# Preconception Care Reduces Relapse of Inflammatory Bowel Disease During Pregnancy

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**BACKGROUND & AIMS:** **Women with inflammatory bowel disease (IBD) may have incorrect beliefs about their disease and its medication in relation to pregnancy. We studied the effects of preconception care (PCC) on patients' behavior during pregnancy, disease relapse during pregnancy, and birth outcomes.**

**METHODS:** **In a prospective study, we followed up all women with IBD seen at the preconception outpatient clinic at Erasmus MC–University Medical Center in Rotterdam, The Netherlands (from 2008 through 2014). We compared patients who received PCC before they became pregnant (PCC group; n = 155) with patients who visited the clinic after they already were pregnant (no-PCC group; n = 162). We collected data on lifestyle, medication adherence, planning of conception, disease activity, and birth outcomes. We compared adherence to medical advice, rates of disease relapse during pregnancy, and birth outcomes.**

**RESULTS:** **The PCC group was on average younger than the no-PCC group (29.7 vs 31.4 y; $P = .001$), and a greater proportion were nulliparous (76.1% vs 51.2%; $P = .0001$). PCC was associated with adherence to IBD medication during pregnancy (adjusted odds ratio [aOR],5.69; 95% confidence interval [CI], 1.88–17.27), adequate folic acid intake (aOR, 5.26; 95% CI, 2.70–10.26), and smoking cessation (aOR, 4.63; 95% CI, 1.22–17.55). PCC reduced disease relapse during pregnancy independent of parity, disease duration, or disease activity before conception (aOR, 0.51; 95% CI, 0.28–0.95). The PCC group was less likely to deliver babies of low birth weight (aOR, 0.08; 95% CI, 0.01–0.48).**

**CONCLUSIONS:** **In a prospective study, we found that preconception care reduces IBD relapse during pregnancy by promoting adherence to medication and smoking cessation. Preconception also reduces risk for babies of low birth weight.**

*Keywords:* Neonatal; In Utero; Drugs; Complication.

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Women with inflammatory bowel disease (IBD) tend to have incorrect beliefs, unfounded fears, and insufficient knowledge when it comes to their disease and its medication in relation to pregnancy.[1–4] Lack of correct knowledge could lead to decreased IBD medication adherence during pregnancy,[5] which increases the risk of disease relapse and, consequently, the risk of pregnancy complications.[6–8] Therefore, to rectify misperceptions among patients and eventually achieve substantial health gain for both mother and child, patient education by means of IBD-specific preconception care (PCC) seems warranted. Previous studies have shown patient education and a single consultation with a physician on IBD and pregnancy to be effective in increasing knowledge[9] and promoting correct IBD medication

*Abbreviations used in this paper:* aOR, adjusted odds ratio; CI, confidence interval; IBD, inflammatory bowel disease; OR, odds ratio; PCC, preconception care; POC, Preconception Outpatient Clinic; TNF, tumor necrosis factor.

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adherence during pregnancy.[5] In general, the goal of PCC in IBD patients is to identify and modify medical and behavioral risk factors for adverse maternal and pregnancy outcomes. The importance of timely PCC (ie, before pregnancy occurs) is founded in the idea that early embryonic development and the placentation phase is crucial for pregnancy outcomes. This critical phase often already has passed when a woman first finds out about the pregnancy, and therefore advice when already pregnant can come too late. In women with IBD, PCC has the added value of educating the patient in the importance of conceiving in times of quiescent disease because this is an important risk factor for disease relapse during pregnancy.[10–16] In addition, the IBD medication regimen can be adjusted to one compatible with pregnancy. To date, it is unknown if IBD-specific PCC has the ability to prevent disease relapse during pregnancy. However, the efficacy of PCC in women with a chronic disease such as pregestational diabetes mellitus has been shown previously.[17,18] The aim of this study was therefore as follows: (1) to investigate the effect of PCC in IBD women before pregnancy on IBD medication adherence and general factors such as smoking behavior, (2) to assess the effect of PCC on disease relapse during pregnancy, and, consequently, (3) to assess birth outcomes.

