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## Inflammatory bowel disease-related economic costs due to presenteeism and absenteeism

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### ABSTRACT

**Background:** Inflammatory bowel disease (IBD), consisting of Crohn's disease and ulcerative colitis, can be a lifelong burden generating high costs to an economic system. Data regarding the cost of workplace presenteeism and absenteeism in workers with IBD are limited. Our objective was to assess these costs in employed adults.

**Methods:** A structured questionnaire, hospital records and national registers were combined to assess the economic costs involved with workplace presenteeism and absenteeism in employed patients. Our final sample comprised 320 IBD patients. The costs were calculated as productivity-loss costs by using a Human Capital Approach.

**Results:** Due to IBD, the mean annual economic costs of workplace presenteeism were €643.90/patient, and mean annual absenteeism costs were €740.90/patient. Women had higher costs (€955/patient/year) from absenteeism compared to men (€531/patient/year) especially when working blue-collar jobs. These findings were also evident in presenteeism. CD and UC patients had similar total costs due to presenteeism and absenteeism. The use of biologics did not have a major impact on these costs.

**Conclusion:** IBD patients had moderate economic costs from workplace presenteeism and absenteeism. Interestingly, women, working blue-collar jobs, had higher costs than men.

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Absenteeism; presenteeism; IBD costs; Crohn's disease; ulcerative colitis

### Introduction

Inflammatory bowel disease (IBD) consists of two chronic inflammatory disorders being Crohn's disease (CD) and ulcerative colitis (UC). An early peak age onset of IBD with chronic relapses may thus affect a person throughout their life [1,2]. There is no definitive curative treatment. There are both surgical and medical treatment options to manage this disease, which aim to provide the patient a good quality of life with an asymptomatic state. However, due to a varying disease profile, it affects people greatly during their prime working age. This leads to a high and sustained economic burden [1,3].

The direct and indirect medical costs in IBD are significant. The indirect costs are estimated to be greater [4,5] or similar [6] to that of direct costs. The indirect costs impacting work due to illness or disability consist of mainly three major components being presenteeism, absenteeism, and disability pension (DP). Presenteeism is generally working while ill and typically results in decreased work productivity [4,7]. Absenteeism, on the other hand, is usually defined as an absence from work or being unable to work due to being ill.

When assessing the overall economic burden of IBD, the costs due to presenteeism are considered important [4,7,8]. These costs have been omitted from past studies, although

during the last decade, these have been increasingly included [9,10]. In recent studies, the indirect costs vary greatly, and the methods of estimating such costs also differ. It has been estimated that costs due to lost productivity vary between US\$1159 to US\$14,135 annually for CD and US\$926 to US\$6583 for UC, respectively [9,11,12]. In a recent Canadian study, the annual indirect economic burden of IBD was CAD1.29 billion or roughly CAD4781 per person [13], and in a Danish 10-year follow-up study, the annual total indirect costs amounted to €4500 for CD and €5100 for UC [6]. Productivity-loss costs are usually monetized using either the friction cost method or using the human capital approach (HCA) [14]. In the present study, the costs of presenteeism and absenteeism were monetized using HCA.

Data regarding the costs of presenteeism and absenteeism in workers with IBD are limited [5,11] with data on presenteeism especially scarce. In earlier IBD-cost studies, presenteeism has been deemed difficult to measure [5]. Differentiating the presenteeism costs from the total indirect costs has not been reported in most earlier studies. In two major systematic reviews of IBD costs, with one based on real-life data [5], only one of the selected studies accounted for separate presenteeism costs [5,10,11]. Furthermore, to

our knowledge, no earlier studies have differentiated costs between occupations in workers with IBD.

The aim of this study was to comprehensively estimate the costs of presenteeism and absenteeism due to IBD in employed adults.

## Materials and methods

### Patient sample

The sample was derived from patients with IBD, who were living in the Turku University Hospital (TUH) district, Turku, Finland, which covers a population of 470,000 people. IBD patients were identified using the ICD-10 (International Classification of Diseases, tenth revision) system, K50 for CD and K51 for CU. Patients were identified during a 1-year period from 1 September 2015 to 31 August 2016. This produced a sample of 2208 patients. This was conducted retrospectively through hospital records [15].

