BMJ Open Gastroenterology

Treatment persistence and colectomy-free outcomes in patients with ulcerative colitis receiving golimumab or adalimumab: a UK experience

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To cite: Hoque S, Puenpatom A, Boccaletti S, *et al*. Treatment persistence and colectomy-free outcomes in patients with ulcerative colitis receiving golimumab or adalimumab: a UK experience. *BMJ Open Gastro* 2020;**7**:e000476. doi:10.1136/bmjgast-2020-000476

Received 1 July 2020
Revised 7 October 2020
Accepted 24 October 2020

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ABSTRACT

Objective To examine real-world treatment persistence, colectomy-free survival and treatment switching patterns in UK patients with ulcerative colitis (UC) prescribed golimumab or adalimumab.

Design This was a retrospective chart review study in adult patients diagnosed with UC using data from 16 National Health Service sites in the UK. Patient records were included in the study if they had initiated first or second-line adalimumab or golimumab between 1 March 2016 and 30 September 2017 (index date). Subjects were required for ≥6 months post treatment initiation. Demographics, clinical characteristics, treatment-related data and colectomy data were extracted over a follow-up period of 6–12 months. Treatment persistence rate was the primary outcome. Colectomy-free survival and treatment switching were secondary outcomes. Outcomes were compared between treatments using χ^2 tests and Fisher's exact test for categorical variables. The t-tests were used for continuous variables. Time-to-event variables were evaluated using Kaplan-Meier curves and log-rank tests.

Results The study included a total of 183 patients (96 (52.5%) prescribed adalimumab; 87 (47.5%) golimumab), and patients were mostly first line (79.8%). Demographic and clinical characteristics were generally similar between treatment groups. Persistence rates within 12 months were 64.6% for adalimumab and 64.4% for golimumab (p=0.681). Overall, 20.2% switched to other therapy within 1 year, with 8.2% golimumab and 12.0% adalimumab switching to another biologic. Of patients prescribed adalimumab, 14.6% had ≥1 dose change, mainly dose escalations. In the 12 months post treatment initiation, 8.2% of patients underwent colectomy, with no significant difference in colectomy-free survival by treatment, p=0.73.

Conclusion This study provides evidence of clinical outcomes and real-world persistence for adalimumab and golimumab in UC. The persistence rates of both therapies were above 64.0% at 12 months following treatment initiation. In addition, the 1-year colectomy-free survival was relatively similar between the two treatments.

INTRODUCTION

Ulcerative colitis (UC) is the most common type of inflammatory bowel disease (IBD) in the UK, with around 146 000 people affected.[1] UC is a chronic disease, with patients experiencing relapses and periods of remission, and patients who initially have disease of limited extent (proctitis) sometimes progressing to more extensive disease (proctosigmoiditis, left-sided colitis or pancolitis).[1–3] Symptoms of UC include bloody diarrhoea, abdominal pain, urgency and tenesmus as a result of inflammation and ulceration of the colonic mucosa.[2 4 5]

UK and European clinical guidelines recommend that UC treatment selection should aim for sustained steroid-free remission, and consider disease severity, extent and current activity.[6 7] Treatment options for UC include aminosalicylates (5-ASA), corticosteroids, immunosuppressants, biologics and the Janus kinase inhibitor, tofacitinib.[8 9] Although biologics are efficacious in many patients, failure to respond has been reported to occur in 30.0%–40.0% of patients with acute refractory UC.[10] A secondary loss of response to biologics is also experienced by some patients, which is believed to result from antidrug antibodies formed due to biologics being naturally produced proteins; antidrug antibodies have been detected in ≤41.0% of patients with UC receiving biologics.[11]

The therapeutic potential of biologics reported in clinical trials, with narrowly defined populations and carefully controlled conditions, is not always seen in clinical practice, with suboptimal adherence and persistence impacting clinical outcomes.[12] Studies that explore real-world treatment outcomes following product approval are valuable in providing decision-makers with insight to the effectiveness of a product used

Summary box

What is already known about this subject?

