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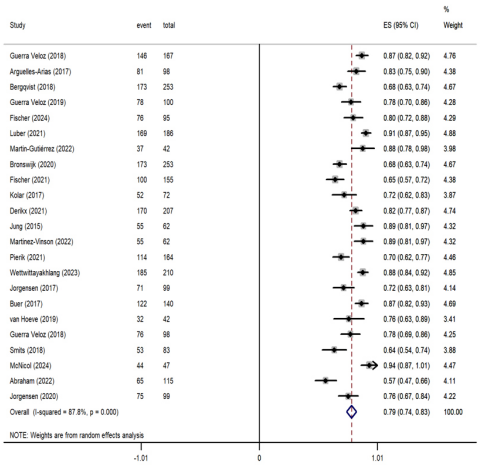
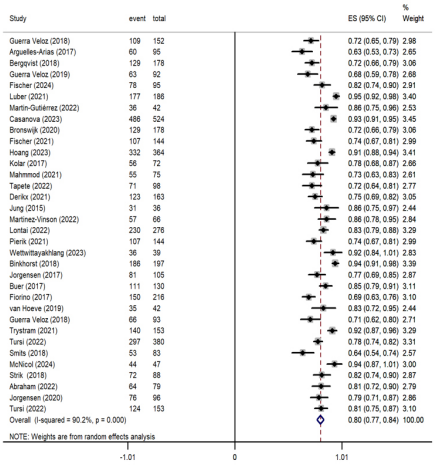
Biosimilar Switching in IBD: Safety, Efficacy, and Immunogenicity in 10,812 Patients — A Systematic Review and Meta-analysis





Biosimilars demonstrated comparable clinical remission rates pre- and post-switch in CD (OR: 0.87, 95% CI: 0.74-0.96) and UC (OR: 1.25, 95% CI: 0.83-1.90) .

Biomarkers (CRP, fecal calprotectin) remained stable post-transition.

Safety profiles were similar between biosimilars and originators.

Zheng, et al.

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Biosimilar switching in IBD: safety, efficacy, and immunogenicity in 10,812 patients — A systematic review and meta-analysis

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Data Availability Statements: The data underlying this article are available in the article and in its online supplementary material.

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Abstract

Background: Biosimilars of infliximab and adalimumab are increasingly adopted in inflammatory bowel disease (IBD) to reduce healthcare costs, but concerns persist regarding their long-term efficacy, immunogenicity, and safety post-switch. This meta-analysis synthesizes contemporary evidence on outcomes after transitioning from originators to biosimilars.

Methods: We systematically searched PubMed, Embase, MEDLINE, and conference abstracts (inception-June 2025) to identify randomized controlled trials (RCTs) and observational studies comparing biosimilars (CT-P13, SB2, SB5, etc.) with originators in IBD. Primary outcomes included clinical remission, discontinuation rate, adverse events (AEs), C-reactive protein (CRP), and fecal calprotectin (FCAL), and anti-drug antibody (ADA) incidence. Risk of bias was assessed using Cochrane and Newcastle-Ottawa tools. Pooled odds ratios (ORs) and event rates were calculated using random-effects models.

Results: Among 37 studies (36 observational, 1 RCTs) encompassing 10812 IBD patients, biosimilars demonstrated comparable clinical remission rates pre- and post-switch in Crohn's disease (CD) (OR = 0.87, 95% CI: 0.74–0.96) and ulcerative colitis (UC) (OR = 1.25, 95% CI: 0.83–1.90). Biomarkers (CRP, fecal calprotectin) remained stable post-transition. Pooled discontinuation rates were 13% (range: 2-36%) after switching. Safety profiles were similar between biosimilars and originators, ADA incidence (OR = 0.96, 95% CI: 0.46-2.02) showed no significant differences. Heterogeneity stemmed from differences in follow-up duration, disease subtype (CD vs. UC), and variable outcome definitions.

Conclusion: Biosimilars maintain comparable efficacy, safety, and immunogenicity to originators in IBD, supporting their use in single or multiple switching scenarios. Standardized reporting of mucosal healing, drug monitoring, and economic metrics is critical to optimize biosimilar adoption in real-world practice.

Keywords: Biosimilars. Inflammatory bowel disease. Infliximab. Adalimumab. Switching. Meta-analysis.

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Introduction

Inflammatory bowel disease (IBD), encompassing Crohn's disease (CD) and ulcerative colitis (UC), represents a group of chronic immune-mediated disorders characterized by relapsing gastrointestinal inflammation. The advent of biologic therapies targeting tumor necrosis factor-alpha (TNF-α), particularly infliximab and adalimumab, has revolutionized IBD management by modifying disease progression and improving long-term outcomes.[1] However, the substantial economic burden associated with these biologic agents poses significant challenges to healthcare sustainability.[2,3]

The emergence of biosimilars - biological products demonstrating high similarity to reference products in quality, safety, and efficacy - offers a cost-effective alternative to originator biologics.[4,5] Since the 2013 approval of CT-P13, the first infliximab biosimilar, over 15 TNF-α inhibitor biosimilars have entered global markets, achieving 30-50% cost reductions while maintaining therapeutic equivalence in rheumatologic conditions.[5,6]

Despite established efficacy in biologic-naïve patients, concerns persist regarding outcomes following transition from originators to biosimilars.[7-9] The NOR-SWITCH trial, while establishing non-inferiority in mixed populations, included only 20% IBD patients with limited long-term follow-up.[10-15] Real-world evidence reveals paradoxical trends - while some cohorts demonstrate 90% drug persistence at 12 months[16,17], others report 15-30% discontinuation rates attributed to non-medical factors,[18] suggesting potential nocebo effects requiring further investigation.

Current clinical guidelines[19,20] endorse single biosimilar transitions but provide limited guidance on reverse switching or biosimilar-to-biosimilar transitions. Pharmacoeconomic analyses remain fragmented, with only 22% of studies incorporating indirect costs of switching failures.[21] Additionally, emerging pharmacokinetic data suggest potential trough level variations ≥15% between certain biosimilar-originator pairs,[22] raising questions about therapeutic drug monitoring applicability in switched populations.

