Germany	57 (11.1)
Spain	62 (12.1)
Italy	65 (12.6)
Gender, n (%)	
Female	222 (43.2)
Male	292 (56.8)
Non-binary	0 (0)
I prefer not to answer	0 (0)
Geographic region, n (%)	
Major metropolitan area	139 (27.0)
Urban area	214 (41.6)
Suburb of a large city	80 (15.6)
Small city	51 (9.9)
Rural or small town	30 (5.8)
Household income (€/£), n (%)	
< 15,000	32 (6.2)
15,001 – 30,000	38 (7.4)
30,001 – 60,000	175 (34.0)
60,001 – 90,000	150 (29.2)
90,001 – 150,000	77 (15.0)
> 150,000	39 (7.6)
I prefer not to answer	3 (0.6)
Highest level of education, n (%)	
No schooling completed	2 (0.4)
Primary education/compulsory school	9 (1.8)
Upper secondary school	51 (9.9)
Vocational/trade school	76 (14.8)
University degree	189 (36.8)
Graduate degree or higher	186 (36.2)
I prefer not to answer	1 (0.2)
Current employment status, n (%)	
Employed, full-time	276 (53.7)
Employed, part-time	74 (14.4)
Full-time homemaker or family caregiver	19 (3.7)
Not employed and seeking work	5 (1.0)
Not employed and unable to work for health reasons	15 (2.9)
On temporary medical leave	72 (14.0)
Retired	32 (6.2)
Student	17 (3.3)
Other	4 (0.8)

(Continues)

TABLE 1 | (Continued)

	Patients ($N = 514$)
UC severity, n (%)	
Moderate	325 (63.2)
Severe	189 (36.8)
Time since UC diagnosis, n (%)	
3 months – 1 year ago	30 (5.8)
1 – 3 years ago	205 (39.9)
3 – 5 years ago	156 (30.4)
5 – 10 years ago	75 (14.6)
10 or more years ago	48 (9.3)
5-ASA agents (e.g., sulfasalazine, mesalamine, olsalazine, balsalazide), n (%)	
Currently taking	283 (55.1)
Taken in the past, but not currently	183 (35.6)
Never taken	44 (8.6)
Don't know/not sure	4 (0.8)
Oral corticosteroids (e.g., prednisone, budesonide), n (%)	
Currently taking	184 (35.8)
Taken in the past, but not currently	220 (42.8)
Never taken	104 (20.2)
Don't know/not sure	6 (1.2)
Immunomodulators (e.g., azathioprine, mercaptopurine), n (%)	
Currently taking	183 (35.6)
Taken in the past, but not currently	125 (24.3)
Never taken	177 (34.4)
Don't know/not sure	29 (5.6)
Oral corticosteroid use, n (%)[a]	*[n = 404]*
Only for short period of time (~2 – 3 months at a time) when experiencing a flare/worsening symptoms	197 (48.8)
Consistently for 3 – 6 months at a time	129 (31.9)
Consistently for > 6 months at a time	74 (18.3)
Don't know/not sure	4 (1.0)
Had a UC flare in the past 12 months, n (%)	
No	92 (17.9)
Yes	422 (82.1)
Number of UC flares in the past 12 months, mean (SD)[b]	6.2 (7.9) [$n = 422$]
Ever hospitalized for UC, n (%)	
No	226 (44.0)
Yes	288 (56.0)
Ever hospitalized for UC in the past 12 months, n (%)[c]	[$n = 288$]
No	26 (9.0)
Yes	262 (91.0)
Number of hospitalizations in the past 12 months, mean (SD)[d]	4.0 (2.9) [$n = 262$]
P-SCCAI, mean (SD)[e]	4.9 (3.3)
IBD-Control, mean (SD)	
Control-8 subscore[f]	8.5 (4.9)
Control-VAS[g]	64.0 (18.3)

Abbreviations: 5-ASA, 5-aminosalicylate; IBD, inflammatory bowel disease; P-SCCAI, Patient Simple Clinical Colitis Activity Index; SD, standard deviation; UC, ulcerative colitis; UK, United Kingdom; VAS, visual analog scale.
[a]Only asked participants who reported taking oral corticosteroids currently or in the past.
[b]Only asked participants who reported having had a flare in the past 12 months.
[c]Only asked participants who had ever been hospitalized for UC.
[d]Only asked participants who reported having been hospitalized for UC in the past 12 months.
[e]Range: 0–19 (higher score reflects greater symptom severity).
[f]Range: 0–16 (0 = worst control).
[g]Range: 0–100 (0 = worst control).

TABLE 2 | Gastroenterologist background characteristics.