- The therapeutic benefit observed in clinical trials for patients with ulcerative colitis (UC) treated with biologics may not necessarily be achieved in routine practice. Real-world studies are required to examine this, many of which have focused specifically on adalimumab and infliximab. US database real-world data indicates that less than half of patients continue using their initial biologic (infliximab, adalimumab, certolizumab, golimumab and vedolizumab) treatment after 1 year (44.8% in UC cohort). These persistence profiles suggest a high rate of dissatisfaction or adverse disease outcomes resulting in discontinuation and switching to a different agent. One Korean study reported at 1 and 3 years after initiation of first biologic treatment, the cumulative rates of colectomy-free survival were 100.0% and 97.3%, respectively, for adalimumab users. Another Spanish study reported probability of colectomy-free survival in golimumab patients was 85% at 52 weeks. The current study provides important data to fill the evidence gap describing key outcomes for golimumab and real-world persistence and colectomy-free data between adalimumab and golimumab in the UK.

What are the new findings?

- Analysis of data extracted from medical records for 183 patients with UC who initiated treatment with adalimumab and golimumab is reported. The persistence rates of both therapies were approximately 65.0% within 12 months following treatment initiation. Overall, 20.2% switched to other therapy within 1 year, with 8.2% golimumab and 12.0% adalimumab switching to another biologic. Colectomies were reported for 8.2% of patients in the 12 months following initiation of treatment.

How might it impact on clinical practice in the foreseeable future?

- Awareness of the persistence levels observed in clinical practice with adalimumab and golimumab treatments for UC will support appropriate monitoring of patients and better informed decisions by clinician in the treatment of their patients, with the potential for dose escalation or treatment switching.

beyond the controlled environment of a clinical trial. Published studies report treatment persistence rates at 1 year for biologics ranging from 35.0% to 63.0% in patients with UC from Ireland, the USA and Canada.[13–17] A number of observational studies have explored treatment response in the three antitumour necrosis factor (anti-TNF) agents currently licensed for use in UC. These have included multicentre cohort studies of adalimumab and golimumab in Spain,[18 19] an observational study of golimumab in Italian primary IBD centres[20] and a retrospective analysis of the outcomes of infliximab treatment at a Japanese academic hospital.[21]

Real-world data on biologic persistence in patients with UC in the UK are lacking. However, given the reported poor persistence for biologics in UC in other countries, this chart review could provide valuable insight into disease management within the National Health Service (NHS) specific to the UK setting. Indeed, to our knowledge, this is the first observational study to report persistence and colectomy outcomes, and comparison of these, between golimumab and adalimumab in the UK. The objective of the current study was, therefore, to examine treatment persistence in patients with UC prescribed the anti-TNF agents golimumab and adalimumab at first or second line, using real-world data. The analysis also aimed to evaluate colectomy-free outcome and treatment patterns of golimumab and adalimumab.

METHODS

Study design

This was a retrospective chart review conducted across 16 NHS sites in the UK. Each site provided data on between 2 and 30 patients, depending on the available pool of eligible patients. Data were extracted from patient medical records onto a purpose-designed standardised electronic Case Report Form (eCRF), with an eCRF completed for each eligible patient across each site. Variables included clinical characteristics, demographics, comorbidities and treatment-related data, including treatment history prior to the initiation of a biologic and details of colectomies, where present. Dose adjustment was captured but only for patients treated with adalimumab since, at the time of study design, the label for golimumab did not include dose adjustments. Subjects were required to have at least 6 months after treatment initiation up to the 12 months post initiation of the biologic if available. Overall, 86.3% (158/183) of the patients in this study had 12-month follow-up data. In order to maximise recruitment in the golimumab cohort, these patients were identified first on a consecutive basis until the site's quota was met, or the site exhausted the pool of available patients. Following this, adalimumab patients were identified consecutively.

