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Delays Related to Prior Authorization in Inflammatory Bowel Disease

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Abstract

BACKGROUND: Delays in advancing to biologic therapies are associated with adverse outcomes in inflammatory bowel disease (IBD). Insurer-mandated prior authorizations have been linked to prolonged medication initiation times. We hypothesized that prior authorizations are associated with prolonged biologic initiation time and increased IBD-related healthcare utilization among children with IBD.

METHODS: We performed a retrospective cohort study of 190 pediatric patients with IBD initiating biologics at a tertiary care hospital to measure the association between prior authorization, biologic initiation time (physician recommendation to first dose), and healthcare utilization (hospitalization, surgery, or emergency department visit). Demographic, insurance, and

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disease severity–related covariables were collected. Multivariable linear regression was used to measure the association between prior authorization and biologic initiation time. Propensity score methods were used to measure the associations between prior authorization and IBD-related healthcare utilization within 180 days and corticosteroid dependence at 90 days, with adjustment for insurance type, demographics, and disease severity–related characteristics.

RESULTS: Median biologic initiation time was 21 days. Prior authorization and complicated prior authorizations (requiring appeal, step therapy, or peer-to-peer review) were associated with 10.2-day (95% confidence interval [CI] 8.2 to 12.3) and 24.6-day (95% CI 16.4 to 32.8) increases in biologic initiation time, respectively. Prior authorizations increased the likelihood of IBD-related healthcare utilization within 180 days by 12.9% (95% CI 2.5 to 23.4) and corticosteroid dependence at 90 days by 14.1% (95% CI 3.3 to 24.8).

CONCLUSIONS: Prior authorizations are associated with prolonged biologic initiation time and increased IBD-related healthcare utilization. Minimizing prior authorization–related delays may expedite biologic delivery and reduce the risk of IBD-related healthcare utilization.

Biologic medications, including anti–tumor necrosis factor-α (TNF-α), anti-integrin, and anti–interleukin 12/23 monoclonal antibodies have revolutionized the treatment of inflammatory bowel disease (IBD) by increasing remission rates, delaying disease progression, and reducing surgical complications.[1–4] Biologics are commonly used in many pediatric conditions, including asthma, lymphoma, psoriasis, and juvenile idiopathic arthritis,[5–8] and their use continues to increase.[9–11] In IBD, biologics are cost-effective[12–14] and are associated with reduced surgery and hospitalization rates in adults.[15,16] Delays in advancing to anti-TNF-α medications in IBD increase the risks of penetrating complications, future surgery, and corticosteroid-related toxicities, including growth failure, fractures, thromboembolism, and infections.[17–21]

Initiating biologic therapies requires multiple steps, including patient counseling and consent, laboratory screening, infusion or injection scheduling, and prior authorization. Prior authorizations are cost-control processes by which healthcare providers are often required to obtain advance approval from insurers, instituted in an attempt to ensure appropriate and cost-effective medication prescription.[22,23] Prior studies in adult rheumatology and asthma and pediatric epilepsy suggest these policies may induce potentially unnecessary delays, resulting in deleterious clinical outcomes.[24–26] In pediatric IBD, prior authorizations are anecdotally believed to delay biologic initiation, although supporting data are limited. These practices may vary by insurance type. Expediting biologic initiation via accelerating prior authorization processes could improve patient care by reducing the risk of IBD-related healthcare utilization and corticosteroid-related toxicity.[27]

We aimed to assess the impact of prior authorizations on biologic initiation time and IBD-related healthcare utilization. We hypothesized that prior authorizations are associated with (1) prolonged biologic initiation time and (2) increased subsequent IBD-related healthcare utilization and corticosteroid dependence among pediatric patients with IBD initiating biologic medications.

METHODS

Study Population and Design

We performed a retrospective cohort study of pediatric patients with IBD initiating biologic therapies at a tertiary referral center in the United States. Patients were eligible for inclusion if they were <18 years old at the time of physician biologic recommendation, were diagnosed with IBD, and started a new biologic medication for IBD at Children's Hospital Colorado as an outpatient between January 1, 2010, and January 31, 2020. Patients were excluded if they were treated via a clinical trial or changed insurance coverages during the prior authorization process, as these situations do not represent the typical biologic initiation process being examined. In cases of patients with multiple coexisting insurances, the primary insurance, as noted in the electronic medical record, was used for categorization purposes. Patients initiating biologic therapies during IBD-related hospitalizations were excluded because inpatient medication approval is often accelerated. Patients starting biologics postoperatively were excluded, as they often experience a surgically induced remission with low likelihood of short-term disease activity–related healthcare utilization.[28] Patients were also excluded if data regarding biologic initiation, insurance coverage, or 180-day follow-up after biologic recommendation were unavailable or if biologic initiation time was >90 days to account for patients with irregular circumstances (Fig 1).