	Gastroenterologists (*N* = 397)
Country, n (%)	
UK	130 (32.7)
France	140 (35.3)
Germany	40 (10.1)
Spain	47 (11.8)
Italy	40 (10.1)
Years practicing gastroenterology, n (%)	
5 – 10 years	94 (23.7)
11 – 15 years	107 (27.0)
16 – 20 years	101 (25.4)
> 20 years	95 (23.9)
Gender, n (%)	
Female	90 (22.7)
Male	301 (75.8)
Non-binary	2 (0.5)
I prefer not to answer	4 (1.0)
Primary practice location, n (%)	
Public teaching hospital	243 (61.2)
Public non-teaching hospital	76 (19.1)
Private hospital	33 (8.3)
Public office	20 (5.0)
Private office	25 (6.3)
Geographic region, n (%)	
Major metropolitan area	157 (39.5)
Urban area	156 (39.3)
Suburb of a large city	37 (9.3)
Small city	37 (9.3)
Rural or small town	10 (2.5)
Average number of moderate-to-severe UC patients treat per month, mean (SD)	50.1 (46.6)

Abbreviations: SD, standard deviation; UC, ulcerative colitis; UK, United Kingdom.

3.4.2 | *Differences in Preferences Between Latent Classes*

Latent class analysis identified 4 classes (data-driven groups) of preferences among patients and 2 classes among gastroenterologists (Supporting Information S1: Appendices 19–24). Overall, while each class had distinct preference patterns, efficacy-related attributes were most important for classes representing 80% of the patient sample and 100% of the gastroenterologist sample (Figure 4).

A "remission maximizer" class was identified in both groups, consisting of 30% of patients and 72% of gastroenterologists. Combined remission (RAI = 57.5% for patients; RAI = 58.9% for gastroenterologists) was most important, followed by adverse event-related attributes (adverse event-related RAI = 28.7% for patients; RAI = 24.9% for gastroenterologists). There were no statistically significant differences in RAI across the 3 adverse events for either patients or gastroenterologists. The RAI for mode of administration was 5.6% and 7.4% for patients and