This systematic review and meta-analysis aims to address current evidence gaps regarding the clinical outcomes of switching from originator to biosimilar through three primary objectives: 1) Evaluate changes in clinical remission rates, discontinuation, and adverse events before and after switching; 2) Assess immunogenicity profiles by analyzing anti-drug antibody incidence and variations in inflammatory biomarkers, including CRP and fecal calprotectin; 3) Explore factors contributing to heterogeneity, such as disease subtype and follow-up duration. By synthesizing evidence from 37 multinational studies, we aim to provide definitive guidance for biosimilar implementation in diverse clinical scenarios.

Methods

Search Strategy

This systematic review and meta-analysis was performed according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. We used a predetermined protocol and registered this meta-analysis (PROSPERO number: CRD420251038142). We systematically searched PubMed, Ovid Embase, Medline, Cochrane CENTRAL, and conference abstracts such as European Crohn's and Colitis Organization (ECCO), Digestive Disease Week (DDW), and United European Gastroenterology (UEG) week from inception up to June 2025. Search terms were "CT-P13", "infliximab biosimilar", "inflammatory bowel disease (IBD)", "ulcerative colitis (UC)", "Crohn's disease (CD)", and related keywords.

Inclusion Criteria and Exclusion Criteria

Studies were selected based on the PICOS framework:

1. Population: Adults/pediatric IBD patients (CD/UC) undergoing originator-to-biosimilar transition;
2. Intervention: Single/multiple switches between approved TNF-α biosimilars (CT-P13, SB2, GP2017, etc.);
3. Comparator: Originator maintenance or reverse switching;
4. Outcomes: Primary - clinical remission (CDAI/HBI/pMayo), drug persistence; Secondary - biomarker stability (CRP/fCal), immunogenicity (ADA), trough levels,

adverse events (AEs);

5. Study design: RCTs, prospective/retrospective cohorts ≥2 months follow-up.

Exclusion criteria included animal studies, non-English publications, and incomplete data.

Data extraction and Quality assessment

Two investigators independently extracted data on study design, sample size, patient demographics, interventions, and outcomes. RCT quality was assessed using the Cochrane Risk of Bias Tool (2019). Observational studies were evaluated via the Newcastle-Ottawa Scale (NOS), with scores ≥5 indicating high quality. Risk of bias was categorized as low, high, or unclear.

Statistical analysis

A random-effects model (STATA 17) was used to pool event rates (clinical remission, discontinuation rate, ADA incidence, and adverse events) and odds ratios (ORs) with 95% confidence intervals (CIs). Standardized mean differences (SMDs) were used to analyze inflammatory biomarker changes (C-reactive protein (CRP) and fecal calprotectin (FCAL)). Heterogeneity was quantified using the I^2 statistic: I^2 <25% (low), 25-75% (moderate), >75% (high). Subgroup analyses were performed by disease type, follow-up duration (short-term: 8–16 weeks; medium-term: 17–32 weeks; long-term: ≥33 weeks), geographic region (Europe, North America, Asia) and prior biologic use (infliximab, adalimumab, or mixed). Sensitivity analyses tested robustness by sequentially excluding individual studies.

Results

Literature Search and Study Characteristics

This meta-analysis included 37 studies (36 observational cohorts, 1 RCTs) from 15 countries, predominantly European (76%, e.g., Spain [6], Italy [5], Netherlands [4], Belgium [3], Norway [3]). Prospective observational designs dominated (67.6%, 25 studies), followed by retrospective observational (29.7%, 11 studies) and RCTs (2.7%,

1 studies). Studies evaluated infliximab biosimilars (CT-P13 in 22 cohorts and 1 RCTs, SB2 in 8 cohorts and 1 RCT) and adalimumab biosimilars (SB5, ABP501, GP2017 in 7 studies) across diverse populations (n=42-1092), with Crohn's disease (CD) and ulcerative colitis (UC) cohorts explicitly reported in 30 studies. Follow-up durations varied: ≤6 months (6 studies), 8-24 months (31 studies), and >2 years (1 studies). Clinical remission rates post-switch ranged from 63% (Arguelles-Arias 2017) to 95% (Luber 2021). CRP and fecal calprotectin levels showed no clinically significant changes across cohorts. Pooled discontinuation rates were 13% (range: 2-36%). Adverse event rates post-switch 20% (2%-70%) mirrored pre-switch periods. Table 1 provides a comprehensive overview of the study characteristics pertaining to the papers incorporated in our meta-analysis.

Clinical remission

Clinical remission rates before switching were reported in 23 studies, with a pooled remission rate of 79% (95% CI: 74%-83%; I^2 = 87.8%) (Figure 1) . After switching, 34 studies reported clinical remission, with a pooled remission rate of 80% (95% CI: 77%-84%; I^2 = 90.2%) (Figure 2) . The pooled odds ratio (OR) comparing remission rates after versus before switching was 0.86 (95% CI: 0.68-1.08; I^2 = 65.8%), indicating no significant difference between the two periods.

Subgroup analysis by follow-up duration after switching included six studies. The pooled clinical remission rates were 85% (95% CI: 74%-97%; I^2 = 94.1%) at 8-16 weeks, 85% (95% CI: 74%-96%; I^2 = 92.4%) at 17-32 weeks, and 75% (95% CI: 69%-81%; I^2 = 59.0%) at ≥33 weeks, indicating stable remission in the short-to-medium term, with a modest decline observed in longer-term follow-up.

Subgroup analysis by disease type included 22 studies. In UC, the clinical remission rate was 78% (95% CI: 72%-84%; I^2 = 75.7%) before switching and 81% (95% CI: 76%-86%; I^2 = 73.0%) after switching, with a pooled OR of 1.25 (95% CI: 0.83-1.90; I^2 = 52.8%), suggesting a slight improvement post-switch. In CD, the remission rate was 79% (95% CI: 75%-84%; I^2 = 85.0%) before switching and 78% (95% CI: 74%-83%; I^2 = 84.5%) after switching, with a pooled OR of 0.87 (95% CI: 0.74-0.96; I^2 = 92.4%), indicating no significant change. These results suggest that

switching to a biosimilar maintained clinical remission across disease types.