Primary Exposure and Outcomes

The exposure of interest was prior authorization, defined as an insurer-required prior authorization for a biologic medication that had not been completed at the time of physician biologic recommendation. Prior authorization was further categorized as uncomplicated or complicated; complicated prior authorization processes included those requiring peer-to-peer review, letter of appeal, or step therapy. When examining the association between prior authorization and biologic initiation time, the primary outcome was the time from physician biologic recommendation to receipt of the first dose. The following phases of biologic initiation were predefined in our conceptual model and determined via chart review (Fig 2, Supplemental Methods A):

1. The contemplative phase was the time from physician biologic recommendation to patient decision to initiate the biologic. If these events occurred on the same day, this phase equaled 0.
2. The laboratory evaluation phase was the time from pre-biologic screening initiation to completion and included tuberculosis, hepatitis B virus, and varicella-zoster virus (VZV) screening. If screening was completed before patient decision, this phase equaled zero.
3. The administrative phase was the time from completion of laboratory evaluation or patient decision (whichever was later) to the time of prior authorization initiation. If prior authorization was initiated the same day as patient decision and if laboratory evaluation was previously completed, this phase equaled 0.

4. The prior authorization phase was the time from prior authorization initiation to prior authorization completion. If prior authorization was not required, this phase equaled 0.

5. The scheduling and processing phase was the time from prior authorization completion to receipt of the first dose. This phase included medication shipments and coordinating hospital–based infusions or injections.

When we examined the association between prior authorization and IBD-related healthcare utilization, the primary outcome was defined as the composite of any IBD-related hospitalization, surgery, and/or emergency department (ED) visit within 180 days of biologic recommendation. All outcome types were recorded during follow-up, with the first of any outcome defining the timing of the primary combined outcome. Corticosteroid dependence at 90 days from biologic recommendation was a secondary outcome, defined as requiring corticosteroids (methylprednisolone, prednisone, prednisolone, or budesonide) at any dose. This time point was chosen to account for commonly used 8-week steroid tapers used during biologic induction therapy. All exposure and outcome data were extracted via chart review and adjudicated between 2 authors (B.D.C. and F.I.S.) when necessary.

Covariables of Interest

Covariables of interest included demographics; anthropometrics; IBD characteristics, including subtype and Montreal classification[29]; medication history; year of biologic recommendation; and prior disease complications, measured at the time of biologic recommendation (Table 1, Supplemental Methods B).

Self-identified race, as documented in the electronic medical record, was recorded. Because of the low frequency of non-White individuals (13%, consistent with local demographics), race was dichotomized as White or non-White. Given the previously described association with healthcare utilization in IBD, race was included in all healthcare utilization models to adjust for factors involved in the racialization of individuals, which may act as a surrogate for more granular socioeconomic and cultural factors that may confound this relationship.[30]

Insurance type was recorded and categorized as private or public insurance. Prior authorizations are inherent to insurance coverage of biologic medications; yet prior authorization practices may be dissimilar among insurance types. We aimed to disentangle this relationship by adjusting for the differential effects of insurance type in all models. By doing so, our primary analyses effectively describe the association between prior authorizations and IBD-related healthcare utilization among those with identical insurance types.

Statistical Analysis

Data were collected and managed by using Research Electronic Data Capture.[31] Statistical analyses were performed by using Stata version 16.0 (Stata Corp, College Station, TX).[32] Baseline demographics and disease characteristics were tabulated and stratified by prior authorization requirement. Continuous variables were summarized as means and SDs or medians and interquartile ranges (IQRs) as appropriate. Categorical variables were

summarized as counts and percentages. The Shapiro-Wilk test, 2-sample unpaired t test, Mann-Whitney U test, χ^2 test, and Fisher's exact test were used when appropriate.[33] A 2-tailed significance level of .05 was used for all analyses.

Univariable linear regression was employed to measure the association between prior authorization and all measured covariables with biologic initiation time and phase lengths. Prior authorization was categorized as a 3-level categorical variable: no prior authorization requirement (reference), prior authorization requirement, and complicated prior authorization requirement. The relationship between prior authorization and biologic initiation time was assessed by using stepwise forward selection to construct a multivariable linear regression model adjusting for factors associated with biologic initiation time, based on maximal explanation of biologic initiation time variance, as determined by adjusted R^2 (Supplemental Methods C).[34]

Crude rates of IBD-related healthcare utilization were tabulated. To isolate and measure the association between prior authorization and IBD-related healthcare utilization, while adjusting for demographics, insurance type, and disease severity–related characteristics, propensity score methods, specifically inverse probability of treatment-weighted regression adjustment (IPTWRA), were implemented. Univariable regression was used to select covariables associated with exposures and/or outcomes of interest for inclusion in IPTWRA models. The propensity score was derived from a logistic regression model and computed as the probability of requiring prior authorization, conditional on included covariables. Absolute standardized mean differences (SMDs) were used to assess covariable balance between groups, with an absolute SMD <0.1 considered adequate.[35,36] Variables included in IPTWRA models and corresponding absolute SMDs are presented in Supplemental Table 4. Overlap and overidentification assumptions were assessed.[37] By using IPTWRA, the average treatment effects of prior authorization on IBD-related healthcare utilization and corticosteroid dependence were calculated (Supplemental Methods D).[38,39] IPTWRA analyses were performed by using Stata's *teffects* package.[40]

Sensitivity Analyses, Secondary Outcomes, and Subgroup Analyses

Follow-up times of 30 and 90 days and individual outcome types were assessed. Subgroup analyses were used to examine the association between prior authorization and IBD-related healthcare utilization in (1) Crohn's disease, to assess any differential associations in IBD subtypes and adjust for Crohn's disease behavior and distribution, and (2) patients receiving infliximab, to determine if drug-specific factors influenced outcomes.