Patients

Inclusion criteria

According to the inclusion criteria, patients had to be at least 18 years old, and had a clinically confirmed diagnosis of UC, aligning with marketing authorisation. Patients were required to have initiated treatment with either adalimumab or golimumab at first or second line between 1 March 2016 and 30 September 2017. The date of initiation of adalimumab or golimumab was referred to as the index date. Patients were required to have data available for at least 6 months post initiation of the biologic treatment up to 12 months.

Exclusion criteria

Patients were excluded if they had received adalimumab or golimumab during the study period through a clinical trial or early access programme.

Outcomes

The primary outcome was treatment persistence rate over 6–12 months post initiation. Treatment persistence rate at any point in time was defined as the proportion of patients who had not discontinued biologic treatment at that time. The secondary outcome measures included colectomy-free survival outcome (defined as not receiving

any type of colectomy within the 6–12 months post golimumab/adalimumab treatment initiation), treatment switching pattern and dose escalation (for adalimumab).

Statistical analysis

Categorical variables were summarised using frequency and percentage, numeric variables using mean, SD, IQR, minimum and maximum. Variables were compared between patients receiving adalimumab and golimumab using χ^2 tests for categorical variables, Fisher's exact test for two-by-two categorical variable comparisons and t-tests for continuous variables.

Time-to-event variables were summarised using Kaplan-Meier analysis and the accompanying median (if the median was reached), and time to discontinuation and first surgery were compared between patients receiving adalimumab and those receiving golimumab. Kaplan-Meier curves were generated for treatment persistence and colectomy rates for both treatments over 12 months. Persistence and colectomy rates at 3, 6, 9 and 12 months after treatment initiation. The times at which survival outcomes was at 75.0% and 95.0% were also reported for each treatment. A log-rank test was used to determine if the persistence and colectomy rates differed statistically between treatments, with p<0.05 used to indicate a significant difference. To summarise treatment persistence and colectomy-free survival, Kaplan-Meier analysis was used. For persistence, the event was the treatment discontinuation and for colectomy-free survival, the colectomy was the event. Time to the event was taken from the treatment initiation. Patients for which the event had not yet occurred by the date of data collection were censored at that date.

All analyses were based on observed data only, and missing data were not imputed as the number of missing values was expected to be low and there was not expected to be any systematic reason for any values that would be missing, that is, missing at random was expected. All analysis was performed using Stata Statistical software, V.15.1, College Station, Texas: StataCorp LLC.[22]

RESULTS

Patient demographic, disease and treatment characteristics are shown in table 1. Of 183 patients, 87 (47.5%) had initiated treatment with golimumab,and 96 (52.5%) with adalimumab. At least 12 months of follow-up data were available for 86.3% of the sample.

We observed a higher proportion of males treated with golimumab (71.3%) compared with adalimumab (49.0%) (p=0.003). Baseline characteristics between golimumab and adalimumab were relatively similar in age, body mass index (BMI), time to treatment, type of UC diseases, % treatment experienced (first line vs second line) and Charlson Comorbidity Index (p<0.05). At diagnosis, most patients (61.7%) had either pancolitis or left-sided colitis. The mean time between diagnosis of UC and initiation of treatment with golimumab or adalimumab were 8.5 and 7.4 years, respectively (p=0.397). About 80.0% of the patients received golimumab or adalimumab as their first-line biologic therapy. For 37 patients receiving a second-line biologic, half of the patients received infliximab (Remicade) as their first-line treatment followed by infliximab (biosimilar) (37.8%). Antidrug antibody status after first-line treatment was available for very few patients receiving a second-line biologic. Overall, 24.3% of patients tested positive for antidrug antibodies at discontinuation of their first-line biologic treatment.

Treatment persistence

At 12 months following treatment initiation, 56 (64.4%) patients receiving golimumab and 62 (64.6%) patients receiving adalimumab remained on treatment. Kaplan-Meier analysis revealed that there was no significant difference in persistence rates over 12 months between golimumab and adalimumab (p=0.681; figure 1). However, we found that proportions of patients receiving golimumab remained on treatment at 3, 6, 9 and 12 months after treatment initiation were slightly higher, although not statistically significant, than those receiving adalimumab (figure 1 and table 2). The time for medication persistence rates at 75.0% was slightly longer for golimumab (8.6 months) compared with adalimumab (6.8 months) (table 2). The sensitivity analysis adjusting for sex revealed no significant difference of treatment persistence between golimumab and adalimumab patients.