Additional subgroup analyses were conducted by prior biologic use (33 studies) and geographic region (33 studies). The clinical remission rates after switching were: infliximab (79%), adalimumab (79%), and mixed (93%) for patients with different prior biologics. Across regions, the remission rates were: Europe (78%), North America (90%), and Asia (86%). No significant differences were observed between subgroups.

Discontinuation rate

A total of 34 studies reported discontinuation rates before and after switching. The pooled discontinuation rate was 15% (95% CI: 7%-24%; I^2 = 98.2%) (Figure 3) before and 13% (95% CI: 10%-17%; I^2 = 95.1%) after switching, indicating no apparent increase in treatment withdrawal following the transition to biosimilars. The pooled OR comparing discontinuation after versus before switching was 0.74 (95% CI: 0.43-1.27; I^2 = 87.0%), suggesting a modest, non-significant trend toward lower discontinuation following the switch.

Subgroup analysis by disease type included 8 studies. In UC, the pooled discontinuation rate was 8% (95% CI: 3%-14%; I^2 = 33.3%) before switching and 8% (95% CI: 5%-12%; I^2 = 21.7%) after switching, indicating overall stability in treatment continuation across studies. In CD, discontinuation rates were 12% (95% CI: 0%-28%; I^2 = 96.0%) before and 11% (95% CI: 4%-17%; I^2 = 80.8%) after switching, also suggesting no notable difference post-switch.

Additional subgroup analyses were conducted by prior biologic use (35 studies) and geographic region (30 studies). The post-switch discontinuation rates were: infliximab (13%), adalimumab (15%), and mixed (10%). Across regions, the rates were: Europe (12%), North America (16%), and Asia (14%). No significant differences were observed between subgroups, suggesting that prior biologic type and geographic region did not substantially influence discontinuation rates after switching.

Inflammatory biomarker (CRP and FCAL) changes

Changes in inflammatory biomarkers, including CRP and FCAL, were assessed using standardized mean differences (SMD) in this meta-analysis. For CRP, 8 studies were included in the pooled analysis. The pooled SMD comparing levels after versus before switching was 0.00 (95% CI: -0.09-0.10; I^2 = 0%) (Figure 4), indicating no significant overall change in systemic inflammation following the switch. Subgroup analysis by disease type included 17 studies. In the CD subgroup, the pooled SMD was -0.16 (95% CI: -0.31- -0.01; I^2 = 75.4%), indicating a modest but statistically significant reduction in CRP levels after switching. In contrast, the UC subgroup showed a similar effect size SMD = -0.16 (95% CI: -0.30- -0.03; I^2 = 32.6%).

For FCAL, the pooled analysis included 4 studies, yielding an overall SMD of -0.07 (95% CI: -0.39- -0.26; I^2 = 88.5%), which reflects minimal change in fecal inflammatory burden after switching. Subgroup analysis by disease type was conducted based on 5 studies. In UC, a reduction in FCAL was observed SMD = -1.29 (95% CI: -2.71-0.13; I^2 = 96.9%), indicating a potential improvement in mucosal inflammation. Conversely, in CD, the SMD was 0.47 (95% CI: -0.53-1.46; I^2 = 97.8%), suggesting a possible increase in FCAL levels following the switch.

Anti-drug antibodies incidence

The incidence of anti-drug antibodies (ADAs) before and after switching was analyzed across 19 studies. The pooled ADA rate was 6% (95% CI: 4%-8%; I^2 = 62.9%) (Figure 5) before switching and decreased slightly to 4% (95% CI: 2%-5%; I^2 = 76.5%) after switching. The pooled OR for ADA incidence after versus before switching was 0.96 (95% CI: 0.46-2.02; I^2 = 78.4%), indicating no statistically significant difference in immunogenicity risk. Subgroup analysis by disease type was conducted based on three studies that explicitly reported ADA incidence in UC and CD. Before switching, the ADA incidence was 7% (95% CI: 3%-12%; I^2 = 0.0%) in UC and 4% (95% CI: 0%-8%; I^2 = 0.0%) in CD. After switching, the incidence increased to 13% (95% CI: 7%-20%; I^2 = 0.0%) in UC and 15% (95% CI: -0.11%-41%; I^2 = 68.0%) in CD.

Adverse events incidence

A total of 31 studies reported AEs before and after switching. The pooled AE incidence was 30% (95% CI: 18%-42%; I^2 = 97.5%) before and 20% (95% CI: 15%-24%; I^2 = 97.0%) after the switch, suggesting a possible reduction in overall AE risk following the transition to biosimilars. The pooled OR comparing AE incidence after versus before switching was 0.63 (95% CI: 0.35-1.14; I^2 = 82.9%). Subgroup analysis by disease type included 8 studies. In UC, the pooled AE incidence decreased from 38% (95% CI: 6%-71%; I^2 = 95.9%) before switching to 19% (95% CI: 7%-30%; I^2 = 93.6%) after switching. In CD, the AE incidence similarly declined from 58% (95% CI: 44%-72%; I^2 = 38.4%) before to 24% (95% CI: 10%-39%; I^2 = 97.5%) after the switch. These findings suggest a consistent trend toward lower AE incidence post-switch across both UC and CD.

Additional subgroup analyses were conducted by prior biologic use (30 studies) and geographic region (30 studies). The post-switch AE incidence rates were: infliximab (19%), adalimumab (18%), and mixed (10%). Across regions, the rates were: Europe (20%), North America (16%), and Asia (6%). The lower AE incidence rate observed in Asia may be influenced by the small number of studies and patients included, and thus the difference may not fully reflect the true situation. Nevertheless, it also highlights that regional differences in healthcare systems and drug availability could potentially affect AE incidence.

Heterogeneity and Sensitivity Analysis

Subgroup analyses were conducted to explore potential sources of heterogeneity across primary outcomes. Analyses stratified by region and prior biologic use, in addition to follow-up duration and disease type, revealed that heterogeneity remained high for most outcomes. These findings suggest that, while baseline disease characteristics and study-level factors may partially explain variability, other unmeasured factors—such as patient demographics (age, sex, disease duration and severity), baseline inflammatory status (CRP, fecal calprotectin), study design (prospective vs retrospective, single vs multicenter), follow-up duration, and differences in switching strategies may contribute to the

observed heterogeneity across studies.