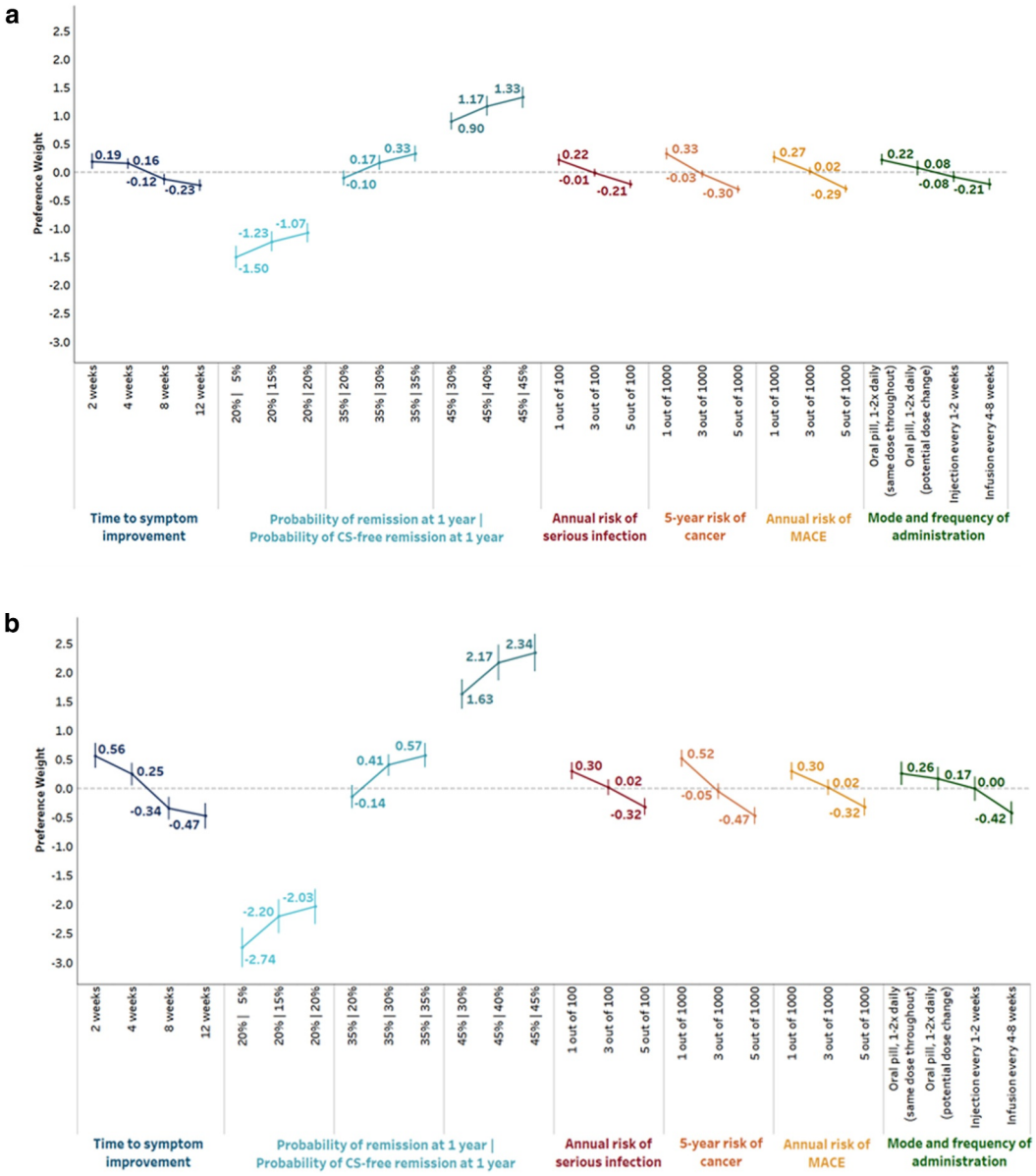
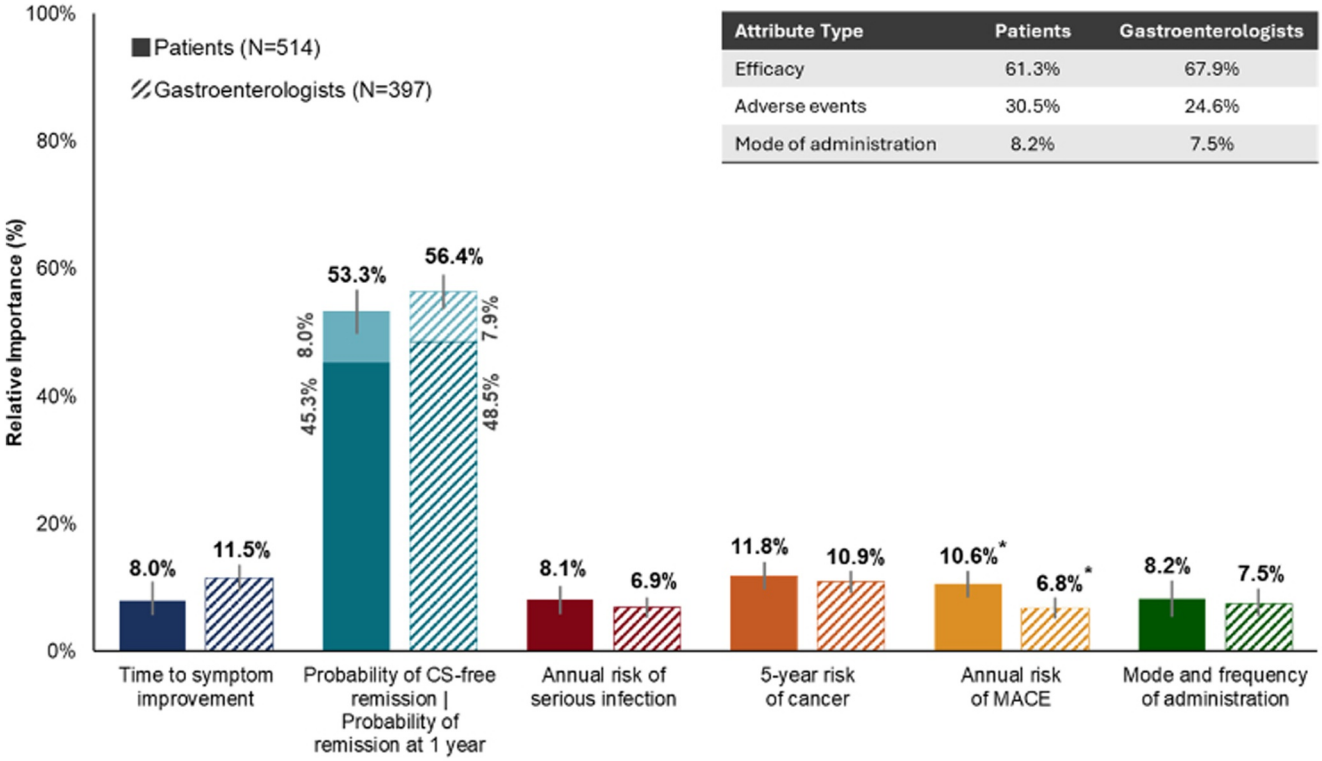


FIGURE 2 | Preference weights for treatment attributes: (a) Patients ($N = 514$), (b) Gastroenterologists ($N = 397$). CS, corticosteroid; MACE, major adverse cardiovascular event. Estimated in a joint model. Error bars represent 95% confidence intervals. Non-overlapping error bars indicate statistically significant differences in attribute-level preference weights. The combined Probability of remission at 1 year | Probability of CS-free remission at 1 year attribute is presented as pairs of levels of probability of remission and the probability of CS-free remission, for example 20% | 5% represents a 20% probability of remission at 1 year and 5% probability of CS-free remission at 1 year.

gastroenterologists, respectively. While there were no statistically significant differences in preferences for the various routes among patients in this class, numerically oral formulations were most preferred, whereas injections and infusions were least preferred. Among gastroenterologists, injections were most preferred, followed by oral formulations, and infusions were least preferred, though there were no statistically significant differences in preference weights between injections and oral formulations.