Regarding the data on antidrug antibodies, only 17 (26.2%) patients who discontinued treatment had the results of tests for antidrug antibodies recorded (6 receiving golimumab and 11 receiving adalimumab); a positive result was reported for only one patient, who was receiving adalimumab.

Treatment switching

Overall, 20.2% (n=37) switched to other therapy within 1 year. By treatment, 8.2% (n=15) of patients receiving golimumab switched to another biologic compared with 12.0% (n=22) of those receiving adalimumab. Among patients switching biologics (n=37), 56.8% switched to vedolizumab, followed by infliximab biosimilar (29.7%) and infliximab bio-originator (13.5%) (table 2). The switching pattern for both medications was similar. Of 22 patients initially prescribed adalimumab who switched to another biologic, 14 (63.6%) switched to vedolizumab, 6 (27.3%) to an infliximab biosimilar and 2 (9.1%) to infliximab bio-originator. Of those 15 patients initially prescribed golimumab, more than half switched to either infliximab biosimilar or to infliximab bio-originator (table 2).

Data on dose adjustment were available for 90 patients prescribed adalimumab (Table not shown). We found that 14 (14.6%) had at least one dose adjustment. The majority (85.7%) of cases had a dose escalation. Kaplan-Meier analysis indicated that 10.0% of adalimumab

Table 1 Patient demographic, clinical and treatment characteristics

	Total	Adalimumab	Golimumab	
	N=183	N=96	N=87	P value
Age at treatment initiation (years)				
N	183	96	87	0.2971
Mean (SD)	45.6 (15.0)	44.4 (15.6)	46.8 (14.3)	
Median	45.3	42.7	47.1	
Sex, n (%)				
N	183	96	87	0.0026
Female	74 (40.4)	49 (51.0)	25 (28.7)	
Male	109 (59.6)	47 (49.0)	62 (71.3)	
BMI (kg/m^2)				
N	55	17	38	0.7936
Mean (SD)	26.95 (5.79)	26.64 (5.95)	27.09 (5.79)	
Median	25.83	25.51	26.41	
Charlson Comorbidity Index				
N	183	96	87	0.0503
Mean (SD)	0.10 (0.42)	0.16 (0.55)	0.03 (0.18)	
Median	0.00	0.00	0.00	
Disease extent at diagnosis, n (%)				
N	183	96	87	0.3384
Ulcerative proctitis	26 (14.2)	11 (11.5)	15 (17.2)	
Proctosigmoiditis	12 (6.6)	9 (9.4)	3 (3.4)	
Left-sided colitis	54 (29.5)	26 (27.1)	28 (32.2)	
Pancolitis	59 (32.2)	31 (32.3)	28 (32.2)	
Do not know	32 (17.5)	19 (19.8)	13 (14.9)	
Time between UC diagnosis and treatment initiation (months)				
N	168	84	84	0.3974
Mean (SD)	95.4 (107.6)	88.3 (114.0)	102.4 (101.0)	
Median	58.1	43.9	63.7	
Treatment line, n (%)				
N	183	96	87	0.7129
First-line biologic	146 (79.8)	78 (81.3)	68 (78.2)	
Second-line biologic	37 (20.2)	18 (18.8)	19 (21.8)	
First-line biologic for patients at second line, n (%)				
N	37	18	19	0.4022
Adalimumab	1 (2.7)	0 (0.0)	1 (5.3)	
Golimumab	1 (2.7)	1 (5.6)	0 (0.0)	
Infliximab (bio-originator)	19 (51.4)	10 (55.6)	9 (47.4)	
Infliximab (biosimilar)	14 (37.8)	7 (38.9)	7 (36.8)	
Other	2 (5.4)	0 (0.0)	2 (10.5)	
Antidrug antibodies after first-line biologic, n (%)				
N	37	18	19	0.4501
Positive	9 (24.3)	6 (33.3)	3 (15.8)	
Negative	10 (27.0)	4 (22.2)	6 (31.6)	
Not known/not tested	18 (48.6)	8 (44.4)	10 (52.6)	

BMI, body mass index; IQR, inter-quartile range; SD, standard deviation; UC, ulcerative colitis.