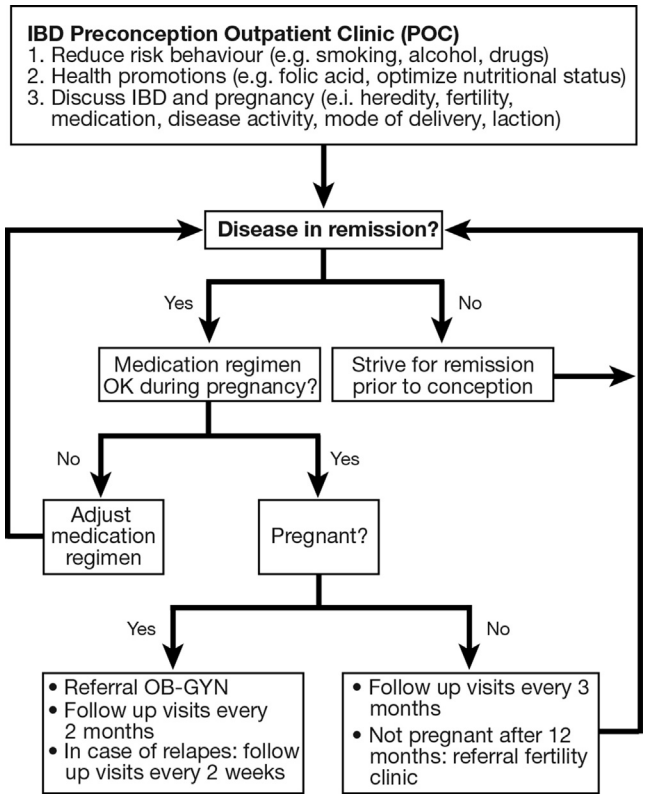


**Figure 1.** Preconception care schematic. OB-GYN, obstetrician-gynecologist.

## Methods

### *Study Design and Setting*

From January 2008 until July 2014, we conducted an ongoing prospective clinical cohort study at the IBD preconception outpatient clinic (POC) at Erasmus MC, a tertiary referral hospital. All IBD women in the fertile age range (18–42 y) visiting the regular IBD outpatient clinic were routinely asked about the desire for pregnancy. In case of an active pregnancy desire within 2 years, the patient was referred to the POC (Figure 1). At the POC, 30 to 45 minutes are scheduled for each new patient to discuss reproduction aspects in relation to IBD adhering to recent European Crohn's and Colitis Organization guidelines.[15,19] In addition, general health-promoting advice was given (folic acid intake, smoking cessation, no alcohol during pregnancy) at the POC. The emphasis of this specialized consultation lies in the importance of conceiving in times of quiescent disease. If necessary, IBD medication alterations are made. In cases of quiescent disease and nonteratogenic medication, a green light was given for pregnancy. All patients received a written letter after the consultation with the given advice summarized. After the first consultation or baseline visit, patients were followed up intensively. Before pregnancy patients were followed up every 3 months until conception and every 2 months during pregnancy, and in case of disease activity during pregnancy every 2 weeks.

### *Participants*

All IBD women with an active pregnancy wish or who already were pregnant treated at the regular IBD outpatient clinic at our institution were included in the cohort. In addition, IBD women referred to the POC because of an active pregnancy wish or an ongoing pregnancy from another hospital were included in the cohort, only when no preconception care was available in the referring hospital. For the purpose of this study, we compared IBD women who received the preconception advice when they were not yet pregnant (PCC group) with IBD women who first presented at the POC when they already were pregnant (no-PCC group). All IBD women received the same advice, follow-up evaluation, and treatment during pregnancy.

### *Variables and Data Measurement*

At the baseline visit (either before or during pregnancy), we obtained the patient demographics, disease history, obstetric history, data on smoking and alcohol use, and clinical assessment of the disease activity through the Harvey–Bradshaw Index for Crohn's disease patients and the Simple Clinical Colitis Activity Index for ulcerative colitis patients. From 2010, the fecal calprotectin level was measured to assess disease activity (fecal calprotectin $> 200$ $\mu$g/g). At every follow-up visit, disease activity was monitored clinically, medication and folic

acid adherence were assessed, as well as smoking habits and alcohol intake. In a large proportion of anti–tumor necrosis factor (TNF)-treated patients and patients treated with thiopurines, patient-reported medication adherence was validated with maternal serum drug levels during pregnancy or at delivery. At the end of pregnancy, birth outcomes (birth weight, gestational age, congenital abnormalities, and appearance, pulse, grimace, activity, respiration score) were recorded.

