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ORIGINAL ARTICLE

Guideline recommendations for treatment of patients with inflammatory bowel diseases are not implemented in clinical practice—results of a non-representative survey

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Abstract

Purpose There is a growing evidence for over-, under-, or misuse of health care in patients with inflammatory bowel disease. Most studies looked at treatment variability or used quality measures, which mostly capture supportive interventions rather than treatment of IBD in itself. We aimed to evaluate if current recommendations in clinical practice guidelines regarding the medical treatment of patients with inflammatory bowel diseases are being followed in Germany.

Methods A questionnaire was sent to 1901 patients insured with two large German statutory sickness funds and an ICD 10 diagnosis of Crohn's disease (CD) or ulcerative colitis (UC). The questionnaire asked about drug treatment, indications for drug treatment, provision of surveillance endoscopies in ulcerative colitis patients, and smoking status in Crohn's disease patients.

Results Out of 460 evaluable patients, 62.4% of UC patients and 53.9% of CD patients were treated with mesalamine according to guidelines, 91.3% of all patients were treated with glucocorticoids according to guideline recommendations, while only 75.6% received recommended immunosuppressive treatment. Of UC patients, 94.5% had surveillance colonoscopies at the recommended interval and 58.8% of CD patients were non-smokers. No predictor for overall treatment according to guidelines could be found while being of age older than 60 or being treated outside of a dedicated IBD clinic was associated with less immunosuppressive treatment.

Conclusions A large proportion of patients with IBD do not receive drug treatment in accordance with clinical practice guidelines. Quality improvement measures are much needed.

Keywords Survey · Health services · Treatment · Clinical practice guidelines · Inflammatory bowel diseases

Introduction

Crohn's disease (CD) and ulcerative colitis (UC) are the most common types of inflammatory bowel diseases (IBD). Most patients are diagnosed within the first three decades of their life and 19% are even children. Due to the chronic progression, IBD often results in lifelong morbidity accompanied by impairment of patient's quality of life and considerable costs to society. Due to the chronic nature of the disease, the treatment goal has to be long-lasting relief of symptoms. Treatment of IBD mostly relies on immunosuppressive drugs, but not all patients can achieve this goal by medical therapy, hence many patients with IBD will eventually need abdominal surgery.

Several organizations, among them the German Society of Gastroenterology (DGVS) as well as the European Crohn's and Colitis Organisation (ECCO), have developed evidence-

Wolfgang Höhne and Martin Zeitz are deceased; the manuscript is dedicated to them.

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based clinical practice guidelines in order to guide diagnosis and treatment of patients with IBD [1–6].

Many studies have assessed the quality of care in patients with IBD. A considerable diagnostic delay has been shown in the Swiss IBD cohort [7]. Here, 25% of all UC patients were diagnosed more than 1 year and CD patients even 2 years after their first symptoms. Moreover, studies consistently provided evidence indicating distinct deficiencies regarding supportive measures. For example, IBD patients did not receive recommended supportive measures including blood monitoring, surveillance colonoscopies, thromboembolism prophylaxis, or assessment for metabolic bone disease [8–12]. Furthermore, general preventive health services including cancer screening, cardiovascular risk assessment, and immunizations are not provided to IBD patients as recommended [13–16].

In addition, differences have been revealed in the approach to patients with IBD between different groups of physicians [17–19]. This was first documented in a paediatric IBD cohort from the Great Britain and Ireland, where the diagnostic and therapeutic approach of paediatric gastroenterologists was compared to adult gastroenterologists [20]. Thus, these differences seem to depend amongst others on local factors, therapeutic settings, and the specialization of the physician. While in a German cohort in 2008, outpatients in private practices were prescribed primarily with mesalamine and glucocorticoids, those treated in a university outpatient clinic were prescribed rather with immunosuppressants [21]. A study comparing the treatment of IBD patients in neighbouring regions of Northern Portugal and Galicia in Spain indicated that patients in Northern Portugal more often obtained surgery, while patients in Galicia received more immunosuppressants [22]. The medical treatment among seven high-volume academic medical institutions in the US varied considerably [23]. Aside from treatment by an IBD specialist, factors including age, gender, race, and type of disease have been discussed as predictors for adequate treatment [15, 24–27].

Studies investigating the knowledge of guideline recommendations indicated furthermore a lack of knowledge in physicians treating IBD patients, regarding vaccination schedules, infliximab side effects, or recommendations about treatment in the context of premalignant conditions [28–31]. Most of these studies were based on self-reported behaviour and tested knowledge or attitudes of physicians. Yet, physician self-report surveys usually overestimate guideline adherence [32]. Only a few studies tried to ascertain actual treatment of IBD patients [33].