The second class identified among both patients and gastroenterologists was a "trade-off" class consisting of 45% and 28% of the samples, respectively. Efficacy was most important (efficacy-related RAI = 47.7% and 44.5% for patients and gastroenterologists, respectively); however, this class had a more balanced preference structure with lower importance placed on remission and greater importance placed on both adverse events (adverse event-related RAI = 33.5% and 38.3%, respectively) and mode of administration (RAI = 18.8% and 17.2%, respectively) compared with the "remission maximizer" class. Additionally, among both patients and gastroenterologists, this class placed more importance on time to symptom improvement compared with other classes. Oral formulations were preferred over injections and infusions for both patients and gastroenterologists.

In the patient sample, an "adverse event cautious" class (20% of patient sample) was identified whereby the greatest importance was placed on adverse event-related attributes (adverse



Attribute Type	Patients	Gastroenterologists
Efficacy	61.3%	67.9%
Adverse events	30.5%	24.6%
Mode of administration	8.2%	7.5%

FIGURE 3 | Relative attribute importance. CS, corticosteroid; MACE, major adverse cardiovascular event. *Patient and gastroenterologist confidence intervals do not overlap, indicating that patients placed a statistically significant higher importance on the annual risk of MACE than gastroenterologists. Estimated in a joint model of patients and gastroenterologists. Error bars represent 95% confidence intervals. For the Probability of CS-free remission | Probability of remission at 1 year attribute, the top portion of the bar (lighter blue) represents the relative importance of the probability of CS-free remission at 1 year, while the lower portion of the bar (darker blue) represents the relative importance of the probability of remission at 1 year. The ranges used for the RAI calculations were derived from the most preferred and least preferred level for each attribute: Time to symptom improvement (range 2–12 weeks); Probability of remission after 1 year (20%–45%); Probability of CS-free remission (no difference to 15% less than remission); 5-year risk of cancer (0.1%–0.5%); Annual risk of serious infection (1%–5%); Annual risk of MACE (0.1%–0.5%); Mode and frequency of administration (oral pill 1-2x daily same dose, infusion every 4–8 weeks).

event-related RAI = 47.1%). Specifically, cancer was the most important adverse event (RAI = 19.6%), and was significantly more important than serious infection (RAI = 13.8%) and MACE (RAI = 13.7%). The RAI for mode of administration was 14.3%. Patients were indifferent between oral formulations with or without potential dosage changes and injections, which were all strongly preferred over infusions. Lastly, patients in an "inconsistent findings" class (5% of patient sample) exhibited preferences suggesting they may have answered randomly.

There were few statistically significant differences in the characteristics of patients or gastroenterologists between classes (Supporting Information S1: Appendices 25–26). More patients in the "remission maximizers" class (26.4%) versus the "adverse event cautious" class (10.1%) had taken oral corticosteroids consistently for more than 6 months at a time; however, patients' disease severity, age, gender, and country were not associated with class membership.

4 | Discussion

Overall, clinical remission had the greatest impact on therapy choice for both patients and gastroenterologists, with both groups demonstrating a willingness to accept increased risks for a higher chance of remission. For patients, the next most important attributes were risks of cancer and MACE, compared to time to symptom improvement and cancer for gastroenterologists. Heterogeneity was observed not only between patients and gastroenterologists but also within groups. Notably, while the benefits of AT were largely prioritized over risks, risks were more important among 20% of patients. Findings highlight the critical need for shared decision-making and effective patient-provider communication to ensure treatment decisions align with individual preferences and goals.

Our findings are broadly consistent with previous UC preference literature, which similarly found efficacy to be the most influential attribute [7, 15–18]. Notably, our study is the first to examine preferences for both the probability of remission and CS-free remission. The combined probability of remission and CS-free remission was the dominant attribute, primarily driven by remission; however, CS-free remission also played a role, suggesting that minimizing steroid use is also an important factor influencing AT choice. Although a previous study found that patients placed more importance on risks of cancer and serious infection compared to providers [7], our results showed that they placed similar importance on these risks. However, we found that patients were more risk averse to MACE than