Ethical Considerations

This study was deemed exempt by the Colorado Multiple Institutional Review Board (Aurora, CO).

RESULTS

Among 537 patients receiving care at the study center, 190 met inclusion and exclusion criteria (Fig 1) (48.4% female; median age 14.5 [IQR 12.0–16.3] years), of whom 141 required prior authorization (74.2%) and 25 had complicated prior authorization

(13.2%). Baseline demographics and disease severity–related covariables are presented in Table 1, stratified by prior authorization requirement. Although most characteristics were similar, prior authorizations were more frequent among White patients and those starting adalimumab compared with infliximab. Cohort insurance characteristics are presented in Supplemental Table 5. Prior authorizations were more common in privately, compared with publicly, insured patients (83.1% vs 51.9%; $P < .001$). Step therapy was requested in 7 patients and ultimately required in 4 (all privately insured). Pre-biologic screening results are presented in Supplemental Table 6.

Prior Authorization Requirements and Biologic Initiation Time

Overall, the median biologic initiation time was 21 days (IQR 13–35). The median biologic initiation time among patients requiring prior authorization was 25 days (IQR 16–38), with the prior authorization phase consisting of 8 days (IQR 5–16) (Supplemental Table 7, Supplemental Results A). The median biologic initiation time of patients not requiring prior authorization was 13 days (IQR 9–28). Other biologic initiation time subphases were similar when stratified by prior authorization requirement.

In univariable regression analyses, covariables significantly associated with biologic initiation time included prior authorization, complicated prior authorization, year of recommendation, initiation of infliximab or adalimumab (compared with all other biologics), and all phases of biologic initiation time (Supplemental Table 8). Covariables associated with biologic initiation phase lengths are presented in Fig 3 and Supplemental Results B. Treatment by an IBD specialist was associated with a shortened contemplative phase, and VZV immunity was associated with a shortened laboratory evaluation phase. In multivariable analyses, compared with no prior authorization, uncomplicated prior authorization was associated with a 10.2-day (95% confidence interval [CI] 8.2 to 12.3) increase in biologic initiation time and complicated prior authorization (requiring step therapy, peer-to-peer review, or letter of appeal) was associated with a 24.6-day (95% CI 16.4, 32.8) increase in biologic initiation time, after adjustment for contemplative, administrative, and scheduling and processing phases of biologic initiation (Table 2). Insurance type was not associated with biologic initiation time.

Prior Authorization Requirements and IBD-Related Healthcare Utilization

At 180 days from physician biologic recommendation, 23.7% of the cohort had at least 1 IBD-related healthcare utilization outcome (Supplemental Table 9). Hospitalizations accounted for >69% of outcomes at each time point. The average hospitalization length was 5 days (IQR 3–13.5). After we adjusted for baseline demographics, disease severity–related characteristics, and insurance type using IPTWRA, prior authorization was associated with a 12.9% (95% CI 2.5 to 23.4) increased likelihood of IBD-related healthcare utilization within 180 days of physician biologic recommendation (Table 3, Supplemental Table 4).

Sensitivity Analyses, Subgroup Analyses, and Secondary Outcomes

Healthcare utilization rates increased during follow-up, with 6.8% and 14.2% of patients having an outcome at 30 and 90 days, respectively. Prior authorization conferred a 5.9% (95% CI 0.4 to 11.2) and 8.7% (95% CI 0.2 to 17.1) increased likelihood of healthcare

utilization within 30 and 90 days, respectively (Table 3). Analyses measuring the effect of prior authorization on individual components of the combined primary outcome, as well as subgroup analyses of IBD subtype and infliximab use, were similar to primary analyses (Supplemental Results C and D, Supplemental Tables 10 through 12). Prior authorizations were also associated with a 14.1% (95% CI 3.3 to 24.8) increased likelihood of corticosteroid dependence at 90 days (Table 3).

DISCUSSION

We sought to determine the association between prior authorization, biologic initiation time, and IBD-related healthcare utilization. Our findings demonstrate that among pediatric patients with IBD initiating biologics, prior authorizations are associated with prolonged biologic initiation time, which was further exacerbated by complicated prior authorization processes, and independent of insurance type. Prior authorizations were associated with a 12.9% increased likelihood of IBD-related healthcare utilization within 180 days of biologic recommendation and a 14.1% increased likelihood of corticosteroid dependence at 90 days. Clinically, this translates to ~1 potentially avoidable healthcare utilization outcome for every 8 patients requiring prior authorization.