While there is strong evidence that the quality of support and treatment for IBD patients is often insufficient and depends on numerous factors; so far, most studies focused on supportive measures. In addition, they investigated rather the way treatment was delivered than if IBD patients received the correct medical treatment for their disease.

This study aimed to investigate in a diverse population of patients with IBD if medical treatment was given to all patients, where clinical practice guidelines recommended their use. Furthermore, we wanted to identify predictors for treatment according to guidelines.

Methods

We conducted a postal survey among IBD patients insured with either one of the three German staturory sickness funds in Berlin and Hamburg. The local ethics board approved the protocol. No formal consent procedure was deemed necessary.

Study population

Patients were identified from the databases of the statutory sickness funds Allgemeine Ortskrankenkasse (AOK) Nordost, AOK Rheinland/Hamburg, and Techniker Krankenkasse (TK). Inclusion criteria were an International Classification of Diseases, 10th revision (ICD-10) code of K50 or K51 during a hospital stay between January 2002 and June 2007 as main or ancillary diagnosis, place of residence in Berlin (B) or Hamburg (HH), and age 18 to 80 years. Exclusion criteria were Operations and Procedure Classification (OPS, German adaptation of the International Classification of Procedures in Medicine) 5-455 to 5-458 that indicate colonic resection in patients with ICD-10 K51 (ulcerative colitis) or the patient had deceased. AOK Nordost randomly selected 740 patients from their database, AOK Rheinland/Hamburg identified 364 and TK 797 patients, so altogether 1901 patients were identified and contacted in October 2007.

Study protocol

In order to stay in accordance with German privacy laws, the sickness funds did not provide the investigators with the names and addresses of identified patients but rather sent out the questionnaires provided by the investigators themselves. Patients were sent a package including a cover letter by the sickness fund explaining the legal background, a cover letter from the investigators explaining the study, the questionnaire, a pre-stamped envelope with the investigators' address, and a form to provide contact information. Patients were informed that providing contact information was voluntary and the form was to be destroyed after remaining questions of the investigators about the questionnaire had been answered.

Questionnaire

A questionnaire was prepared containing 43 questions (see supplemental data). These questions were grouped in five categories. Patients were asked about 1) their disease, its activity, and prior operations; 2) current drug treatment; 3) smoking status; 4) timing of colonoscopies; and 5) demographics including the type of physicians they were seeing for their disease. We performed a pilot study of the questionnaire on patients from our IBD clinic. Feedback from that pilot study was used to adapt the final questionnaire.

Statistical analysis

All questionnaires were checked for inconsistencies or remarks from the respondent. Respondents who provided their contact information were contacted if necessary in order to clarify any questions arising from the answers. Responses were entered into an SQL database and verified independently (MySQL, Oracle). Age adjusting of the results was done by direct standardization to the age- and disease-specific prevalence reported for Olmstead County, MN, USA. Due to particularly low numbers of respondents below 20 years, the age groups 0–19 and 20–29 were aggregated for that purpose. Statistical analysis of responders in comparison to all contacted patients was done with Fisher's exact test or Mann-Whitney *U* test depending on data type (binary vs. continuous). Multivariate analysis of potential predictors of adequate treatment was done by binary logistic regression analysis in a stepwise regression model. In a first step, the potential predictors were each tested separately. In a second step, all risk factors with $p < 0.2$ were entered together in a multivariate logistic regression model. Statistical analysis as well as calculation of odds ratios with confidence intervals was done in IBM SPSS Statistics 19.

Results

Patient population

Out of all patients contacted, 460 sent back an evaluable questionnaire (response rate 24.2%). Respondents were slightly older than all contacted patients (mean 56.6 vs. 54.1, $p = 0.005$) and more respondents suffered from Crohn's disease (36.9% vs. 30.7%, $p = 0.011$). No significant difference was seen in sex distribution (47.3% male vs. 48.7%, $p > 0.05$).

Respondents' demographics and clinical characteristics are given in Table 1. Age ranged from 18 to 85 years with the majority being over 60 years old. Accordingly, median disease duration was 10.7 years covering a range of 0 to 50 years. While about one-fourth of all patients were exclusively treated by a general practitioner and another one-fourth only by a general internist, about 40% were also seen by a gastroenterologist and 12% also in a dedicated IBD clinic.