Sensitivity analyses conducted across all primary endpoints based on pooled overall rates showed consistent results, suggesting that the pooled estimates were generally robust despite variations in study quality and design.

Quality assessment and Publication Bias

The methodological quality of the included studies was evaluated using standardized tools. For the RCTs, the Cochrane Risk of Bias tool was applied, while the observational studies were assessed using the Newcastle-Ottawa Scale (NOS), with scores ranging from 7 to 9, indicating overall moderate to high quality, the certainty of evidence for each primary outcome was assessed using the GRADE evidence profile.

Funnel plots were generated to visually assess potential publication bias across primary outcomes. While many plots appeared largely symmetrical, suggesting minimal bias, some funnel plots indicated notable asymmetry, raising the possibility of publication bias in certain outcome domains. These results are presented in the supplementary tables.

Discussion

Across 37 studies encompassing over 10,000 patients, our findings demonstrate that biosimilar switching does not compromise clinical remission, nor does it increase the risk of treatment discontinuation, immunogenicity, or adverse events. These results support the therapeutic equivalence of biosimilars to their reference products in real-world IBD populations.

Consistent with previous large-scale trials such as NOR-SWITCH and various real-world studies, we observed no significant difference in clinical remission rates before and after switching. Subgroup analyses by disease type further confirmed the maintenance of disease control in both CD and UC, with UC patients showing a modest, non-significant trend toward improvement. Importantly, AE profiles

remained stable or improved post-switch, with pooled AE rates declining from 30% pre-switch to 20% post-switch. These results suggested that biosimilars are well tolerated, even in patients previously stabilized on originators.

Nevertheless, in our meta-analysis, CD patients showed a trend toward increased FCAL levels and higher ADA incidence following switching to a biosimilar. This observation may be related to the intrinsic disease characteristics of CD, including more extensive multi-segment involvement, broader intestinal lesions, and higher inflammatory burden, which could render FCAL levels more variable. Additionally, the heightened immune reactivity in CD patients may contribute to the increased ADA incidence observed post-switch. However, it is important to note that the number of studies reporting these outcomes was limited, and the pooled estimates were characterized by wide confidence intervals that crossed zero and very high inter-study heterogeneity, suggesting that individual variability and small sample sizes may have substantially influenced the results. Therefore, these findings should be interpreted with caution.

Despite these limitations, the observed signals raise the possibility that certain subgroups of CD patients may benefit from targeted therapeutic drug monitoring (TDM) following biosimilar switching, particularly those with extensive intestinal involvement or previous history of immunogenicity. Future high-quality studies with larger sample sizes are needed to confirm these trends and to determine whether post-switch TDM could help optimize treatment outcomes in these potentially higher-risk subgroups.

From a health-economic perspective, the widespread adoption of biosimilars offers substantial opportunities for cost savings and budget optimization. Previous budget impact analyses have shown that biosimilar implementation can reduce overall treatment expenditures by 20–40%, allowing the reallocation of healthcare resources to expand biologic accessibility for a broader patient population. Such cost savings are particularly relevant in chronic conditions like IBD, where long-term biologic use imposes significant economic burden on both patients and healthcare systems.

From a clinical and policy standpoint, our findings support biosimilar switching as a sustainable strategy for both clinicians and payers. To ensure successful implementation, it is essential to mitigate the nocebo effect—a negative therapeutic response driven by patients' expectations of reduced efficacy after switching. Structured patient education, transparent communication about therapeutic equivalence, and consistent messaging from healthcare professionals can effectively minimize this effect. In addition, integrating therapeutic drug monitoring (TDM) and real-world pharmacovigilance programs can help maintain patient confidence and treatment adherence post-switch. Collectively, these measures may enhance both the clinical and economic value of biosimilar adoption in routine IBD management.

This study has several notable strengths, including its large sample size, broad geographic representation, inclusion of both infliximab and adalimumab biosimilars, and assessment of diverse outcomes spanning clinical, immunologic, and biochemical domains. A critical strength of this analysis lies in the inclusion of inflammatory biomarkers-CRP and FCAL-as objective measures of disease activity. We also assessed ADA incidence to address concerns regarding immunogenicity. The pooled ADA rates did not differ significantly before and after switching, aligning with prior pharmacovigilance data and supporting the immunologic safety of biosimilars.

Our meta-analysis revealed substantial heterogeneity across several key outcomes. To explore potential sources of this variability, we performed multiple subgroup analyses stratified by geographic region, disease subtype, prior biologic exposure, and follow-up duration. However, heterogeneity remained high in most comparisons, suggesting that these factors alone could not fully explain the observed inconsistencies. This may be attributed to unmeasured patient-level and study-level differences, including demographic characteristics (such as age, sex, disease duration, and baseline disease severity), baseline inflammatory status (CRP and fecal calprotectin levels), and variations in study design (prospective vs. retrospective, single-center vs. multicenter). In addition, differences in switching strategies—such as single versus multiple transitions between biosimilars—may further contribute to the observed heterogeneity.

The limited number of randomized controlled trials (only one RCT included in our analysis) represents a key limitation, as the predominance of observational data introduces potential selection bias and confounding. Although sensitivity analyses confirmed the robustness of pooled estimates for most outcomes, a few individual studies exerted disproportionate influence on the overall results, highlighting variability in data quality, analytical methods, and reporting standards. The persistently high heterogeneity ($I^2 > 75\%$) observed for certain endpoints—particularly fecal calprotectin and adverse events—indicates that these results should be interpreted with caution. Future research should aim to improve methodological uniformity, employ standardized outcome definitions, and report detailed patient-level data to enable more precise and comparable analyses.

In conclusion, this meta-analysis provides robust evidence that biosimilar switching in IBD is safe, effective, and immunologically comparable to originator biologics. Subtle improvements in select biomarkers and a reduction in AE rates further support the clinical utility of biosimilars. High-quality, standardized, and long-term studies are essential to address remaining uncertainties and guide biosimilar integration into routine IBD management.