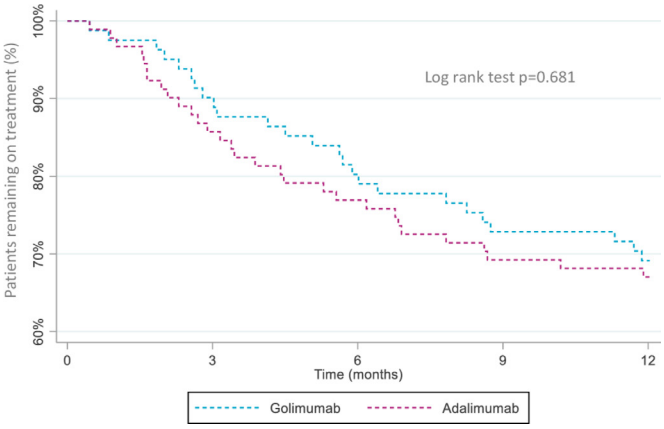

Figure 1 Kaplan-Meier chart of persistence rates.

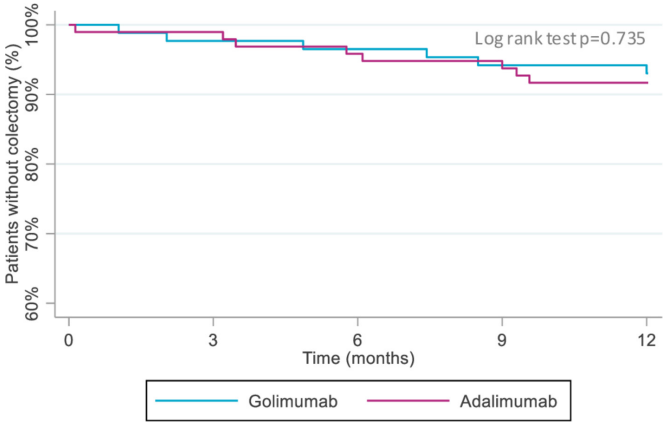

Figure 2 Kaplan-Meier chart of colectomy-free survival rates.

patients had undergone a first dose adjustment at 7.3 months.

Colectomy-free outcomes

A total of 8.2% (n=15) of patients underwent colectomy within 12 months following initiation of golimumab or adalimumab. At 12 months, 88 (91.7%) and 80 (92.0%) patients who received adalimumab and golimumab, respectively, demonstrated colectomy-free survival at 12 months. The Kaplan-Meier analysis showed no significant difference between the two treatments in colectomy-free survival over the 12 months after treatment initiation (p=0.735; figure 2). Our sensitivity analysis when adjusting for sex confirmed the colectomy-free survival result. When evaluating the proportion of patients at 3,6,9 and 12 months, patients with golimumab were slightly higher, although not statistically significant, than those receiving adalimumab at 12 months (94.2% vs 91.7%, respectively) after treatment initiation (table 3). In addition, the average time for colectomy-free survival rates to drop to 95.0% was slightly longer for golimumab (8.5 months) compared with adalimumab (6.1 months); however, this was not statistically significant (table 3).