Table 1 Demographics and clinical characteristics of respondents (CD: Crohn's disease; UC: ulcerative colitis)

Characteristic	Value
Age (median; quartiles [years])	60; 42.3–71.0
Duration of disease (median; quartiles [years])	10.7; 5.7–21.7
Male sex	47.3%
Crohn's disease	36.9%
Disease activity	
Acute flare	12.6%
Chronically active	12.4%
Remission	64.6%
Unknown	10.4%
Patient with ostomy	5.1%
CD patients and smoking	
Now	39.5%
Never	26.3%
Earlier	29.9%
Unknown	4.2%
CD patients with fistula	30.5%
CD patients with previous operations	59.0%
Extent of colitis in UC patients	
Proctitis	22.0%
Distal colitis	34.3%
Extensive colitis	26.6%
Unknown	17.1%
Treating physician	
General practitioner	23.6%
Internist	24.9%
Gastroenterologist	39.3%
IBD clinic	12.2%

Treatment according to guidelines

In order to rate patients therapy, we chose four treatment modalities, for UC and CD, that we deemed of utmost importance in the care of IBD patients. The treatment was categorized in proper, over-, under-, or misuse, when clinical practice guidelines clearly recommended a certain way of treatment.

We determined (1) treatment with aminosalicylates, (2) long-term treatment with glucocorticoids, (3) treatment with immunosuppressants, and (4) for UC patients' performance of surveillance colonoscopies, or (5) smoker status for CD patients. In order to define adequate treatment, we used the European and German guidelines for the diagnosis and treatment of Crohn's disease and the German guidelines on ulcerative colitis which had been published in 2006, 2003, and 2004 respectively [34–38]. The German and European Crohn's disease guidelines

included the same recommendations on the above topics while the German guideline from 2004 contained the same recommendations as the first European guidelines from 2009 [39–41].

Patients were defined as being "at risk" for over-, under-, or misuse when a certain way of treatment was clearly recommended by clinical practice guidelines (Table 2). In Table 3, treatments according to guidelines are presented for all patients. The table indicates patients "at risk" as defined above in the left column as well as all patients adding the patients not "at risk" where we defined treatment always as adequate based on the fact that no strong recommendation for a specific treatment existed.

Only 55.2% of all UC patients were being treated with aminosalicylates at an adequate dose (any rectal preparation or > 1.2 g/d p.o.). Of all patients, 7.2% had been in remission for more than 2 years and did not take mesalamine, which is in line with guideline recommendations. Out of the patients "at risk", i.e. those patients with a clear indication for aminosalicylates, only 59.5% were being treated adequately.

Most CD patients did not have an indication for long-term treatment with aminosalicylates (88.7%). At that time, the European as well as the German clinical practice guidelines advised against the use of mesalamine for maintenance of remission unless in a postoperative setting. 48.0% of patients were taking neither mesalamine nor sulfasalazine continuously. In most cases (85%), patients were taking mesalamine. Taken together, 46.1% of all CD patients were receiving an inadequate long-term treatment with aminosalicylates.

Long-term treatment with glucocorticoids was reported by 17.3% of all respondents. Almost 10% of patients received long-term treatment with glucocorticoids that did not seem to be justified.

Of all patients, 33.2% were taking immunosuppressants. According to our predefined criteria, we saw an indication in 57.6% of all patients. Only 57.6% out of those having an indication were actually taking an immunosuppressant. Overall, 75.6% of all patients were being treated adequately with respect to immunosuppressants.

Age-adjusted values

Since the patients we contacted were older than expected for a normal population of IBD patients, we adjusted this skewed age distribution by using the prevalence reported for Olmsted County, MN, USA, [42] for age-adjusting of our numbers (Table 4).

The age-adjusted number of patients taking aminosalicylates was lower for UC as well as CD resulting in even less UC patients being treated according to guidelines while more CD patients were treated adequately. Age-adjusted numbers revealed also considerable differences for long-term treatment with glucocorticoids and treatment with immunosuppressants. After age-adjusting, in two-thirds of all patients who received long-term treatment with glucocorticoids, this therapy was not deemed adequate. Out of all patients, less than 10% were inadequately taking glucocorticoids long term. After age-adjusting, one quarter of all patients who should receive immunosuppressants as mandated by clinical practice guidelines did not receive these drugs. Numbers for surveillance colonoscopy and smoking did not change considerably after age adjustment.