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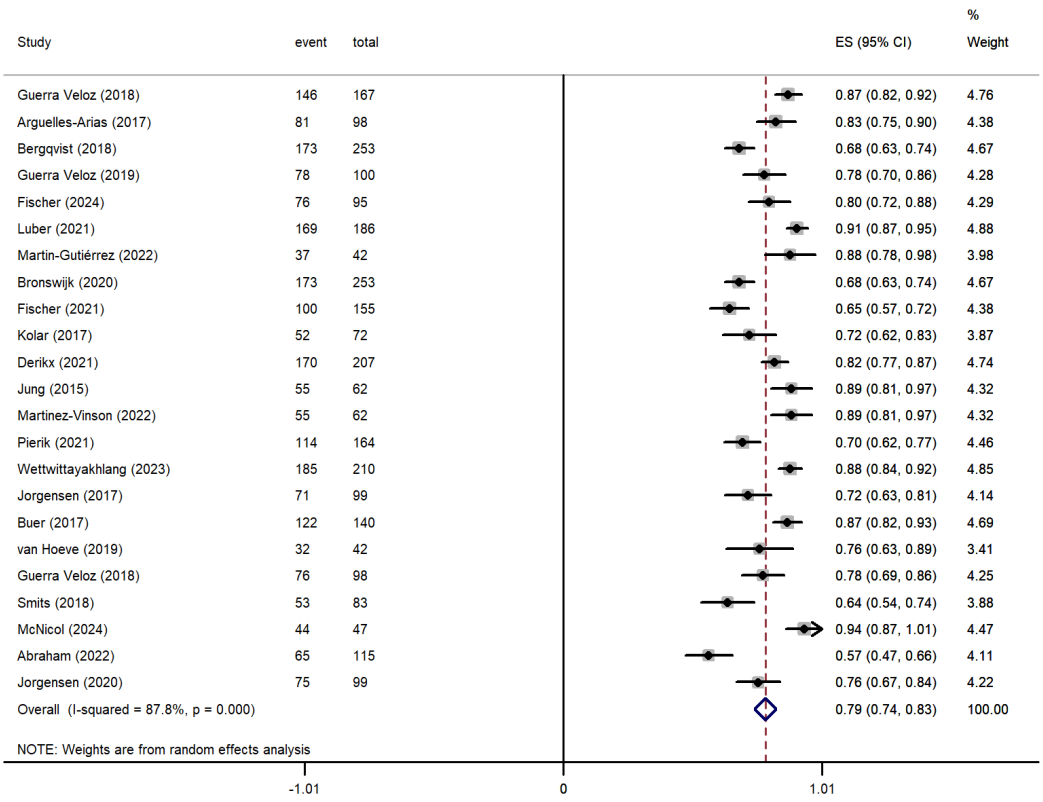

Figure 1: Forest plot depicting the pooled clinical remission rate before-switching

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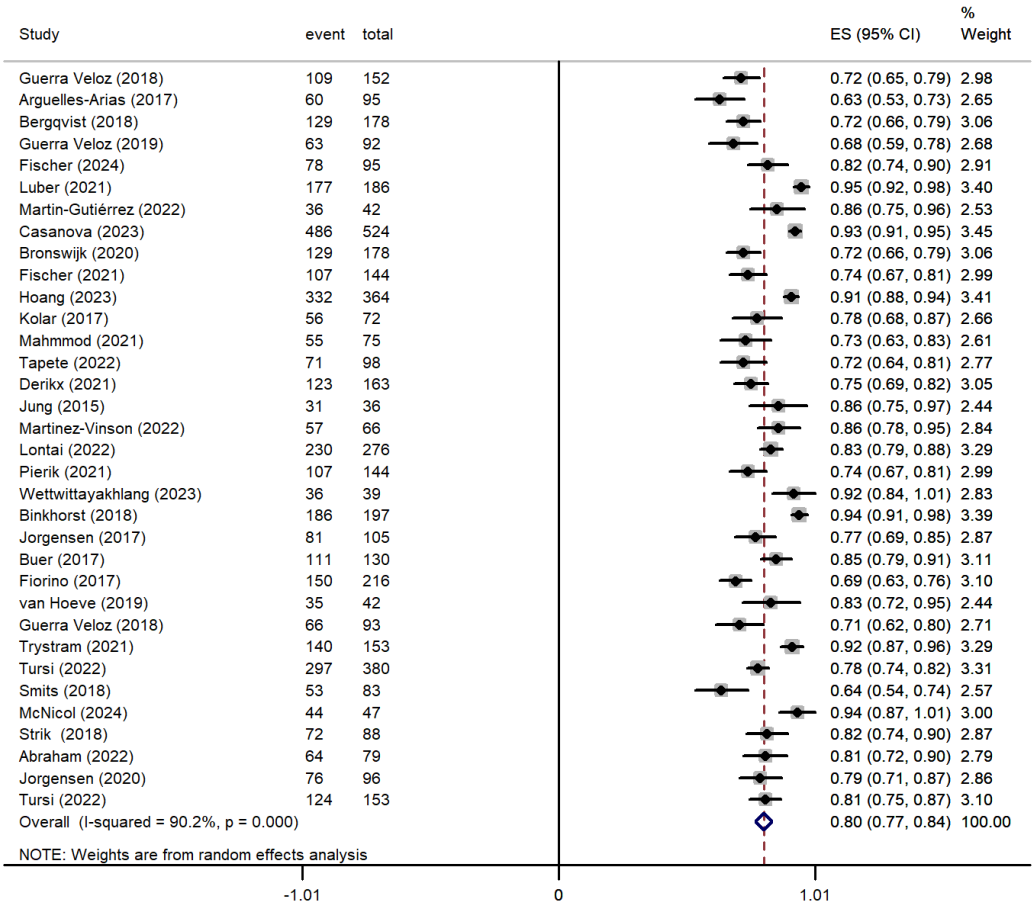

Figure 2: Forest plot depicting the pooled clinical remission rate after-switching