Table 2 Kaplan-Meier analysis of persistence and treatment switching data

	Total	Adalimumab	Golimumab
	N=183	N=96	N=87
Persistence data			
Missing, n		5	6
Events, n		30	25
Censored, n		61	56
Time from treatment initiation (months)		Patients remaining on treatment, (%)	
3		85.7	90.1
6		76.9	80.2
9		69.2	72.8
12		67.0	69.1
		Time (months)	
75% of patients remaining on treatment		6.8	8.6
Switching data			
Per cent of patients who stopped adalimumab or golimumab within 12 months, n (%)	65 (35.5)	34 (35.4)	31 (35.6)
Per cent of patients who switched to another biologic within 12 months, n (%)	37 (20.2)	22 (12.0)	15 (8.2)
Of those who switched, which biologic did they switch to? n (%)			
N	37	22	15
Infliximab (Remicade)	5 (13.5)	2 (9.1)	3 (20.0)
Infliximab biosimilar (Inflectra/Remsima)	11 (29.7)	6 (27.3)	5 (33.3)
Vedolizumab (Entyvio)	21 (56.8)	14 (63.6)	7 (46.7)

Table 3 Colectomy-free survival analysis

	Adalimumab	Golimumab
	N=96	N=87
Colectomy-free survival data		
Missing, n	0	1
Events, n	8	6
Censored, n	88	80
Time from treatment initiation (months)	Patients remaining colectomy free, (%)	
3	99.0	97.7
6	95.8	96.5
9	94.8	94.2
12	91.7	94.2
	Time (months)	
95% of patients remaining colectomy free	6.1	8.5

A substantial proportion of patients used additional therapies for their UC in addition to a biologic during the 12 months study period (data not shown). Oral 5-ASA was the most commonly prescribed therapy, taken by 41.4% and 46.9% of patients receiving golimumab and adalimumab, respectively. Corticosteroids were prescribed to 35.6% (golimumab) and 39.6% (adalimumab), respectively, and immunomodulators to 26.4% and 25.0%, respectively. Only 50 (27.3%) patients overall had no additional therapy reported in the 12 months post biologic initiation, with 23 (26.4%) patients prescribed golimumab and 27 (28.1%) patients being prescribed adalimumab. The proportions of patients receiving additional (or no) UC medications were similar between patients receiving golimumab and adalimumab.

DISCUSSION

This study was a retrospective chart review analysis of 183 UK patients. The persistence rate was approximately 65.0% at 12 months post treatment initiation in patients prescribed the anti-TNF agents golimumab and adalimumab as first-line or second-line biologic therapy for UC. In the real world, persistence may be viewed as a surrogate measure of drug efficacy. For golimumab, in the phase 3 Program of Ulcerative Colitis Research Studies Utilizing an Investigational Treatment (PURSUIT) trial, clinical response was maintained through week 54 in approximately 50.0% of patients, all of whom were anti-TNF naïve.[23] Sandborn *et al* conducted a subgroup analyses on the Ulcerative colitis long-term remission and maintenance with adalimumab 2 (ULTRA 2) clinical trial data to evaluate the 1-year maintenance outcomes among patients with moderately-to-severely active UC who responded to induction therapy with adalimumab. The study showed that 30.9% of patients achieved clinical remission and 49.6% achieved clinical response at week 52 (12 months).[24] A real-world postmarketing study in the UK showed that, of 205 anti-TNF naïve patients receiving golimumab, 68.8% achieved clinical response rate at week 6% and 38.5% had clinical remission.[25] Our study showed that the persistence rates of the two medications slightly higher than what we observed in clinical trials. These real-world persistence results provide a broader perspective that can be used to aid treatment decisions in a more heterogenous clinical setting. Our analysis demonstrated that discontinuation of treatment did not appear to result from the known development of antidrug antibodies, as testing was reported in about a quarter of patients, with a positive test reported for only one patient receiving adalimumab.