Prior authorizations are commonly required by insurance companies to curb medication costs. Yet the utility, appropriateness, and disease-related effect of these policies remains largely uncertain. Clinicians treating IBD and other diseases requiring prior authorizations for medical therapies have long suspected these policies may delay care, potentially resulting in deleterious clinical outcomes, especially given their frequent discordance with evidence-based recommendations.[27] In a recent survey conducted by the American Medical Association, 94% of physicians reported that prior authorizations delay access to necessary care, 90% perceived a negative impact on clinical outcomes, and 30% reported that a prior authorization led to a serious adverse event for a patient in their care.[41] To date, advocacy efforts toward expediting or eliminating prior authorization processes have been primarily descriptive, based on surveys, anecdotal reports, and provider opinion, lacking concrete evidence describing their clinical or economic harm.[42,43]

Efforts to mitigate the deleterious impact of prior authorizations would be aided by quantifying their downstream negative effects. Patients with IBD initiating biologic therapies by definition have moderate-to-severe disease, are often experiencing disease flares, and are likely at disproportionately increased risk of healthcare utilization stemming from medication delays. Additionally, clinicians often rely on corticosteroids for symptom control while navigating prior authorization processes. This may partially explain the increased likelihood of healthcare utilization observed during later follow-up periods, demonstrating a corticosteroid-related delay but not prevention of adverse outcomes, in addition to the known risks of infection, fracture, and thromboembolism.[21]

Measuring the downstream effects of prior authorizations is crucial in directly demonstrating to payers and regulatory bodies that such policies likely increase societal costs by increasing the risk of hospitalizations, surgeries, and ED use without altering the medication ultimately delivered. In fact, prior authorization policies are unlikely to achieve their intended aim

of deterring the use of specific medications. Studies in adult asthma, rheumatology, and dermatology and pediatric hematology and oncology have found that prior authorization processes did not alter the prescribed medication in 78.9% to 98.5% of cases after provider appeal, but universally lengthened medication initiation times.[24,25,44,45]

Together, these studies and our data illustrate that prior authorization processes may increase clinical burden, delay care, and result in worsened clinical outcomes while having virtually no effect in altering the medication prescribed, as originally intended.

This study has several important strengths. Our findings uniquely demonstrate that prior authorizations directly correlate with increased healthcare utilization and corticosteroid dependence by significantly prolonging the biologic initiation process, irrespective of insurance type. These findings build upon prior research in pediatric epilepsy, asthma, and rheumatology[24–26] by further isolating the relationship between prior authorizations and healthcare utilization via granular data collection and sophisticated risk adjustment. Analyses adjusted for many known confounders associated with healthcare utilization, including insurance type, biologic exposure, corticosteroid use, surgical history, and race.[30,46–49]

Our work also identified potential targets for streamlining biologic delivery and reducing downstream healthcare utilization and unnecessary steroid exposure. For example, expediently assessing VZV immunity at the time of diagnosis and vaccinating when indicated may hasten eventual biologic initiation. These findings are similar to the previously appreciated association between indeterminate QuantiFERON Gold testing and delayed anti-TNF-α initiation.[50] Additionally, treatment by an IBD specialist was associated with decreased rates of complicated prior authorizations and contemplative phase length. Future research identifying causative factors underlying these associations could lead to the implementation of standardized documentation practices and counseling techniques used by disease-specific subspecialists to expedite biologic initiation.

There are several caveats to consider when interpreting these findings. Generalizability may be limited by our single-center study design. Prior authorization processes vary by insurance provider and location. Our single-center cohort was primarily White, consistent with the demographics of our study center. Future multicenter prospective studies, currently underway in adults, will be required to confirm the generalizability of our findings and better analyze the granular cultural and socioeconomic factors involved in healthcare utilization in more racially and geographically diverse areas. In our study, we did not assess individuals in whom prior authorizations completely prevented biologic initiation, anecdotally a relatively rare event, as confirmed in other disease processes.[24,25,44,45] Future research should quantify this occurrence to confirm this assumption. Data collection relied on retrospective chart review, potentially resulting in outcome misclassification. This was minimized by objectively predefining outcomes and adjudicating questionable outcomes. Missing data prevented us from considering biochemical markers of disease activity and disease activity scores. We included a large patient population with diverse disease characteristics over several years coupled with granular data collection to inform our models. Still, as with any retrospective cohort, unmeasured confounders could potentially bias our results.

CONCLUSIONS

Our results demonstrate an association between prior authorizations and both delays in biologic initiation and subsequent IBD-related healthcare utilization. This research lays the groundwork for future multicenter prospective studies and real-world cost-effectiveness analyses to validate our findings and assess the potential clinical and financial impact of minimizing prior authorization processes. Identifying a maximal acceptable prior authorization length that optimizes resource use while simultaneously minimizing risk of biologic initiation delay is essential. Until then, given the potential for clinical harm and downstream deleterious economic effects for patients, insurers, and health care systems, our findings emphasize that payers should revise their current prior authorization policies. Legislation may be needed to regulate the prior authorization process if payers are unwilling to follow evidence-based guidelines that prioritize patient care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Dr Constant conceptualized and designed the study, designed data collection instruments, collected and curated data, conducted statistical analyses and interpretation of data, coordinated project administration, acquired funding, drafted the initial manuscript, and reviewed and revised the final manuscript; Drs de Zoeten, Stahl, Vajravelu, Lewis, Fennimore, and Gerich conceptualized and designed the study, contributed to statistical analyses and interpretation of data, and reviewed and revised the final manuscript for important intellectual content; Dr Scott conceptualized and designed the study, provided overall study supervision, contributed to statistical analyses and interpretation of data, acquired funding, drafted the initial manuscript, and reviewed and revised the final manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

ABBREVIATIONSS

CI	confidence interval
ED	emergency department
IBD	inflammatory bowel disease
IPTWRA	inverse probability of treatment-weighted regression adjustment
IQR	interquartile range

SMD	standardized mean difference
TNF-α	tumor necrosis factor
VZV	varicella-zoster virus

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WHAT'S KNOWN ON THIS SUBJECT:

Prior authorization requirements have been linked to delayed medication initiation and deleterious clinical outcomes in several disease processes. Delays in initiating biologic medications in inflammatory bowel disease have been previously shown to result in disease progression, surgery, and corticosteroid dependence.