### Bias

The primary aim of this study was to investigate the effect of preconception counseling before pregnancy on IBD patients' behavior and consequently on disease activity during pregnancy. Inherently, the observational, nonrandomized study design creates a bias in the selection of patients. This was countered by consecutively and structurally asking for a pregnancy wish in all IBD women who were treated at our regular outpatient clinic. Therefore, the patients recruited from our own hospital probably suffered less from selection bias than patients who were referred to our POC from other hospitals.

### Study Size

Based on previous studies,[15] we expected a risk of disease activity during pregnancy of approximately 30%. In the case of a reduction in disease activity during pregnancy of 50% in the study group, at a significance level of 0.05, and a desired power of 80%, 121 patients per arm were necessary. In the study period we included a total of 336 cases that were eligible for inclusion, with an equal distribution of patients between study arms.

### Statistical Methods

Analyses were performed using IBM SPSS statistics (version 20.0; Chicago, IL). All descriptive statistics are shown as medians with interquartile ranges for continuous variables and as absolute numbers with percentages for categoric variables. Comparisons for continuous variables were performed using Mann–Whitney *U* tests and chi-square or Fisher exact tests for categoric variables. These tests were performed 2-tailed and at a significance level of 0.05. The effect of preconception advice on patient behavior, disease activity, and birth outcomes was calculated using both univariate and multivariate logistic regression. Crude and adjusted odds ratios (ORs) are shown with 95% confidence intervals (CI). The significance level was adjusted for multiple comparisons using the Bonferroni method.

### Ethical Considerations

All authors had access to the study data and reviewed and approved the final manuscript. Publication of this data was approved by our local ethics committee.

## Results

### Participants

In total, 144 IBD women conveyed 167 pregnancy desires to us at our IBD preconception outpatient clinic. Twelve women (7.7%) were lost to follow-up evaluation after the first consultation because they were unable to attend follow-up visits for financial or logistic reasons. This resulted in a study group of 132 women, with 155 pregnancies with preconception advice before these pregnancies (PCC group). Another 115 IBD women visited the preconception outpatient clinic when they already were pregnant (no-PCC group). These 115 women accounted for 169 pregnancies. Six women (3.6%) were first diagnosed with IBD during pregnancy, and these women were excluded from further analysis. Another woman in this group was lost to follow-up evaluation because of logistic reasons. The no-PCC group consisted of 108 IBD women with 162 pregnancies, without preconception advice before these pregnancies.

### Descriptive Data

Patient demographics are shown in Table 1. IBD women in the PCC group were on average younger, had a shorter disease duration, and were more often nulliparous compared with IBD women in the no-PCC group. IBD women in the PCC group also underwent more fertility treatments such as in vitro fertilization ($P = .0001$). In the no-PCC group the majority of pregnancies (80.9%) were planned. The main reason for other hospitals to refer patients to our POC in both the PCC as well as the no-PCC group was the request of the patient to receive treatment for IBD during pregnancy from a center with specific expertise in this area (71% vs 66%; $P = .57$). Only 10% of women referred to the POC by another hospital in both the PCC as well as the no-PCC groups (10.9% vs 12.3%; $P = 1.00$) were referred because of active disease or difficult-to-control disease.

### The Effect of Preconception Care on Behavior During Pregnancy

At first consultation, in 13 IBD women (8.4%) medication adjustments were necessary to avoid teratogenicity during pregnancy (n = 7), or because of inefficacy or side effects of medication (n = 6). One woman who first presented at the POC when already pregnant had used methotrexate periconceptionally. This was discontinued immediately and replaced by anti-TNF. In the group receiving PCC before pregnancy, conception occurred in the majority of cases (61.3%) after the green light for pregnancy date. Importantly, PCC was associated with correct IBD medication adherence during pregnancy independent of parity (adjusted OR [aOR], 5.69; 95% CI, 1.88–17-27). In addition, PCC was