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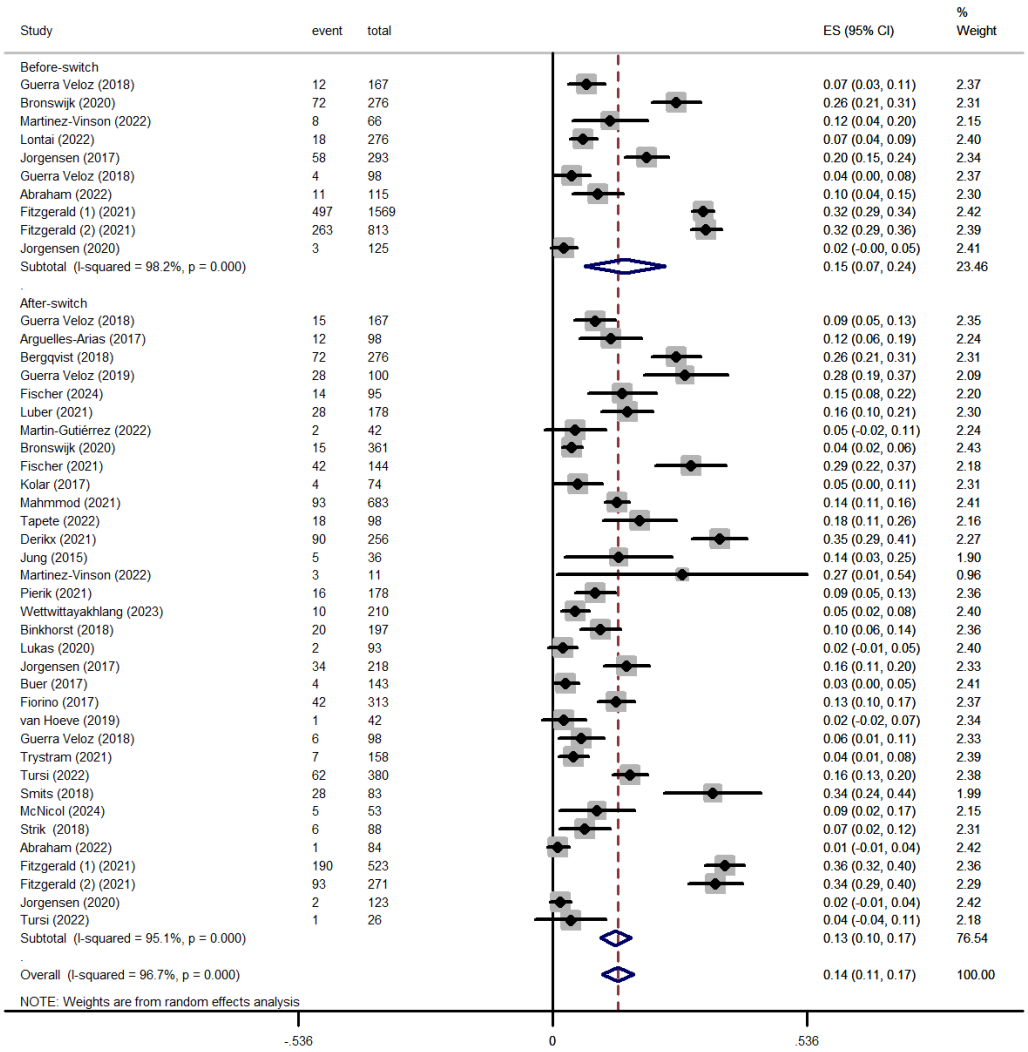

Figure 3: Forest plot depicting the pooled discontinuation rate before and after switching

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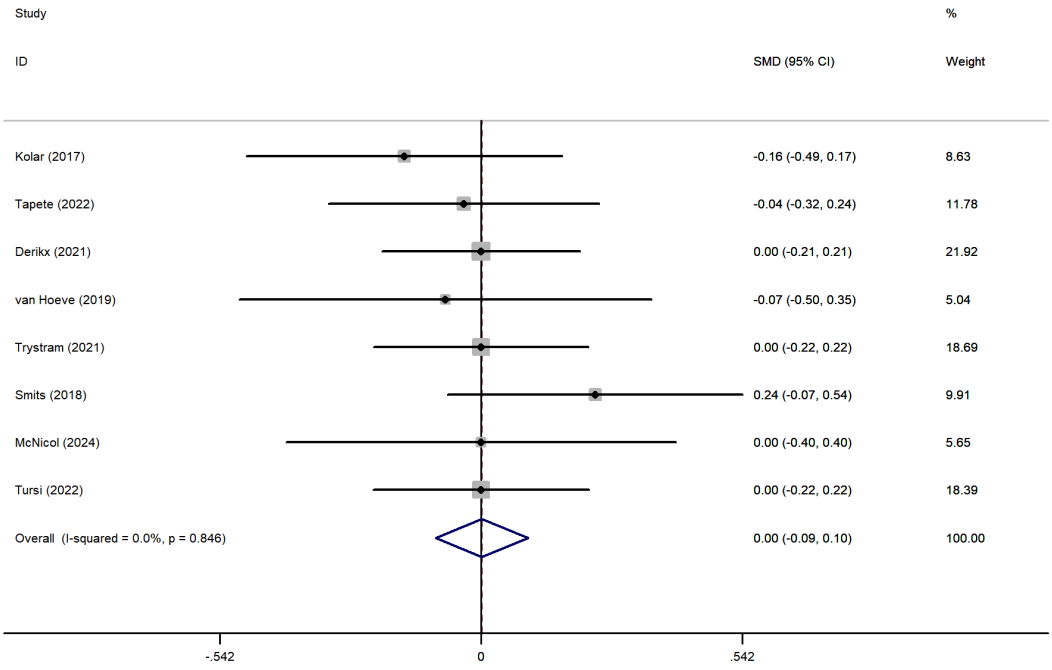

Figure 4: Forest plot depicting the pooled SMD in CRP levels before and after switching