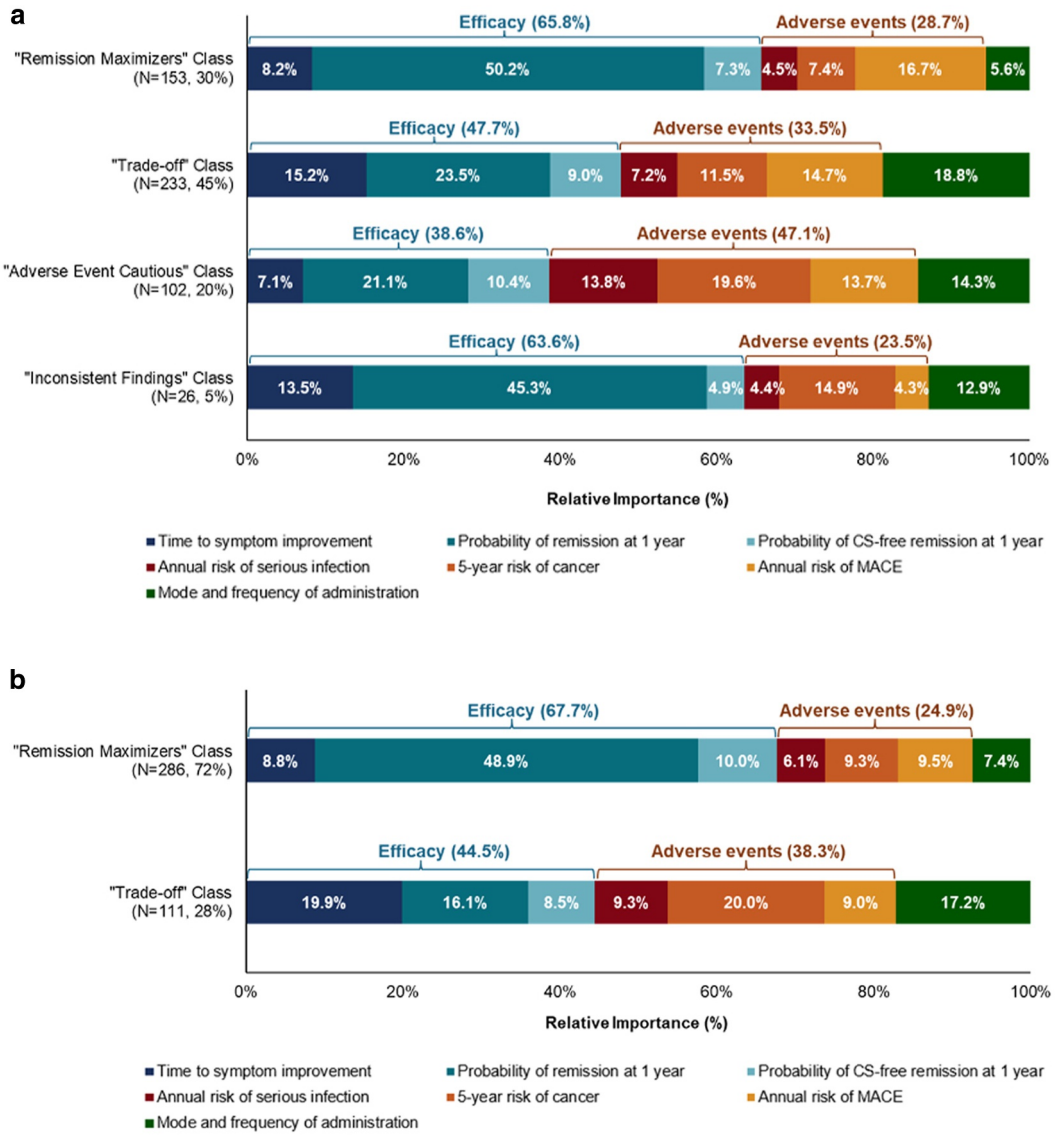


FIGURE 4 | Relative attribute importance by latent class: (a) Patients ($N = 514$), (b) Gastroenterologists ($N = 397$). CS, corticosteroid; MACE, major adverse cardiovascular event.

gastroenterologists, potentially reflecting greater clinical familiarity among gastroenterologists who recognize that MACE is primarily associated with a specific class of AT. Nonetheless, given the importance of these risks, and that uncontrolled disease itself can increase risks of adverse events [19], it is essential that information regarding these risks are included in patient-provider treatment decision-making conversations.

Furthermore, in-line with prior studies [7, 20, 21], our findings demonstrate a willingness to accept risks for improved efficacy and disease control. Notably, for all three adverse events assessed in this study, patients with moderate-to-severe UC currently on conventional therapy and gastroenterologists were willing to accept risk levels beyond those included in the DCE in exchange for clinical remission. To better align with treatment guidelines recommending early AT use and support patient-centered care [3], gastroenterologists should assess individual-level risk tolerances as part of the decision-making process and consider timely escalation to AT for patients uncontrolled on conventional therapy.

Mode of administration was the fourth most important attribute for both patients and gastroenterologists. Patients indicated a clear preference for oral treatments, specifically with the same dose throughout treatment, over parenteral formulations. In contrast, gastroenterologists showed no strong preference between oral and parenteral formulations but were notably averse to infusions. While gastroenterologist preferences for mode of administration varied across countries, patients consistently preferred oral formulations, in-line with prior findings [7, 18, 22–24].

Latent class analysis revealed 4 classes or "types" of patients and 2 classes of gastroenterologists with different preference patterns. Two classes ("remission maximizers" and "trade-off") were found among both patients and gastroenterologists, characterized by a strong emphasis on efficacy-related attributes. However, only the patient sample included an "adverse event cautious" class, in which the risk of adverse events collectively was more important than the efficacy attributes, which has been observed in other UC patient preference research [6].

Interestingly, patients' preference "type" was not strongly associated with demographic or clinical characteristics. Overall, findings underscore the importance of shared decision-making, including discussions about individual preferences, risk tolerance, and treatment goals in order to tailor AT choices and deliver patient-centered care. Future research is needed to develop communication strategies and decision-support tools to facilitate more informed and collaborative discussions between patients and providers and support shared decision-making [25].