**Table 1.** Baseline Characteristics

| Variable | PCC (n = 155) | No PCC (n = 162) | *P* |
|---|---|---|---|
| Maternal age, *y* | 29.7 (26.5–32.4) | 31.4 (28.7–34.1) | .001 |
| Type of IBD, n (%) | | | |
| Crohn's disease | 113 (72.9) | 112 (69.1) | .54 |
| Ulcerative colitis | 35 (22.6) | 48 (29.6) | |
| IBD unclassified | 7 (4.5) | 2 (1.2) | |
| Disease duration, *y* | 5.1 (2.4–9.3) | 8.0 (5.2–11.9) | .0001 |
| Parity, n (%) | | | |
| Nulliparous | 118 (76.1) | 83 (51.2) | .0001 |
| Multiparous | 37 (23.9) | 79 (28.8) | |
| Marital status, n (%) | | | |
| Not married | 72 (46.5) | 73 (45.1) | .91 |
| Married | 83 (53.5) | 88 (54.3) | |
| Planned pregnancy, n (%) | | | |
| No | 0 (0.0) | 18 (11.1) | .0001 |
| Yes | 133 (85.8) | 131 (80.9) | |
| Education level, n (%) | | | |
| Low | 2 (1.3) | 4 (2.5) | .69 |
| Medium | 69 (44.5) | 89 (54.9) | .07 |
| High | 66 (42.6) | 60 (37.0) | .36 |
| Smoking before pregnancy, n (%) | | | |
| No | 111 (71.6) | 134 (82.7) | .14 |
| Yes | 32 (20.6) | 25 (15.4) | |
| BMI before pregnancy (median, IQR) | 23.3 (21.2–26.0) | 22.7 (20.8–25.3) | .25 |
| Fertility treatment, n (%) | | | |
| No | 113 (72.9) | 145 (89.5) | .0001 |
| Yes | 33 (22.6) | 15 (9.4) | |
| Relapse in the year preceding pregnancy, n (%) | | | |
| None | 89 (57.4) | 92 (56.8) | 1.00 |
| ≥1 | 66 (42.6) | 70 (43.2) | |
| Never preconception advice, n (%) | - | 129 (79.6) | - |

BMI, body mass index; IQR, interquartile range.

**Table 2.** The Effect of Preconception Advice on Behavioral Parameters

| Variable | PCC (n = 155) | No PCC (n = 162) | *P* | Crude OR (95% CI) | Adjusted OR (95% CI) |
|---|---|---|---|---|---|
| Medication change necessary before pregnancy, n (%) | | | | | |
| No | 142 (91.6) | 161 (99.4) | .0006 | 7.54 (1.67–33.98) | 7.12 (1.56–32.51)[b] |
| Yes | 13 (8.4) | 1[a] (0.6) | | | |
| Adequate planning of conception, n (%) | | | | | |
| No | 16 (10.3) | - | - | - | - |
| Yes | 95 (61.3) | - | | | |
| Correct adherence to IBD medication during pregnancy, n (%) | | | | | |
| No | 4 (2.6) | 22 (13.6) | .002 | 5.78 (1.94–17.18) | 5.69 (1.88–17.27)[c] |
| Yes | 151 (97.4) | 140 (86.4) | | | |
| Adequate folic acid intake, n (%) | | | | | |
| No | 14 (9.0) | 61 (37.7) | .0001 | 5.71 (3.01–10.86) | 5.26 (2.70–10.26)[b] |
| Yes | 118 (76.1) | 90 (55.6) | | | |
| Quit smoking during pregnancy, n (%) | | | | | |
| No | 7 (29.2) | 17 (70.8) | .009 | 5.90 (1.70–20.48) | 4.63 (1.22–17.55)[b] |
| Yes | 17 (70.8) | 7 (29.2) | | | |
| Alcohol intake during pregnancy, n (%) | | | | | |
| No | 125 (80.6) | 151 (93.2) | 1.00 | 0.81 (0.22–2.92) | 0.74 (0.20–2.71)[b] |
| Yes | 4 (2.6) | 6 (3.7) | | | |

[a]Periconceptional methotrexate use.
[b]Adjusted for education level.
[c]Adjusted for parity.