A questionnaire was sent by mail during July 2018 to a randomized half of this study sample being 1104 patients. To improve the response rate, the questionnaire was resent once in September 2018 to those who did not respond initially. Furthermore, SMS reminders were sent twice to patients to improve the response rate. An option to answer the questionnaire via the internet was also provided in the mailed questionnaire and text message. We excluded any redundant answers. 31 of the patients, who had returned the mailed questionnaires, did not give written consent to the study and were thus excluded. Two of the patients reported not having IBD and were also excluded. In total, 555 patients (53.3%) answered the questionnaire. Finally, patients, who reported to be employed, were selected for the final sample. This resulted in a study group of 320 patients, which consisted of 162 males (50.6%) with an average age of 46.2 years (Figure 1).

### Questionnaire

Sociodemographic background data were gathered. Questions asked were: 'How many years did the patient have IBD?'; 'Did the patient need surgery due to IBD?'; and if yes, 'How much time lapsed from the surgery and whether the surgery required a stoma?'; 'Was a stoma still required and how long the patient needed a stoma?'

The current working status was asked as follows: (1) employed, (2) retired, (3) unemployed or a (4) student. Patients were able to select multiple choices.

The patients were asked about their weekly working hours and to describe their current or last occupation or profession. From the description, categorization was made with separate parameters being: (1) Blue-collar worker, (2) White-collar worker, (3) Management position and (4) Self-employed. First, patients were asked if they had any loss of work due to IBD during the previous 12 months. If yes, they estimated the days and hours of absenteeism from work within the last month. The same question was repeated for other medical reasons with similar phrasing. Patients were

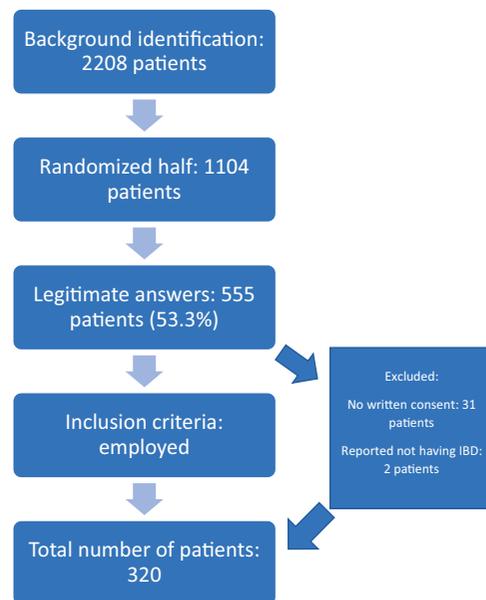


Figure 1. Patient selection.

also asked to estimate the number of hours they had been working while sick (i.e., presenteeism) during the last month. They were then asked to estimate the reduction in working capacity using a visual analogue scale (VAS) from 0 to 100, where 0 was labelled as 'not at all' and 100 as 'extremely'. Presenteeism due to other medical reasons was solicited using identical phrasing.

The translated official and licenced IBDQ32-questionnaire was included [16]. The IBDQ32 questionnaire consists of 32 questions regarding the most frequent and important problems IBD presents to patients' quality of life. Each question is scored from 1 to 7 points thus generating a total score of 32–224. The higher the score, the better the quality of life (QoL). The questionnaire has been validated in several instances and in different languages [17–19].

For a more thorough approach, we combined the patients' answers with data from the Social Insurance Institution of Finland and the data from hospital records. This data included laboratory results, administration of biologics and hospitalization.

### Costs and time

An estimate was computed to assess the productivity loss due to presenteeism. The VAS score was used as a percentage to indicate the amount of productivity loss during the hours the patient was working while sick. The VAS score (mm) of lost productivity for presenteeism was divided by 100 to indicate the magnitude of lost productivity during the hours the patient worked while sick. All reported time estimates were then extrapolated to an annual level. The percentage was used to multiply the hours per year to give an estimate of productivity loss due to presenteeism annually. The costs regarding disability pension were not estimated in this study.

To estimate the monetary value of the productivity loss, a time-cost assessment was used. The value of an hour was

estimated using the Human Capital Approach (HCA) [14]. The value was based on the reported average monthly income by the patients, which was €3768.14 (SD ± 1941.8) for men and €3044.21 (SD ± 3369.9) for women. The monthly income levels were then computed to an hourly wage based on the reported working hours in the questionnaire. The mean reported weekly hours were 40.1 h (SD ± 11.7) for men and 35.3 h (SD ± 8.8) for women.