WHAT THIS STUDY ADDS:

Prior authorization requirements prolonged biologic initiation time and were associated with a 12.9% increased likelihood of healthcare utilization (hospitalization, surgery, or emergency department visit) in the 6 months following physician biologic recommendation, after adjustment for insurance type and disease severity–related factors.

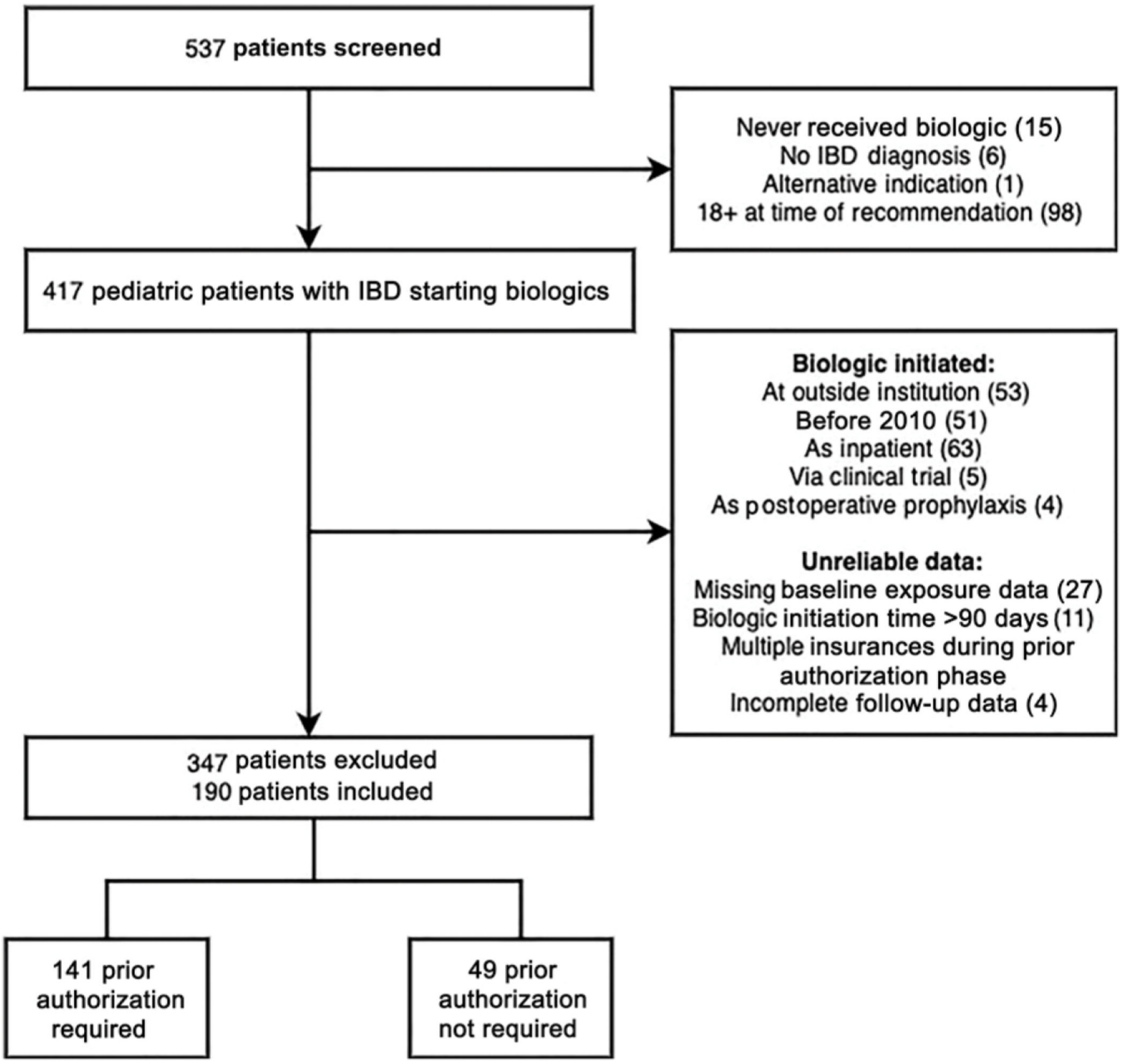

FIGURE 1.
Cohort eligibility screening process and primary exposure status.