These findings may be subject to information and selection bias. Due to the panel-based online recruitment method resulting in a convenience sample, results may not represent the preferences of the broader UC population. All respondent characteristics were self-reported, including patient diagnosis, disease severity, and treatment history. In addition, because the patient and gastroenterologist samples were recruited separately, the results do not represent the preferences of patients and their treating physicians or physicians and their own patients.

While we followed best practices in designing the DCE and used clinical trial data to inform attribute calibration were available [9], data for some attributes was not consistently reported across trials. Additionally, the hypothetical DCE scenarios do not fully reflect the complex nature of UC, its treatment, and characteristics of individual patients; thus, results may not predict actual decisions made in clinical settings. Preferences are based on the levels provided and are relative to the attributes assessed. Other treatment attributes or attribute levels may impact preferences and trade-offs. Moreover, real-world treatment decisions may be influenced by country-specific regulatory approvals and reimbursement policies. Finally, while the objective of the study was to measure preferences at the point of escalation to AT, the patient DCE instructions did not explicitly reference escalation to AT. However, to be included in the study, patients were required to be AT naïve and self-report a history of moderately-to-severely active UC. Patient sample characteristics, including steroid dependence, flares, and hospitalizations, were consistent with the need to progress to AT.

In conclusion, efficacy, specifically clinical remission, was found to be the most important treatment consideration at the point of escalation to AT among AT-naïve patients with moderately-to-severely active UC and gastroenterologists; however, adverse events and mode of administration attributes were also important. Both patients and gastroenterologists were willing to accept the potential risks associated with AT in exchange for increased chances of remission. However, findings revealed some heterogeneity in preferences, highlighting the need for shared decision-making to understand individual-level preferences and risk tolerances, personalize treatment choices, and support patient-centered, guideline-concordant care.

Author Contributions

All authors made a significant contribution to this research, including the conception, study design, execution, acquisition of data, and analysis. All authors took part in drafting, revising, or critically reviewing the article and gave final approval of the version to be published.

Acknowledgments

G.G., N.L., and M.C.M. are employees of Precision AQ, which received funding from Pfizer in connection with the development of this manuscript. L.P. was an employee of Precision AQ when this study was conducted. The authors would like to thank Nadya Natale of Precision AQ for her invaluable research support at various stages of this project. Medical writing support for the accompanying graphical abstract was provided by Amy Churchlow, MSc, CMC Connect, a division of IPG Health Medical Communications and was funded by Pfizer, New York, NY, USA, in accordance with Good Publication Practice (GPP 2022) guidelines (Ann Intern Med 2022; 175:1298–1304).

Funding

This study was sponsored by Pfizer Inc.

Ethics Statement

All study procedures were performed in accordance with the principles outlined in the Declaration of Helsinki. The study protocol and materials were reviewed by the Advarra Institutional Review Board and were determined to be exempt from full review on 20 July 2023 (protocol number 00072349).

Consent

All survey participants provided informed consent.

Conflicts of Interest

G.G., N.L., and M.C.M. are employees of Precision AQ, a research consultancy that provides health economics and outcomes research services to life sciences companies, which received funding from the sponsor to conduct this study. L.P. was an employee of Precision AQ when this study was conducted. S.S has received lecture/speaker fees and consultancy/advisory fees from Pfizer Inc. A.W. has received grant/research support from Pfizer Inc. P.H., B.H., J.C., J.C.C., and X.G. are employees and shareholders of Pfizer Inc. K.W. is an employee and shareholder of Pfizer Canada Inc. A.B. has received lecture and consultancy fees from Pfizer Inc.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

1. B. Gros and G. G. Kaplan, "Ulcerative Colitis in Adults: A Review," *JAMA* 330, no. 10 (2023): 951–965, https://doi.org/10.1001/jama.2023.15389.

2. M. Harbord, R. Eliakim, D. Bettenworth, et al., "Third European Evidence-Based Consensus on Diagnosis and Management of Ulcerative Colitis. Part 2: Current Management," *Journal of Crohn's and Colitis* 11, no. 7 (2017): 769–784, https://doi.org/10.1093/ecco-jcc/jjx009.

3. S. Singh, Jr E. V. Loftus, B. N. Limketkai, et al., "AGA Living Clinical Practice Guideline on Pharmacological Management of Moderate-to-Severe Ulcerative Colitis," *Gastroenterology* 167, no. 7 (2024): 1307–1343, https://doi.org/10.1053/j.gastro.2024.10.001.

4. S. Bhat, B. Click, and M. Regueiro, "Safety and Monitoring of Inflammatory Bowel Disease Advanced Therapies," *Inflammatory Bowel Diseases* 30, no. 5 (2024): 829–843, https://doi.org/10.1093/ibd/izad120.

5. C. A. Siegel, D. Sharma, J. Griffith, Q. Doan, S. Xuan, and L. Malter, "Treatment Pathways in Patients With Crohn's disease and Ulcerative

Colitis: Understanding the Road to Advanced Therapy," *Crohns Colitis 360* 6, no. 3 (2024): otae040, https://doi.org/10.1093/crocol/otae040.