Predictors of treatment according to guidelines

Next, we wanted to find possible predictors for inadequate treatment in an exploratory analysis (Table 5). We performed our analysis for an aggregate "ideal treatment" denoting that a given patient's treatment was according to guidelines for each of the investigated quality parameters.

Early aggressive treatment seems to promote a better long-term outcome [43]. Therefore, current clinical practice guidelines stress administration of immunosuppressants in a larger group of IBD patients than in the past. However, possible grave side effects could pose a barrier to prescription of these

Table 2 Definition of patients "At risk". Patients were categorized as "at risk" for under-, over-, or mistreatment, when they fulfilled the definition for the respective quality measure, which was derived from clinical practice guidelines. (CD: Crohn's disease; UC: ulcerative colitis)

Quality measure	Definition
UC and indication for aminosalicylates	Flare within the last 2 years and no treatment with immunosuppressants
CD and no indication for long-term treatment with aminosalicylates	Treatment with immunosuppressants or no intra-abdominal operation
Indication for treatment with immunosuppressants for UC and CD	Three flares in 1 year or two glucocorticoid induction regimens in 1 year or steroid dependent or steroid refractory or treatment with immunosuppressants (UC patients: in spite of treatment with aminosalicylates)
UC and CD no indication for long-term glucocorticoid treatment	All patients unless steroid dependent and treatment with immunosuppressants
UC and indication for surveillance colonoscopy	Extensive colitis and diagnosis for > 8 years or distal colitis and diagnosis for > 15 years
CD and smoking	All patients

Table 3 Treatment according to clinical practice guidelines. For each quality measure, the percentage of patients and raw numbers of patients considered as treated according to guidelines are provided. In order to describe treatment in all patients, patients not "at risk" were considered as treated adequately. All CD patients were considered to be "at risk" for smoking. Not all patients were evaluable for all measures. (CD: Crohn's disease; IBD: inflammatory bowel diseases; UC: ulcerative colitis)

Quality measure	Percentage of patients "at risk"[a] being treated adequately	Percentage of all patient being treated adequately
UC and mesalamine	59.5% (138/232)	62.4% (156/250)
CD and mesalamine	48.0% (60/125)	53.9% (76/141)
IBD and long-term glucocorticoids	90.6% (327/361)	91.3% (356/390)
IBD and immunosuppressants	57.6% (83/144)	75.6% (189/250)
UC and surveillance colonoscopy	77.6% (38/49)	94.8% (200/211)
CD and smoking	58.8% (94/160)	

[a] See Table 2 for definition of "at risk"

drugs. Hence, we additionally sought to investigate predictors for adequate administration of immunosuppressants other than glucocorticoids.

When considering all investigated criteria as an "ideal treatment", patients with UC were treated more often according to clinical practice guidelines than patients with CD (OR 3.0). This difference was solely dependent on the different quality measures applied for CD and UC patients, smoking, and surveillance colonoscopy. When looking only at the drug treatment, the odds ratio was 1.3 with a p value of 0.30 (data not shown). Remarkably, treatment of IBD patients by general practitioners and treatment of female IBD patients fulfilled less quality criteria. These differences were though not statistically significant.

Looking only at patients "at risk" with regard to immunosuppression, i.e. who were considered to have an indication for immunosuppressive treatment, higher age was strongly associated with lack of immunosuppressive treatment (OR 0.09 for patients > 60 years). Here, treatment of patients taken care of by a general practitioner as compared to patients taken care of in a more specialized setting differed greatly. The odds ratio for adequate treatment with immunosuppressive drugs in this group for internists and gastroenterologists was slightly above 1 (OR 1.4 and 1.8 respectively compared to general practitioners) and 4.4 for patients being treated at a specialized IBD clinic. Sex and type of disease were no significant predictors of treatment with immunosuppressive drugs according to clinical practice guidelines in patients "at risk".

Discussion

This study revealed in a broad population that many IBD patients are not being treated according to clinical practice guidelines.

For this study, we defined five treatment modalities, which, in our opinion, are essential for IBD treatment. For each of them, German and European guidelines contain clear recommendation, so that their implementation could be analysed and compared in different patients and physician subgroups included in this study.