**Table 3.** Risk Factors for Nonadherence to Preconception Advice: Univariate Analysis

| | Adherence IBD advice | | | | | Adherence general advice | | | | | Total adherence | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | Yes | $P^a$ | OR (95% CI) | $P^a$ | No | Yes | $P^a$ | OR (95% CI) | $P^a$ | No | Yes | $P^a$ | OR (95% CI) | $P^a$ |
| Age | | | | | | | | | | | | | | | |
| <25 y | 5 | 12 | .32 | 1.89 (0.59–5.99) | .28 | 6 | 10 | .07 | 3.34 (1.06–10.47) | .04 | 9 | 8 | .18 | 2.09 (0.74–5.90) | .16 |
| >25 y | 19 | 86 | | | | 16 | 89 | | | | 35 | 65 | | | |
| Disease duration | | | | | | | | | | | | | | | |
| <1 y | 25 | 2 | .36 | 2.31 (0.50–10.76) | .29 | 18 | 84 | .75 | 0.80 (0.24–2.71) | .72 | 38 | 62 | 1.00 | 1.12 (0.38–3.29) | .83 |
| >1 y | 81 | 17 | | | | 4 | 15 | | | | 6 | 11 | | | |
| Parity | | | | | | | | | | | | | | | |
| Nulliparous | 20 | 73 | .43 | 1.71 (0.53–5.49) | .37 | 18 | 76 | .78 | 1.36 (0.42–4.43) | .61 | 36 | 55 | .50 | 1.47 (0.58–3.74) | .42 |
| Multiparous | 4 | 25 | | | | 4 | 23 | | | | 8 | 18 | | | |
| Education | | | | | | | | | | | | | | | |
| Low/medium | 9 | 50 | .24 | 0.55 (0.22–1.43) | .22 | 12 | 44 | .63 | 1.42 (0.55–3.71) | .47 | 20 | 39 | .43 | 0.71 (0.33–1.54) | .39 |
| High | 13 | 40 | | | | 9 | 47 | | | | 21 | 29 | | | |
| IBD subtype | | | | | | | | | | | | | | | |
| CD | 17 | 75 | .60 | 0.75 (0.28–2.02) | .56 | 17 | 74 | 1.00 | 1.15 (0.38–3.44) | .80 | 32 | 56 | .66 | 0.81 (0.34–1.91) | .63 |
| UC/IBDU | 7 | 23 | | | | 5 | 25 | | | | 12 | 17 | | | |
| IBD medication | | | | | | | | | | | | | | | |
| IS/biologicals | 14 | 68 | .34 | 1.62 (0.65–4.06) | .30 | 16 | 69 | 1.00 | 0.86 (0.31–2.42) | .78 | 29 | 49 | 1.00 | 1.06 (0.48–2.33) | .89 |
| Other | 10 | 30 | | | | 6 | 30 | | | | 15 | 24 | | | |

CD, Crohn's disease; IBDU, IBD unclassified; IS, immunesuppressives; UC, ulcerative colitis.
[a]Tested at a significance level of $\leq 0.006$.

**Table 4.** Effects of Preconception Care on Disease Activity

| | PCC (n = 155) | No PCC (n = 162) | *P* | Crude OR (95% CI) | Adjusted OR (95% CI) |
|---|---|---|---|---|---|
| Periconceptional disease activity, n (%) | | | | | |
| No | 107 (69.0) | 131 (84.5) | .53 | 0.80 (0.43–1.51) | 1.02 (0.50–2.09)[a] |
| Yes | 19 (12.3) | 29 (17.9) | | | |
| Disease activity during pregnancy, n (%) | | | | | |
| No | 90 (58.1) | 102 (63.0) | .05 | 0.58 (0.34–0.99) | 0.51 (0.28–0.95)[b] |
| Yes | 28 (18.1) | 55 (34.0) | | | |

[a]Adjusted for parity, disease duration, and number of relapses in year preceding pregnancy.
[b]Adjusted for parity, disease duration, and periconceptional disease activity.

associated significantly with adequate folic acid intake (aOR, 5.26; 95% CI, 2.70–10.26) and smoking cessation (aOR, 4.63; 95% CI, 1.22–17.55) independent of education level. All crude and adjusted ORs are shown in Table 2. Within the PCC group, we were unable to identify risk factors for nonadherence to the advice (Table 3).