6. E. Coates, N. Wickramasekera, A. Barr, et al., "Patient Preferences and Current Practice for Adults With Steroid-Resistant Ulcerative Colitis: POPSTER Mixed-Methods Study," *Health Technology Assessment* 26, no. 41 (2022): 1–118, https://doi.org/10.3310/rhxr5192.

7. M. Boeri, K. Myers, C. Ervin, et al., "Patient and Physician Preferences for Ulcerative Colitis Treatments in the United States," *Clinical and Experimental Gastroenterology* 12 (2019): 263–278, https://doi.org/10.2147/ceg.s206970.

8. K. Song and D. Wu, "Shared Decision-Making in the Management of Patients With Inflammatory Bowel Disease," *World Journal of Gastroenterology* 28, no. 26 (2022): 3092–3100, https://doi.org/10.3748/wjg.v28.i26.3092.

9. F. R. Johnson, E. Lancsar, D. Marshall, et al., "Constructing Experimental Designs for Discrete-Choice Experiments: Report of the ISPOR Conjoint Analysis Experimental Design Good Research Practices Task Force," *Value in Health* 16, no. 1 (2013): 3–13, https://doi.org/10.1016/j.jval.2012.08.2223.

10. B. Wheeler and M. J. Braun, Package 'Algdesign, (2019), 1–25.

11. J. Louviere, *Stated Choice Methods: Analysis and Applications* (Cambridge University Press, 2000).

12. A. B. Hauber, J. M. González, C. G. Groothuis-Oudshoorn, et al., "Statistical Methods for the Analysis of Discrete Choice Experiments: A Report of the ISPOR Conjoint Analysis Good Research Practices Task Force," *Value in Health* 19, no. 4 (2016): 300–315, https://doi.org/10.1016/j.jval.2016.04.004.

13. J. C. Cooper, "A Comparison of Approaches to Calculating Confidence Intervals for Benefit Measures From Dichotomous Choice Contingent Valuation Surveys," *Land Economics* 70, no. 1 (1994): 111–122, https://doi.org/10.2307/3146445.

14. B. Rosner, *Fundamentals of Biostatistics. Eighth Edition* (Cengage Learning, 2015).

15. J. P. Gisbert, S. Schreiber, C. A. Siegel, et al., "Benefit-Risk Trade-Offs and Patient Preferences for Therapy Selection in Ulcerative Colitis: A Multicountry Preference Study," *Inflammatory Bowel Diseases* 31, no. 5 (2025): 1281–1294, https://doi.org/10.1093/ibd/izae162.

16. S. Schubert, N. Picker, T. Cavlar, J. Knop, A. Kahraman, and W. Mohl, "Inflammatory Bowel Disease Patients' Treatment Preferences Using a Discrete Choice Experiment Technique: The Input Study," *Advances in Therapy* 39, no. 6 (2022): 2889–2905, https://doi.org/10.1007/s12325-022-02143-z.

17. T. Straatmijer, M. E. van den Akker-van Marle, C. Y. Ponsioen, et al., "Patient Preferences in Treatment Options of Ulcerative Colitis: A Discrete Choice Experiment," *Scandinavian Journal of Gastroenterology* 59, no. 3 (2024): 288–295, https://doi.org/10.1080/00365521.2023.2286191.

18. G. Fiorino, N. Bent-Ennakhil, P. Varriale, F. Braegger, and E. Hoefkens, "Patient Preferences for Treatment Attributes in Inflammatory Bowel Disease: Results From a Large Survey Across Seven European Countries Using a Discrete Choice Experiment," *Inflammatory Bowel Diseases* 30, no. 12 (2024): 2380–2394, https://doi.org/10.1093/ibd/izae015.

19. B. Gros, J. Blackwell, J. Segal, C. J. Black, A. C. Ford, and S. Din, "Harms With Placebo in Trials of Biological Therapies and Small Molecules as Maintenance Therapy in Inflammatory Bowel Disease: A Systematic Review and Meta-Analysis," *Lancet Gastroenterology & Hepatology* 9, no. 11 (2024): 1030–1040, https://doi.org/10.1016/s2468-1253(24)00233-4.

20. E. Louis, C. A. Siegel, B. James, S. Heidenreich, N. Krucien, and S. Ghosh, "Patients With Inflammatory Bowel Disease Have Heterogeneous Treatment Preferences That are Largely Determined by the Avoidance of Abdominal Pain and Side Effects [P-POWER IBD Study]," *Journal of Crohn's and Colitis* 17, no. 2 (2023): 231–239, https://doi.org/10.1093/ecco-jcc/jjac130.

21. M. Bewtra, V. Kilambi, A. O. Fairchild, C. A. Siegel, J. D. Lewis, and F. R. Johnson, "Patient Preferences for Surgical Versus Medical Therapy for Ulcerative Colitis," *Inflammatory Bowel Diseases* 20, no. 1 (2014): 103–114, https://doi.org/10.1097/01.mib.0000437498.14804.50.

22. L. M. Hagelund, S. Elkjær Stallknecht, and H. H. Jensen, "Quality of Life and Patient Preferences Among Danish Patients With Ulcerative Colitis - Results From a Survey Study," *Current Medical Research and Opinion* 36, no. 5 (2020): 771–779, https://doi.org/10.1080/03007995.2020.1716704.