Table 4 Treatment according to clinical practice guidelines: age-adjusted results. For each quality measure, the percentage of patients, who were considered to be treated according to guidelines are given. In order to describe treatment in all patients, patients not "at risk" were considered as being treated adequately. Age-adjusting of the results was done by direct standardization to the age- and disease-specific prevalence. All CD patients were considered to be "at risk" for smoking. (CD: Crohn's disease; IBD: inflammatory bowel diseases; UC: ulcerative colitis)

	Patients "at risk"[a]		All patients	
	Survey results	Age-adjusted results	Survey results	Age-adjusted results
UC and aminosalicylates	59.5%	54%	62.4%	56%
CD and mesalamine	48.0%	64%	53.9%	67%
IBD and glucocorticoids	90.6%	96%	91.3%	96%
IBD and immunosuppressants	57.6%	77%	75.6%	85%
UC and surveillance colonoscopy	77.6%	82%	94.8%	96%
CD and smoking	58.8%	52%		

[a] See Table 2 for definition of "at risk"

Table 5 Predictors of treatment according to clinical practice guidelines. Association of demographic and clinical parameters with treatment according to guidelines was evaluated by stepwise binomial logistic regression. Treatment of patients "at risk" with immunosuppressants was considered to be especially important and therefore evaluated separately. Indication for treatment with immunosuppressants was used as proxy for severity of disease. (CI: confidence interval; IBD: inflammatory bowel diseases; OR: odds ratio)

	Treatment according to clinical practice guidelines for all quality measures				Treatment with immunosuppressants in patients "at risk"[a]			
	Univariate analysis			Multivariate	Univariate analysis			Multivariate
	OR	95% CI	*p* value	*p* value	OR	95% CI	*p* value	*p* value
Sex								
Female	0.69	0.47–1.00	0.05	0.38	1.17	0.58–2.36	0.67	
Age								
< 30	1	(Comparator)	0.70		1	(Comparator)	0.001	0.02
30–59	1.26	0.61–2.58			0.22	0.05–1.06		
60+	1.35	0.66–2.74			0.09	0.02–0.41		
Disease								
Ulcerative colitis	3.03	2.00–4.60	< 0.001	< 0.001	1.26	0.65–2.45	0.49	
Duration of disease								
10+ years	1.39	0.96–2.02	0.08	0.06	1.12	0.57–2.17	0.75	
Treating physician								
General practitioner	1	(Comparator)	0.34		1	(Comparator)	0.12	0.11
Internist	1.48	0.86–2.56			1.43	0.46–4.42		
Gastroenterologist	1.57	0.95–2.58			1.81	0.67–4.88		
IBD clinic	1.42	0.73–2.77			4.44	1.26–15.62		
Place of residence								
Hamburg (vs. Berlin)	0.96	0.64–1.43	0.82		3.01	1.45–6.25	0.003	0.04
Immunosuppressants								
Indicated	0.57	0.35–0.92	0.02	0.15				

[a] See Table 2 for definition of "at risk"

We were able to show that there is a very high over-use of aminosalicylates in patients with Crohn's disease while on the other hand there is underuse in patients with ulcerative colitis.

While immunosuppressive treatment is currently considered as the cornerstone of IBD treatment, only half of the patients with an indication for treatment with these drugs were actually receiving them. Other than for a steroid-refractory or steroid-dependent disease course, the European or German guidelines did not define exactly which patients are supposed to be treated with immunosuppressants. We interpreted the guidelines as follows: Patients, who had three or more flares within the last year, who required two or more courses of glucocorticoids within the last year, who were steroid-dependent or steroid-refractory, or had a complex course (more than two abdominal surgeries or extensive perianal disease), should be treated with immunosuppressants. We excluded UC patients, who were not receiving aminosalicylates arguing that these patients should first be treated with aminosalicylates before being introduced to immunosuppressive treatment. Our definition with respect to the number of flares might be too strict, therefore, resulting an inflated number of patients in need of immunosuppressants. On the other hand, the number of patients in need of immunosuppression might even be higher, since we were not able to identify patients who had a severe flare in the past. We did not ask about prior drugs in our questionnaire so we might have missed patients who stopped their immunosuppression due to side effects. Yet only about 20% of patients under azathioprine or methotrexate usually need to stop taking their medication and these patients then still could have been started on a different immunosuppressant. Lastly, we cannot exclude that the high number of patients not receiving appropriate treatment with an immunosuppressant had already failed all drugs currently on the market, even though we consider this unlikely.

The number of patients on long-term glucocorticoids without steroid-sparing immunosuppressants was only 10%. Nevertheless, this is one of the few strong recommendations underpinned by high-quality evidence so almost no patient should receive this treatment.