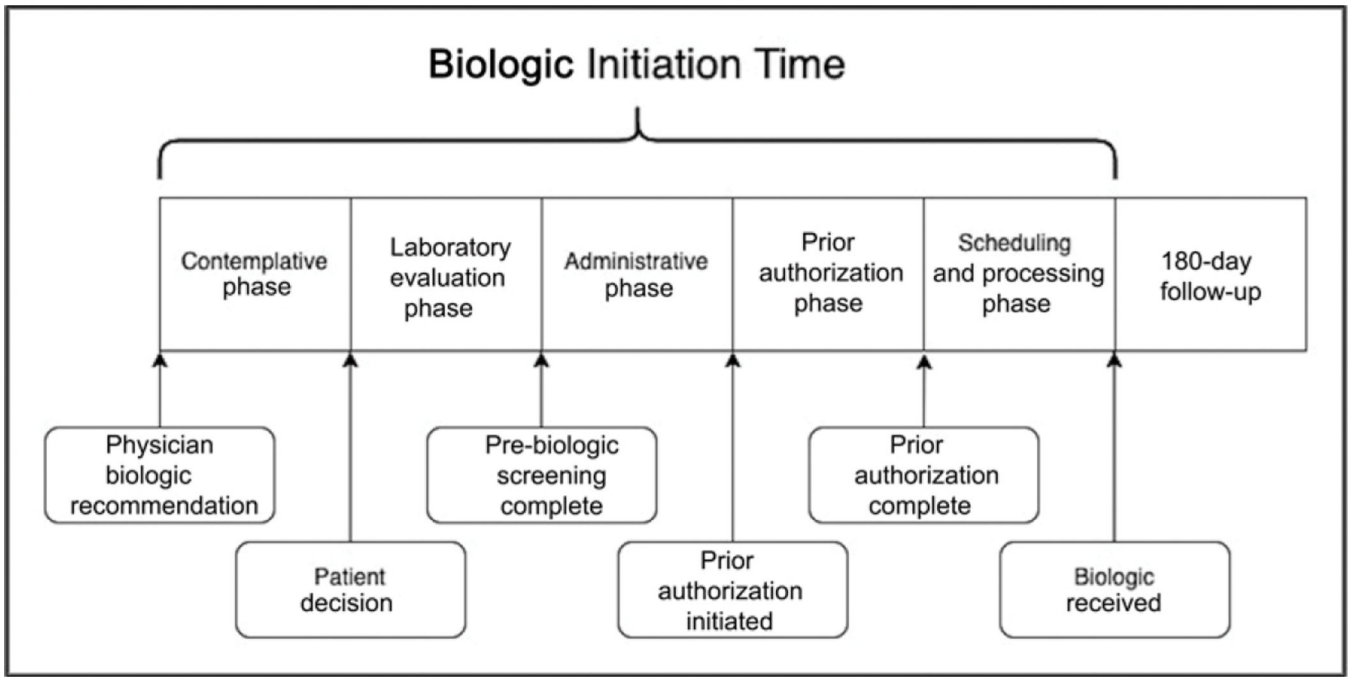

FIGURE 2.

Study timeline, including biologic initiation time, biologic initiation time phases, and follow-up period. Biologic initiation time was defined as the time from physician biologic recommendation to receipt of first biologic dose. Biologic initiation time was divided into the contemplative, laboratory evaluation, administrative, prior authorization, and scheduling and processing phases. IBD-related healthcare utilization was assessed within 180 days from physician biologic recommendation.