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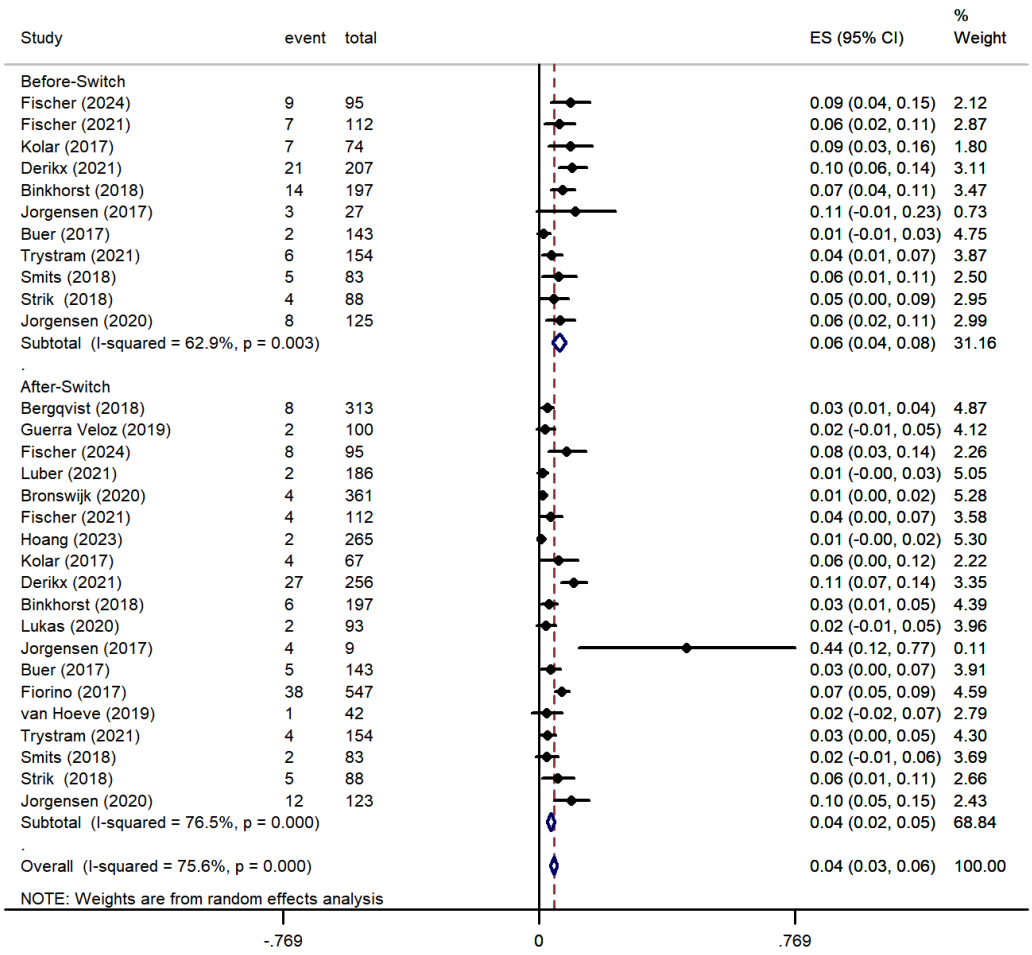

Figure 5: Forest plot depicting ADA rates before and after switching

Table 1: Characteristics of the included studies

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Author	**Year**	**Country**	**Study design**	**Population**	**Mean Age**	**Female**	**Originator**	**Biosimilar**	**Follow-up Duration**
Guerra Veloz	2018	Spain	Multicenter Prospective Observational	167 (116 CD, 51 UC)	CD: 40.5 (28-54) UC: 46 (34-58)	51.00%	Infliximab	CT-P13	12 months
Macaluso	2020	Italy	Multicenter Prospective Observational	276 (136 CD, 140 UC)	39 (29.5-54)	62.30%	Infliximab	SB2	8 months
Arguelles-Arias	2017	Spain	Prospective single-center observational	98 (67 CD, 31 UC)	CD: 42, UC: 43	43.90%	Infliximab	CT-P13	12 months

Bergqvist	2018	Sweden	Prospective multicenter observational	313 (195 CD, 118 UC)	CD: 37, UC: 38	32.60%	Infliximab	CT-P13	12 months
Guerra Veloz	2019	Spain	Prospective single-center observational	100 (64 CD, 36 UC)	CD: 40.5, UC: 46	49.00%	Infliximab	CT-P13	24 months
Fischer	2024	Germany	Prospective single-center observational	95 (60 CD, 35 UC)	CD: 39, UC: 39	40.00%	Infliximab	SB2	48 weeks
Luber	2021	UK	Prospective observational cohort	186 (99 CD, 87 UC)	CD: 33.2, UC: 30.7	56%	CT-P13	SB2	1 year
Martin-Gutiérrez	2022	Spain	Prospective single-center observational	42 (33 CD, 9 UC)	42	45.2%	Infliximab	CT-P13	2 years
Casanova	2023	Spain	Retrospective multicenter	524 (313 NSC, 211 SC)	42-43	45-46%	Adalimumab	Various biosimilars	24 months
Bronswijk	2020	Belgium	Prospective multicenter	361 (251 CD, 110 UC)	CD: 37, UC: 38	45.80%	Infliximab	CT-P13	6 months

			observational						

			Prospective multicenter observational						
Fischer	2021	Germany	Prospective single-center observational	144 IBD (94 CD, 50 UC)	CD: 39 UC: 42.5	45.80%	Infliximab	SB2	80 weeks
Hoang	2023	Canada	Retrospective observational	364 (264 switch, 99 originator) CD: 247 UC: 117	Switch: 39.1±13.0 Originator: 38.2±11.8	Switch: 42.3% Originator: 45.5%	Infliximab	CT-P13/SB2	12 months
Kolar	2017	Czech	Prospective observational cohort	74 IBD (56 CD, 18 UC)	34.3±9.0	48.60%	Infliximab	CT-P13	56 weeks
Mahmmod	2021	Netherlands	Retrospective multicenter cohort	758 IBD (571 CD, 187 UC)	CD: Median 34.5 (IQR 24.3-48.0) UC: Median 34.5 (IQR 24.3-48.0)	52.00%	Infliximab	CT-P13	52 weeks
Tapete	2022	Italy	Prospective	98 IBD (78	40.59 ±	35.71%	Adalimuma	SB5	12 months

			multicenter observational	CD, 20 UC)	17.39		b		

				98 IBD (78 CD, 20 UC)	40.59 ± 17.39		Adalimumab		
Derikx	2021	UK	Retrospective observational cohort	256 (228 CD, 28 UC/IBD-U)	CD: Median 37 years (IQR 29.5–54) UC: Median 38 years (IQR 24.3–48)	47.30%	Adalimumab	SB5	13.7 months
Jung	2015	Korea	Retrospective multicenter	110 IBD (59 CD, 51 UC)	CD: 27.9±13.3 (naive), 24.5±9.4 (switched) UC: 39.2±13.9 (naive), 34.0±11.1 (switched)	CD: 81.3% (naive), 74.1% (switched) UC: 69.0% (naive), 55.6% (switched)	Infliximab	CT-P13	54 weeks