### *The Effect of Preconception Advice on Inflammatory Bowel Disease Activity*

Preconception advice was associated significantly with less disease activity during pregnancy (aOR, 0.51; 95% CI, 0.28–0.95), independent of parity, disease duration, and periconceptional disease activity. This association could not be found between preconception advice and periconceptional disease activity (aOR, 1.02; 95% CI, 0.50–2.09) (Table 4).

### *The Effect of Preconception Advice on Birth Outcomes*

Table 5 shows the effect of preconception advice on birth outcomes. Preconception advice was protective for low birth weight in the newborn (aOR, 0.08; 95% CI, 0.01–0.48) independent of gestational age at birth. However, no significant association was found between preconception advice and small for gestational age babies (aOR, 0.22; 95% CI, 0.05–1.00).

## Discussion

In the present study, we show that preconception care reduces disease relapse during pregnancy and preconception care positively influences birth outcomes by protecting against low birth weight. These effects can be attributed to the beneficial effects of preconception care on planning pregnancy in times of quiescent disease, correct IBD medication adherence, and smoking cessation during pregnancy (Supplementary Table 1).

Previously, a questionnaire-based study reported medication adherence during pregnancy in women with ulcerative colitis of approximately 60%.[5] Counseling also was found to have beneficial effects on medication adherence, however, counseling was nonstandardized and provided by a variety of different physicians. In addition, in nonpregnant IBD women high adherence

**Table 5.** Effects of Preconception Care on Birth Outcomes

| | PCC (n = 129)[a] | No PCC (n = 162) | *P*[b] | Crude OR (95% CI) | Adjusted OR (95% CI) | *P*[b] |
|---|---|---|---|---|---|---|
| Live births, n (%) | 97 (75.2) | 127 (78.4) | .58 | 0.84 (0.48–1.44) | 0.79 (0.45–1.38)[c] | .40 |
| Spontaneous abortions, n (%) | 26 (20.2) | 31 (19.1) | .88 | 1.07 (0.60–1.91) | 1.10 (0.61–2.00)[c] | .75 |
| Birth weight, *g* (median, IQR) | 3373 (2955–3679) | 3363 (2829–3630) | .52 | - | - | |
| Low birth weight <2500 g, n (%) | 7 (7.2) | 16 (12.6) | .19 | 0.53 (0.21–1.35) | 0.08 (0.01–0.48)[d] | .006 |
| Gestational age at birth, *wk* (median, IQR) | 38.4 (34.0–40.0) | 38.0 (36.1–39.5) | .50 | - | - | |
| Preterm birth <37 wk, n (%) | 13 (13.4) | 10 (7.9) | .19 | 1.80 (0.75–4.31) | 1.74 (0.73–4.16)[e] | .22 |
| Small for gestational age,[f] n (%) | 3 (3.1) | 12 (9.4) | .06 | 0.30 (0.08–1.09) | 0.22 (0.05–1.00)[g] | .05 |
| Congenital abnormalities, n (%) | 3 (3.1) | 6 (4.7) | .74 | 0.63 (0.16–2.60) | 0.92 (0.20–4.14)[h] | .91 |

[a]Patients not yet pregnant were excluded from analysis.
[b]Significance level was set at ≤ 0.006.
[c]Adjusted for maternal age at conception.
[d]Adjusted for gestational age.
[e]Adjusted for mode of delivery.
[f]Small for gestational age: birth weight below 10th percentile for gestational age.
[g]Adjusted for smoking during pregnancy.
[h]Adjusted for correct folic acid intake.

was reported in approximately 60% of cases.[17,20] In this study, medication adherence rates are higher than 60% in both the IBD women receiving PCC (97.4%) and in IBD women who did not receive PCC (86.4%). The difference in adherence rates between this study and previous studies may be explained by the high level of motivation for a healthy pregnancy in our cohort of pregnant IBD women. In addition, patients falsely could have reported their adherence because they knew this would be socially desirable. In the majority of anti-TNF–treated patients and in part of the thiopurine-treated patients we measured maternal drug levels at birth or during pregnancy. These levels significantly corresponded with the patient-reported adherence. However, these data were not measured or unavailable for all patients. In this study, we did not check adherence through checking the prescription data with the pharmacy.