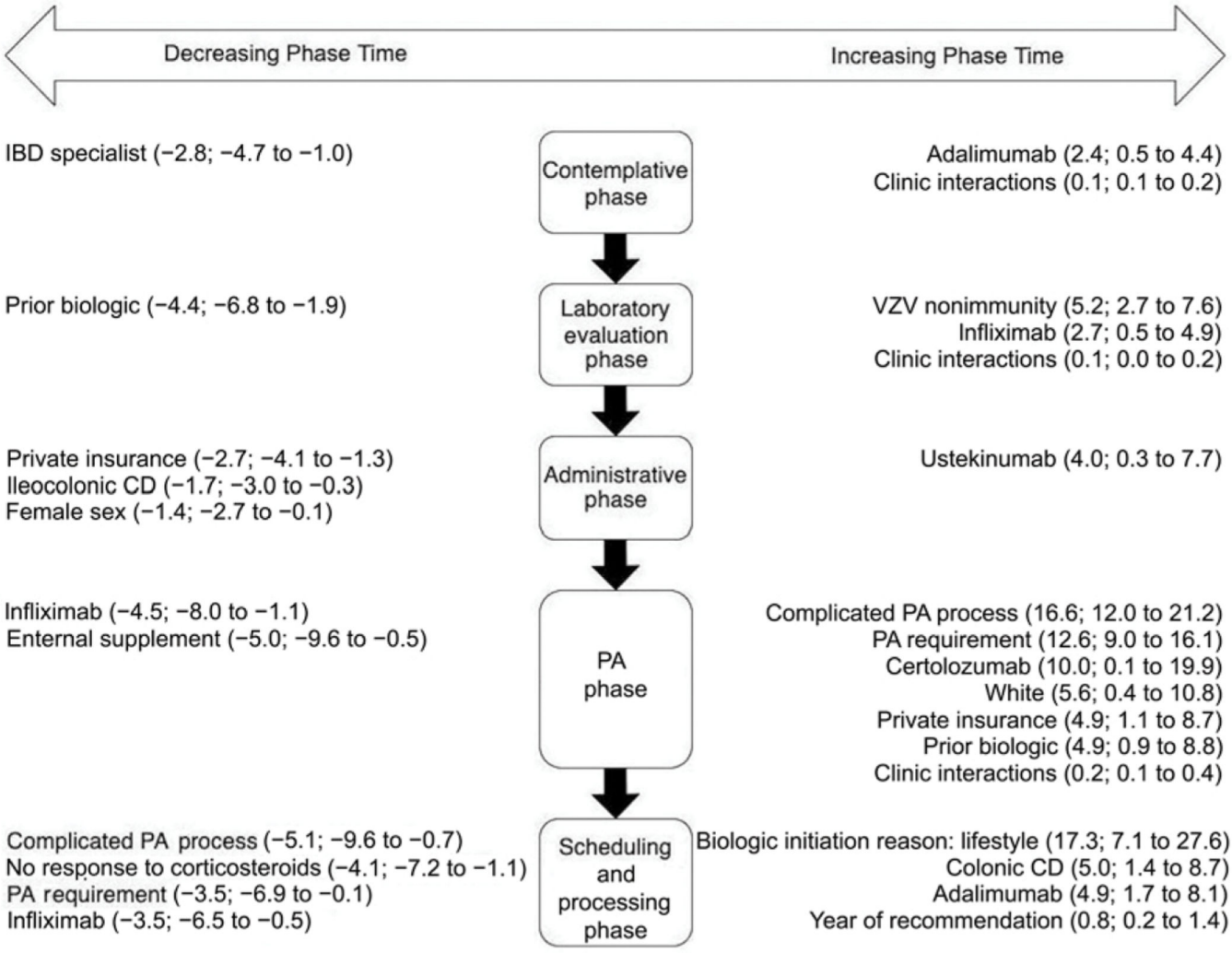

FIGURE 3.

Covariables significantly associated with biologic initiation time phase lengths in univariable regression analyses. Values represent univariable linear regression point estimates and 95% CIs for categorical variables and per one-unit change for continuous variables. Abbreviations: CD, Crohn's disease; PA, prior authorization.

TABLE 1

Baseline Cohort Characteristics Stratified by Prior Authorization Requirement

	Total (*N* = 190)	Prior Authorization Required (*n* = 141)	No Prior Authorization Required (*n* = 49)	*P*
Age at physician recommendation, median (IQR), y	14.5 (12.0–16.3)	14.5 (12.3–16.3)	14.8 (11.2–16.1)	.93
Sex, *n* (%)				.87
Male	98 (52)	72 (51)	26 (53)	—
Female	92 (48)	69 (49)	23 (47)	—
Race, *n* (%)				<.001
White	166 (87)	133 (94)	33 (67)	—
Non-White or other	24 (13)	8 (6)	16 (33)	—
Black	8 (4)	2 (1)	6 (12)	—
Asian American	1 (1)	1 (1)	0	—
American Indian or Alaska Native	1 (1)	0	1 (2)	—
Other	12 (6)	3 (2)	9 (18)	—
Unknown	2 (1)	2 (1)	0	—
Median household income quartile,[a] *n* (%)				.25
1 (0–39 000)	3 (2)	1 (1)	2 (4)	—
2 (39 000–73 965)	66 (35)	50 (36)	16 (33)	—
3 (73 966–125 080)	114 (60)	86 (61)	28 (57)	—
4 (>125 080)	7 (4)	4 (3)	3 (6)	—
Year of recommendation, median (IQR)	2017 (2015–2019)	2017 (2015–2019)	2017 (2015–2018)	.67
IBD specialist, *n* (%)	122 (64)	91 (65)	31 (63)	.87
IBD subtype,[b] *n* (%)				.35
Crohn’s disease	148 (78)	107 (76)	41 (84)	—
Ulcerative colitis	32 (17)	27 (19)	5 (10)	—
IBD unclassified	10 (5)	7 (5)	3 (6)	—
Crohn’s disease phenotype,[b] *n* (%)				.12
Inflammatory (B1)	113 (76)	82 (77)	31 (76)	—
Stricturing (B2)	6 (4)	2 (2)	4 (10)	—
Penetrating (B3)	25 (17)	19 (18)	6 (15)	—
Stricturing and penetrating (B2 + B3)	4 (3)	4 (4)	0	—

	Total (*N* = 190)	Prior Authorization Required (*n* = 141)	No Prior Authorization Required (*n* = 49)	*P*
Crohn's disease location,[b] *n* (%)				.95
Ileal	16 (11)	11 (10)	5 (12)	—
Colonic	46 (31)	33 (31)	13 (32)	—
Ileocolonic	85 (57)	62 (58)	23 (56)	—
Isolated upper gastrointestinal tract	1 (1)	1 (1)	0	—
Upper gastrointestinal tract disease,[c] *n* (%)	51 (35)	16 (39)	35 (33)	.56
Ulcerative colitis extent,[b] *n* (%)				.15
Ulcerative proctitis	0	0	0	—
Left-sided colitis	6 (19)	4 (15)	2 (40)	—
Extensive colitis	3 (9)	2 (7.4)	1 (20)	—
Pancolitis	23 (72)	21 (78)	2 (40)	—
Malnutrition (BMI *z*-score), *n* (%)				.58
Normal (>−1)	109 (57)	84 (60)	25 (51)	—
Mild malnutrition (−2 to −1)	51 (27)	36 (26)	15 (31)	—
Moderate malnutrition (−3 to −2)	20 (11)	13 (9)	7 (14)	—
Severe malnutrition (<−3)	10 (5)	8 (5)	2 (4)	—
Disease-related complications within 30 days, *n* (%)				
Any complication	50 (26)	35 (25)	15 (31)	.45
Abscess[d]	19 (10)	15 (11)	4 (8)	.79
Emergency department visit	26 (14)	17 (12)	9 (18)	.33
Hospitalization	25 (13)	17 (12)	8 (16)	.47
Clostridium difficile infection[e]	8 (4)	4 (3)	4 (8)	.21
Prior surgery, *n* (%)	14 (7)	10 (7)	4 (8)	.76
Medication, *n* (%)				
Infliximab	108 (57)	70 (50)	38 (78)	.001
Adalimumab	57 (30)	51 (36)	6 (12)	.002
Certolizumab	6 (3)	6 (4)	0	.34
Vedolizumab	13 (7)	9 (6)	4 (8)	.74
Ustekinumab	6 (3)	5 (4)	1 (2)	>.99
Medication history, *n* (%)				