Real-world studies on treatment persistence reported from other countries ranged from 35.0% to 85.0%.[13 14 17 26 27] A recent real-world study from Canada reported 63.0% of patients persisted with golimumab treatment.[17] A retrospective study using US claims data reported overall persistence rates of 59.0% at 1 year in biologic-naïve patients with UC, with 56.0% and 44.0% of patients prescribed adalimumab and golimumab, respectively.[16] A real-world analysis from a large-scale US database reported that of patients newly diagnosed with UC prescribed biologic treatment (ie, adalimumab, certolizumab, golimumab, infliximab or vedolizumab), 45.0% persisted with treatment 1 year after initiation.[13] One-year persistence rates in this US study for adalimumab and golimumab were 45.0% and 40.0%, respectively. Overall, 54.0% of patients with UC newly initiated on a biologic (adalimumab, certolizumab, golimumab, infliximab, natalizumab, ustekinumab or vedolizumab) were reported to remain on their first-line therapy at 1 year based on another analysis of the same US insurance claims database.[15] However, McDermott *et al* reported only 35.0% (n=8/23) of patients receiving adalimumab persisting at 1 year.[14] This Irish study might be linked to the low patient numbers, as only 23 out of 3000 patients were found to be patients with UC receiving adalimumab with a high percentage of previous biologic failure (20 of 23 patients had previously received infliximab).

The literature from a recent review of surgery in patients with IBD reported that, although biologics may delay the need for colectomy, 10.0%–30.0% of patients with UC will ultimately require surgery.[28] Our analysis of patient records showed that about 8.0% of patients requiring colectomy in the 12 months following the initiation of golimumab and adalimumab. Other studies reported in the literature support high rates of colectomy-free survival in patients receiving these biologics.[18 29] Given that data were only captured for a maximum of 12 months, in the present study, it is unknown what proportion of these patients may go on to require colectomy at a later timepoint. Two studies in Italian primary IBD centres reported short-term (3 months) colectomy rates of 1.0% and 3.0% in patients with UC receiving golimumab and adalimumab, respectively.[20 30] Two retrospective Spanish multicentre cohort studies reported colectomy outcomes in approximately 16 (11.0%) of 142 patients with UC receiving golimumab[18] compared with approximately 22 (12.0%) of 184 patients with adalimumab as maintenance therapy, during a median 23-month follow-up period[19] and in our sensitivity analysis when adjusting for sex, revealed no significant difference of treatment persistence or colectomy-free survival between golimumab and adalimumab patients.

A systematic literature review reports that switching rate in anti-TNF ranged from approximately 4 (1.0%) of 380 patients at 6 months to approximately 140 (26.0%) of 538 patients at 2 years. In addition, they reported the most common switching pattern, infliximab to adalimumab, occurred in 3.8% (median 5.6 years) to 25.5% (mean 3.3 years) of patients.[31] A US study reported switch rate to another biologic ranged from 4.5% to 20%.[32] About 20.0% of patients switched to other biologic in our study. The most common biologic during the study period that patients switched to was vedolizumab, followed by infliximab.

In our study, 15.0% of patients receiving adalimumab required a dose adjustment within 1 year, and the majority of adjustments were dose escalation. The literature reports a wide range of rates of dose escalation for biologics in UC. Dose escalation of adalimumab patients ranged from 16.0% to 43.0% of patients at 1 year.[19 30 31 33] A Canadian retrospective study of 136 patients with UC receiving golimumab maintenance therapy reported 5.0% having their dose escalated,[17] while an observational study conducted in 14 Italian primary IBD centres reported dose escalations in approximately 17 (16.0%) of 107 patients with UC receiving adalimumab, similar to our findings.[30] The lower rates of dose escalation for golimumab may be due to the lack of approval for dose adjustments for this drug. An analysis of NHS Hospital Episode Statistics in England reported approximately 82 (43.0%) of 191 patients with UC required adalimumab dose escalation during the maintenance phase; however, the duration during which patient data were observed was not reported.[33] Due to the paucity of data, the long-term outcome of dose escalation needs further studies.