To our surprise, this study did not detect an effect of PCC on periconceptional disease activity, although the focus of the PCC was on the importance of quiescent disease at conception. We can only speculate about the explanation for this finding, but we believe this could be a result of a discrepancy between physician-declared disease remission and the patient's own feeling of well-being combined with a strong reproductive desire.

PCC in all women with a pregnancy wish has many advantages, and can be seen as the purest disease prevention available. One of the biggest drawbacks of PCC, however, is that the pregnancy has to be planned. In IBD women, it also must be clear that besides the gynecologist, the gastroenterologist has a major part to play in this respect. We tried to counter these 2 issues by actively inquiring after a pregnancy desire in all IBD women in the reproductive age at our regular outpatient clinic. With this approach, all patients were aware of the existence of the IBD preconception outpatient clinic and we were able to offer PCC to IBD women with a pregnancy wish but who were undecided about when they wanted to start trying.

Although this study was a prospective study, it was limited by its nonrandomized design and therefore may be unable to truly discern the effects of PCC because the study and control group suffered from different types of bias. One could argue the group receiving PCC was an inherently more health-motivated or higher-educated group than the non-PCC group. In our baseline data, we cannot detect a difference in education level or smoking status before pregnancy. Although health-motivation was not measured, these data indicate a minimal difference between the 2 groups, probably achieved by the previously mentioned consecutive inclusion of all IBD women with a pregnancy wish at our own hospital.

Finally, this study did not explore the effects of a single consultation before pregnancy on pregnancy and birth outcomes. We realize PCC accompanied by the intense follow-up regimen as described in this study may not be feasible in every country owing to decreased accessibility, logistics, or financial reasons. Perhaps the development of specific, validated E-health (ie, informative digital online platforms) programs for IBD and pregnancy will be able to counter this problem in the future.

In conclusion, preconception care seems effective in achieving desirable behavioral modifications in IBD women in terms of folic acid intake, smoking cessation, and correct IBD medication adherence, eventually reducing disease relapse during pregnancy. Most importantly, preconception care positively influences birth outcomes.

## Supplementary Meterial

Note: To access the supplementary material accompanying this article, visit the online version of *Clinical Gastroenterology and Hepatology* at www.cghjournal.org, and at http://dx.doi.org/10.1016/j.cgh.2016.03.018.

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**Conflicts of interest**
These authors disclose the following: Z. Zelinkova has received consultancy and lecture fees from MSD, and has consulted for Abbott; and C. J. van der Woude has received consultancy and lecture fees from MSD and Abbott, and has consulted for Shire and Ferring. The remaining authors discloses no conflicts.

**Supplementary Table 1.** Effect of Lifestyle on Disease Relapse and Birth Outcomes

| | Disease relapse during pregnancy | | | | Low birth weight | | | | Preterm birth | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | Yes | OR (95% CI) | *P* | No | Yes | OR (95% CI) | *P* | No | Yes | OR (95% CI) | *P* |
| Incorrect adherence to IBD medication | 14 | 10 | 1.74 (0.74–4.10) | .24 | 5 | 14 | 3.65 (1.18–11.30) | .03 | 16 | 7 | 1.09 (0.43–2.76) | .81 |
| Smoking during pregnancy | 16 | 8 | 1.15 (0.47–2.80) | .82 | 5 | 14 | 3.82 (1.23–11.90) | .03 | 17 | 6 | 0.92 (0.35–2.42) | 1.00 |
| Planning of conception | 77 | 18 | 0.30 (0.10–0.92) | .05 | 71 | 6 | 1.18 (0.13–10.61) | 1.00 | 67 | 25 | 1.12 (0.33–3.80) | 1.00 |
| Folic acid intake | 127 | 60 | 1.12 (0.62–2.01) | .77 | 133 | 15 | 0.93 (0.36–2.41) | 1.00 | 132 | 56 | 1.96 (1.00–3.85) | .06 |