	Total (*N* = 190)	Prior Authorization Required (*n* = 141)	No Prior Authorization Required (*n* = 49)	*P*
Prior biologic exposure	49 (26)	41 (29)	8 (16)	.09
Prior immunomodulator	106 (56)	81 (58)	25 (51)	.51
Biologic initiation reason,[f] *n* (%)				
Nonresponse to prior medication	144 (76)	105 (75)	39 (80)	.56
Nonresponse to biologic and/or immunomodulator	93 (49)	73 (52)	20 (41)	.25
Lifestyle	4 (2)	4 (3)	0	.57
Intolerance	11 (6)	9 (6)	2 (4)	.73
Antibodies or allergy	13 (7)	13 (9)	0	.02
No prior medications trialed	27 (14)	19 (14)	8 (16)	.64
Concomitant medications, *n* (%)				
Systemic corticosteroids	63 (33)	42 (30)	21 (43)	.11
Budesonide	24 (13)	21 (15)	3 (6)	.14
Immunomodulator	85 (45)	67 (48)	18 (37)	.20
5-Aminosalicylic acid	59 (31)	39 (28)	20 (41)	.11
Antibiotics	25 (13)	18 (13)	7 (14)	.81

Laboratory values represent the closest value within 1 month of physician recommendation. For further explanation of variable categorization, see Supplemental Methods. —, not applicable.

[a]Median household income indicates median household income in dollars of the patient's zip code, determined by 2018 census data.

[b]IBD subtype is based on clinical notes at time of cohort entry. Crohn's disease phenotype and location and ulcerative colitis extent are described by using Montreal criteria.

[c]Upper gastrointestinal disease in addition to ileal, colonic, or ileocolonic disease.

[d]Abscess diagnosis is based on clinical and/or imaging diagnosis.

[e]*C difficile* diagnosis is based on clinical symptoms and positive stool polymerase chain reaction assay result.

[f]Biologic initiation reason adds up to >190 because of some patients discontinuing a medication for >1 reason.

TABLE 2

Multivariable Linear Regression Analyses of Biologic Initiation Time

	Multivariable Linear Regression β Coefficient[a] (95% CI), d
Prior authorization	
Not required	Reference
Required, uncomplicated	10.2 (8.2 to 12.3)
Required, complicated	24.6 (16.4 to 32.8)
Insurance type (private)	−0.4 (−3.4 to 2.6)
Biologic initiation time phase	
Contemplative phase	0.9 (0.7 to 1.2)
Administrative phase	0.9 (0.7 to 1.2)
Scheduling and processing phase	1.1 (0.9 to 1.2)

Multivariable linear regression model assessing the effect of prior authorization requirements, insurance type, and biologic initiation time phase lengths on biologic initiation time. Variables not included in the multivariable model were either nonsignificant in the multivariable analysis or, in the case of prior authorization phase length, collinear with the exposure of interest and therefore excluded from the final model (see Supplemental Table 8, Supplemental Methods C). Bootstrapped SEs were used to calculate 95% CIs for the multivariable model.

[a]Regression coefficients represent change in biologic initiation time in days for every 1-unit change of continuous variables.

TABLE 3

Treatment Effects of Prior Authorization Requirement on IBD-Related Healthcare Utilization and Corticosteroid Dependence

		Prior Authorization Required		No Prior Authorization Required			
Outcome and Time Frame, d	***n*** [a]	**Outcome Present**[b]	**No Outcome Present**	**Outcome Present**	**No Outcome Present**	**Average Treatment Effect,**[c] **% (95% CI)**	***P***
IBD-related healthcare utilization							
30	180	9	130	2	39	5.9 (0.4 to 11.2)	.03
90	189	19	121	8	41	8.7 (0.2 to 17.1)	.04
180	167	32	94	6	35	12.9 (2.5 to 23.4)	.02
Corticosteroid dependence							
90	182	41	100	6	35	14.1 (3.3 to 24.8)	.01

Inverse probability of treatment-weighted regression adjustment average treatment effects of prior authorization requirement on IBD-related healthcare utilization within 30, 90, and 180 d, and on corticosteroid dependence at 90 d, of physician biologic recommendation.

[a] *n* represents the number of patients remaining in each exposure group after patients outside of common support were dropped.

[b] Outcomes represent the combined outcome of hospitalization, surgery, or ED visit during the time frame within each exposure group.

[c] Average treatment effect represents change in likelihood of healthcare utilization attributable to the exposure after covariable adjustment.