23. P. Holko, P. Kawalec, and M. Mossakowska, "Quality of Life Related to Oral, Subcutaneous, and Intravenous Biologic Treatment of Inflammatory Bowel Disease: A Time trade-off Study," *European Journal of Gastroenterology and Hepatology* 30, no. 2 (2018): 174–180, https://doi.org/10.1097/meg.0000000000001031.

24. A. Buisson, M. Serrero, L. Orsat, et al., "Comparative Acceptability of Therapeutic Maintenance Regimens in Patients With Inflammatory Bowel Disease: Results From the Nationwide ACCEPT2 Study," *Inflammatory Bowel Diseases* 29, no. 4 (2023): 579–588, https://doi.org/10.1093/ibd/izac119.

25. D. T. Rubin, A. Hart, R. Panaccione, et al., "Ulcerative Colitis Narrative Global Survey Findings: Communication Gaps and Agreements Between Patients and Physicians," *Inflammatory Bowel Diseases* 27, no. 7 (2021): 1096–1106, https://doi.org/10.1093/ibd/izaa257.

26. W. J. Sandborn, S. Vermeire, L. Peyrin-Biroulet, et al., "Etrasimod as Induction and Maintenance Therapy for Ulcerative Colitis (ELEVATE): Two Randomised, Double-Blind, Placebo-Controlled, Phase 3 Studies," *Lancet* 401, no. 10383 (2023): 1159–1171, https://doi.org/10.1016/s0140-6736(23)00061-2.

27. W. J. Sandborn, B. G. Feagan, G. D'Haens, et al., "Ozanimod as Induction and Maintenance Therapy for Ulcerative Colitis," *New England Journal of Medicine* 385, no. 14 (2021): 1280–1291, https://doi.org/10.1056/nejmoa2033617.

28. A. C. Moss and R. J. Farrell, "Infliximab for Induction and Maintenance Therapy for Ulcerative Colitis," *Gastroenterology* 131, no. 5 (2006): 1649–1651: ; discussion 1651, https://doi.org/10.1053/j.gastro.2006.09.039.

29. W. J. Sandborn, G. van Assche, W. Reinisch, et al., "Adalimumab Induces and Maintains Clinical Remission in Patients With Moderate-to-Severe Ulcerative Colitis," *Gastroenterology* 142, no. 2 (2012): 257–265: e1-3, https://doi.org/10.1053/j.gastro.2011.10.032.

30. W. J. Sandborn, B. G. Feagan, C. Marano, et al., "Subcutaneous Golimumab Induces Clinical Response and Remission in Patients With Moderate-to-Severe Ulcerative Colitis," *Gastroenterology* 146, no. 1 (2014): 85–95: quiz e14-85, https://doi.org/10.1053/j.gastro.2013.05.048.

31. W. J. Sandborn, C. Su, B. E. Sands, et al., "Tofacitinib as Induction and Maintenance Therapy for Ulcerative Colitis," *New England Journal of Medicine* 376, no. 18 (2017): 1723–1736, https://doi.org/10.1056/nejmoa1606910.

32. W. J. Sandborn, S. Ghosh, J. Panes, et al., "Efficacy of Upadacitinib in a Randomized Trial of Patients With Active Ulcerative Colitis," *Gastroenterology* 158, no. 8 (2020): 2139–2149.e2114, https://doi.org/10.1053/j.gastro.2020.02.030.

33. B. G. Feagan, S. Danese, E. V. Loftus Jr., et al., "Filgotinib as Induction and Maintenance Therapy for Ulcerative Colitis (SELECTION): A Phase 2b/3 Double-Blind, Randomised, Placebo-Controlled Trial," *Lancet* 397, no. 10292 (2021): 2372–2384, https://doi.org/10.1016/s0140-6736(21)00666-8.

34. B. G. Feagan, P. Rutgeerts, B. E. Sands, et al., "Vedolizumab as Induction and Maintenance Therapy for Ulcerative Colitis," *New England Journal of Medicine* 369, no. 8 (2013): 699–710, https://doi.org/10.1056/nejmoa1215734.

35. A. Dignass, D. Rubin, B. Bressler, et al., "OP23 the Efficacy and Safety of Guselkumab Induction Therapy in Patients With Moderately to Severely Active Ulcerative Colitis: Phase 2b QUASAR Study Results Through Week 12," *Journal of Crohn's and Colitis* 16, no. 1 (2022): i025–i026, https://doi.org/10.1093/ecco-jcc/jjab232.022.

36. B. E. Sands, W. J. Sandborn, R. Panaccione, et al., "Ustekinumab as Induction and Maintenance Therapy for Ulcerative Colitis," *New England Journal of Medicine* 381, no. 13 (2019): 1201–1214, https://doi.org/10.1056/nejmoa1900750.

Supporting Information

Additional supporting information can be found online in the Supporting Information section.
Supporting Information S1: ueg270229-sup-0001-suppl-data.docx.