In a fourth step, we looked at different features in the treatment of patients with UC and CD. Similar to other studies, we

were able to show that many UC patients do not receive surveillance colonoscopy measures. We only analysed whether or not the surveillance colonoscopy was performed as recommended by the guidelines; we did not look at the number of biopsies taken during surveillance colonoscopy or whether chromoendoscopy was performed [44, 45].

Our study also found that smoking is still prevalent among CD patients. Of course, the number of patients being counselled by their physician might be very high if patients ignore the physicians' advice and also continued smoking might be less a problem of guideline implementation than a problem of addiction [46, 47].

We were not able to identify clear predictors for treatment according to clinical practice guidelines. Yet, older patients and patients treated by a general practitioner were less likely to receive immunosuppressants, whereas patients treated at a specialized IBD clinic received this treatment more frequently.

Very often, studies about guideline adherence rely on self-reported data by physicians. Unfortunately, adherence on average is largely overestimated with this method [32]. On the other hand, while recall bias cannot be excluded patients tend to be fairly reliable reporters of their medical condition and recall of pharmacological treatment can be expected to be adequate in this study [48, 49].

Previous studies only inquired the current state of the patients' condition. Therefore, they could only assess variability of treatment. We asked the patients about the course of their disease during the last year enabling us to assess the adequate treatment as recommended by clinical practice guidelines. The only other way to achieve this would have been an extensive chart review of all patients. In addition, all of the respondents from this study were identified through a hospital-coded diagnosis. Therefore, our age distribution was skewed towards the inclusion of more elderly patients. We did adjust for this skewed age distribution by normalizing to a well-described population of IBD patients and the results were still similar.

The response rate to this study was only 24%. Due to data protection, respondents could choose to remain anonymous; therefore, we were not able to contact non-respondents with a reminder letter. The length of the questionnaire might have been another reason for the low response rate.

Several studies have shown treatment variability in IBD between neighbouring regions or between specialists and generalists. Such variation in care is often associated with underuse, overuse, or misuse of diagnosis, yet it can still only be considered a surrogate [50]. While some studies have directly looked at the quality of care in IBD, most of them have only focused at the supportive measures such as evaluation of bone marrow density, vaccination, and drug-monitoring. Only few studies have assessed the quality of treatment with immunosuppressive drugs, which are still the mainstay of IBD treatment.

The number of UC patients who were not treated adequately with aminosalicylates is in line with an earlier study [51]. In CD, the number of patients being treated inadequately with aminosalicylates was even higher in an earlier study as compared to our data [52].

Seventy-seven percent of all patients received long-term glucocorticoid treatment and 59% had not been prescribed with steroid-sparing agents in an analysis by Reddy et al. [53]. Similarly, among patients admitted to an East Chinese University hospital with steroid-dependent, steroid-refractory, or severe fistulizing disease, 80% were not treated with immunosuppressants [54]. In our survey, we only identified 14% of all patients who inadequately received long-term glucocorticoids yet 42% of all patients with an indication for immunosuppressants were not treated as such. This difference most likely is due to the different populations with both earlier studies investigating patients only referred to a tertiary care centre.

Our data indicate that a large number of IBD patients in Germany do not receive treatment with aminosalicylates, immunosuppressants, and, to lesser degree, glucocorticoids as recommended in clinical practice guidelines. Treatment in a specialized setting seemed to be associated with better adherence to guidelines at least for treatment with immunosuppressive drugs. Just like in many other fields in medicine, more efforts are necessary to implement clinical practice guidelines on all layers of IBD care and to better guide IBD patients through the health care system.

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Compliance with ethical standards

Conflict of interest JCH served as consultant for Astra, Falk, Hexal, Janssen, Pfizer, Steigerwald, and Takeda, and received lecture fees from Falk, Janssen, MSD, Pfizer, and Takeda. BS received a research grant from Pfizer, served as consultant for Falk, Janssen, MSD, Abbvie, Celgene, Lilly, Takeda, Pfizer, and Hospira and received lecture fees from Abbvie, Falk, Ferring, Janssen, MSD, Merck, and Takeda; all money went to the Charité-Universitätsmedizin Berlin, Germany. JCP served as a consultant for MSD, Pfizer, Takeda, and Biogen and received lecture fees from Vifor, Falk, Janssen, Abbvie, Pfizer, Vifor, MSD, and Takeda.

Ethical approval The local ethics board approved the protocol. All patient-related data were anonymized after open questions had been resolved in responders who provided their contact information.

Informed consent Informed consent was assumed if patients sent in their questionnaire. The local data protection commissioner approved the protocol.

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