To our knowledge, this is the first study comparing persistence and colectomy outcomes between golimumab and adalimumab treatment in patients with UC in the UK. In this cohort, patient demographics such as age, BMI, time to treatment and type of UC diseases as well as their comorbidity profile were comparable between the two treatment groups, with the exception of gender (higher proportion of males in the golimumab cohort). Although treatment was not randomised in this observational study, the impact of potential confounding factors could be low due to the small sample size. The sample size precluded carrying out adequate subgroup analysis between patients receiving golimumab or adalimumab as first-line or second-line anti-TNF. However, the results of our study must be interpreted taking into consideration the known limitations of retrospective real-world data studies. In particular, some degree of missing data occurred due to incomplete medical records, assumed subtotal colectomy as an exclusion criterion and also end point of colectomy-free survival, and all analyses were based on observed data only. Therefore, the number of patients for each variable was varied. Finally, at the time this study was conducted, dose escalations for golimumab were not approved. However, currently early dose escalation of golimumab is approved by the European Medicines Agency, and real-world data are now available, reporting that early dose optimisation of golimumab improves clinical outcomes.[34] If golimumab dose escalation had been possible to include in this study, clinical outcomes observed may have been better. Despite these limitations, we believe that these real-world data, obtained from 16 sites in the UK to avoid single centre bias, provide a useful insight to treatment persistence and clinical outcomes in patients with UC prescribed the anti-TNF agents golimumab and adalimumab.

CONCLUSIONS

Real-world data on treatment persistence and clinical outcomes in clinical settings are essential to understand the real-world effectiveness of pharmaceutical interventions. Our study evaluated important data to fill the evidence gap comparing real-world persistence and colectomy-free outcomes for adalimumab and golimumab in the UK. The persistence rates of both therapies were above 64.0% at 12 months following treatment initiation. In addition, the 1-year colectomy-free survival was relatively similar between the two treatments. Additional research to evaluate long-term persistence and clinical outcomes in the UK should be encouraged.

Acknowledgements Medical writing support under the guidance of the authors was provided by Carole Evans, PhD, on behalf of Adelphi Real World, and was funded by Merck Sharp and Dohme Corp., a subsidiary of Merck & Co., Kenilworth, New Jersey, USA, in accordance with Good Publication Practice guidelines (Ann Intern Med 2015;163:461–464). All authors contributed to conception and design; have been involved in drafting the manuscript and revising it for critically important intellectual content; have given final approval of the version to be published and agree to be accountable for all aspects of the work.

Contributors SH contributed to the conception or design, or analysis and interpretation of data, drafting and revising the article, providing intellectual content of critical importance to the work described and final approval of the version to be published. SH is responsible for the overall content as guarantor. AP was involved in study design, drafts and revisions of the article, contributed to the intellectual integrity of the manuscript, was involved in data analysis, journal selection and approved all drafts including final version of the manuscript. CG contributed to study design, reviewed and provided feedback for the manuscript drafts, provided input in data analysis and approved final version of the manuscript. CMB contributed to study design, data analysis, manuscript drafts and approved final version of the manuscript. SB contributed to study design, reviewed and provided feedback for the manuscript drafts, provided input in data analysis and approved final version of the manuscript. JR contributed to all aspects of the manuscript, including design, analysis, interpretation of data, drafting manuscript, intellectual content, and approval of final version. IR contributed to all aspects of the manuscript, including design, analysis, interpretation of data, drafting manuscript, intellectual content, and approval of final version. GM contributed to data analysis, interpretation of data, manuscript drafts and approval of final version.

Funding Merck Sharp and Dohme funded the study, grant/award number NO: 7139.

Competing interests Sami Hoque has no conflict of interest. Amy Puenpatom and Christopher Black are employed by Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA (who funded this study).Simona Boccaletti and Chloe Green were employed by MSD Ltd., UK Jenna Roberts, Ivana Rajkovic and Gary Milligan are employed by Adelphi Real World.

Patient consent for publication Not required.

Ethics approval The study was conducted in accordance with Good Pharmacoepidemiology Practices issued by the International Society for Pharmacoepidemiology. The study documentation was submitted and approved by the Health Research Authority and a UK National Health Service Research Ethics Committee.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Data collection was undertaken by Adelphi Real World as part of a real-world non-interventional retrospective chart review study, entitled 'Treatment persistence and colectomy-free outcomes in patients with ulcerative colitis receiving golimumab or adalimumab: A UK experience', sponsored by Merck & Co. All data that support the findings of this study are the intellectual property of Merck & Co. All requests for access should be addressed directly to Merck & Co. AP at puenpatom.amy@merck.com.

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