Martinez-Vinson	2022	France	Prospective observational cohort	126 pediatric IBD (102 CD, 24 UC)	CD: 13.4±2.8 (naive), 15.0±2.7 (switched) UC: 12.4±3.9 (naive), 12.5±3.5 (switched)	CD: 41.2% (naive), 45.1% (switched) UC: 44.4% (naive), 46.7% (switched)	Infliximab	SB2	12 months
Lontai	2022	Hungary	Prospective multicenter study	276 (205 CD, 71 UC)	CD: 38 (IQR 28-47), UC: 32.5 (IQR 26-41)	57.5% (CD), 67.4% (UC)	Adalimumab	ABP501, MSB11022, GP2017	40 weeks
Pierik	2021	Netherlands	Prospective observational study	178 (114 CD, 55 UC)	CD: 41.5 (SD 13.9), UC: 46.7 (SD 15.3)	56.1% (CD), 38.2% (UC)	Infliximab	CT-P13	1 year

Wettwittayakhlang	2023	Canada	Prospective observational cohort	210 IBD (171 CD, 39 UC)	CD: 41 (IQR 28-61) UC: 43 (IQR 32-64)	42.40%	Infliximab/Adalimumab originators	Various biosimilars (Inflectra, Avsola, Abrilada, etc.)	24 weeks
Binkhorst	2018	Netherlands	Retrospective Observational	197 IBD (135 CD, 62 UC)	Median: 43 (18–85)	51%	Infliximab	CT-P13	16 weeks
Lukas	2020	Czech	Prospective Observational	SWITCH cohort: 93 IBD (80 CD, 11 UC) ORIGINATOR cohort: 93 IBD (80 CD,	SWITCH: 40 (IQR: 32–49) ORIGINATOR: 40 (IQR: 33–52)	SWITCH: 54% (50/93) ORIGINATOR: 50.5% (47/93)	Adalimumab	SB5	10 weeks

				13 UC)					

				SWITCH cohort: 93 IBD (80 CD, 11 UC) ORIGINATOR cohort: 93 IBD (80 CD, 13 UC)					
Jorgensen	2017	Norway	Randomized, double-blind, non-inferiority trial	482 patients (155 CD, 93 UC, 91 SpA, 77 RA, 30 PsA, 35 Psoriasis)	47.9 years (SD 14.8)	39%	Infliximab	CT-P13	52 weeks
Buer	2017	Norway	Prospective open-label single-center	143 (99 CD, 44 UC)	CD: 36 (17-83) UC: 35 (19-72)	36%	Infliximab	CT-P13	6 months
Fiorino	2017	Italy	Prospective multicenter observational	547 (313 CD/234 UC)	31.9±14.3 years	42%	Infliximab	CT-P13	4.3 months

van Hoeve	2019	Belgium	Prospective single-center observational	42 pediatric IBD (26 CD, 16 UC)	CD: 12.6 yrs (IQR 9.4-14.3) UC: 12.6 yrs (IQR 9.4-14.3)	50%	Infliximab	CT-P13	6 months
Guerra Veloz	2018	Spain	Multicenter Observational Cohort Study	98 IBD (67 CD, 31 UC)	39.9 (SD 12.5)	44.60%	Infliximab	CT-P13	12 months
Trystram	2021	France	Prospective multicenter cohort study	158 IBD (110 CD, 48 UC)	44.6±14.4 (double switch), 41.7±17.5 (single switch)	49.6% (double), 39.5% (single)	Infliximab	CT-P13	54 weeks
Tursi	2022	Italy	Multicenter Retrospective Observational	380 IBD (197 UC, 183 CD)	UC: 43 (IQR 31.7-56.2) CD: 41 (IQR 29.0-54.7)	48.20%	Infliximab	CT-P13, SB2	12 months
Smits	2018	Netherlands	Prospective observational	83 IBD patients (57	36 (median, IQR 27-51)	66%	Infliximab	CT-P13	104 weeks

			cohort	CD, 24 UC, 2 IBD-U)					

			Prospective observational cohort						
McNicol	2024	USA	Single-center retrospective observational study	53 IBD patients (39 CD, 14 UC)	18 years (SD 2.84)	53%	Infliximab	Infliximab-dyyb, infliximab-abda, infliximab-axxq	12 months
Strik	2018	Belgium/Netherlands	Prospective open-label phase 4 non-inferiority trial	88 (46 UC, 42 CD)	UC: 48.3 (16.0) CD: 41.5 (15.7)	51.1%	Infliximab	CT-P13	16 weeks
Abraham	2022	US & Canada	Prospective observational (24 centers)	115 (48 UC; 67 CD)	44	51%	Infliximab	Infliximab-dyyb	12 months

Fitzgerald (1)	2021	USA	Retrospective cohort	Prevalent IBD: - 523 switchers - 1569 continuers	-	-	Infliximab	CT-P13/SB2	306 days (switchers) 303 days (continuers)
Fitzgerald (2)	2021	USA	Retrospective cohort	Incident IBD: - 271 switchers - 813 continuers	-	-	Infliximab	CT-P13/SB2	296 days (switchers) 304 days (continuers)
Jorgensen	2020	Norway	Randomized double-blind non-inferiority	248(155 CD, 93 UC)	CD: 38.8±13.8 UC: 45.2±14.4	CD: 39-42% UC: 30-38%	Infliximab	CT-P13/SB2	78 weeks
Tursi	2022	Italy	Multicenter retrospective study	153 IBD (127 CD, 26 UC)	42 (IQR 30-53)	49%	Adalimumab	ABP501, SB5, GP2017,	12 months

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