### Statistical analyses

The statistical evaluation of the data was based on the Chi-square test for proportions and on the Students *t*-test for mean. The Pearson coefficients of correlation were used to examine the degree of relationship between two continuous variables.

### Ethical aspects

This study was approved by the ethical committee of the Hospital District of Southwest Finland. The patients received a written description of the sampling procedure and study purpose as well as the planned use and storage of the information they were to provide. This was followed by a description of the patients' rights according to the Helsinki declaration. The internet-based questionnaire was structured to prevent proceeding into the study before the study information and the patients' rights were presented. Each subject gave signed written consent to use his/her information prior to answering any questions.

### Results

Among blue-collar workers, women had statistically significantly higher costs resulting from presenteeism and absenteeism than men (Table 1). There was only a minimal and statistically nonsignificant difference in costs of presenteeism and absenteeism between UC and CD patients (Table 2). Reported presenteeism-based costs of those who had not undergone surgery were higher in both blue-collar and white-collar workers with €695.80/patient/year ( $p < .05$ ) and €720.20/patient/year ( $p < .05$ ), respectively, than in patients needing surgery. Otherwise, surgery due to IBD did not impact the costs between the groups. According to the questionnaire, no patients had undergone surgery within the last month and within the timeframe used to evaluate

**Table 1.** Annual mean productivity-loss costs (€) in different job entities (SD in parenthesis).

	MEN	WOMEN
BLUE COLLAR PRESENTEEISM	246.5 (967.7)	1014.9 (2377)*
WHITE COLLAR PRESENTEEISM	601.7 (2438.1)	610.3 (2025.1)
MANAGER PRESENTEEISM	1038.2 (4410.8)	1144.7 (1645.3)
SELF-EMPLOYED PRESENTEEISM	109.9 (288.7)	X
BLUE COLLAR ABSENTEEISM	75.7 (371.3)	1105 (3455.8)*
WHITE COLLAR ABSENTEEISM	1049.6 (5774.2)	976.1 (3955.6)
MANAGER ABSENTEEISM	516.9 (2532.4)	X
SELF-EMPLOYED ABSENTEEISM	336.4 (997)	X

X = not reported.

\* $p < .05$ .

presenteeism and absenteeism. Patient characteristics are described in Table 3.

There was a statistically significant negative correlation between the IBDQ score and both the cost of presenteeism,  $r = -0.545$  ( $p < .001$ ), and absenteeism,  $r = -0.315$  ( $p < .001$ ). Similar statistically significant correlations were observed in both sex and CD/UC subgroup analyses. There was no statistically significant difference in the mean IBDQ score for CD 171.1 (SD ± 32.3) and UC 177.5 (SD ± 30.1). Men reported having a better quality of life than women (Table 3). This was also evident in both the UC and CD subgroup analyses ( $p < .05$ ). Clinical factors representing disease severity, such as faecal calprotectin and low serum albumin, had a statistically significant correlation coefficient with both presenteeism and absenteeism costs. The faecal calprotectin correlation coefficient for presenteeism costs was  $r = 0.183$  ( $p < .01$ ), and with total absenteeism costs, it was  $r = 0.208$  ( $p < .01$ ). The serum albumin correlation coefficient with presenteeism costs was  $r = -0.183$  ( $p < .01$ ), and with absenteeism costs, it was  $r = -0.149$  ( $p < .05$ ). Other clinical factors, such as anaemia, C-reactive protein, alanine transaminase, alkaline phosphatase or platelet count did not correlate with costs.

Biologics were administered to 49 patients (15.3%) of the study group. These included infliximab ( $n = 32$ ), adalimumab ( $n = 14$ ), vedolizumab ( $n = 4$ ) and golimumab ( $n = 1$ ). Patients receiving biologics had 68% higher total costs due to presenteeism and 24% more total costs due to absenteeism than

**Table 2.** Mean cost in Euros (€) per patient/year (SD in parenthesis).

	PRESENTTEEISM DUE TO IBD	ABSENTEEISM DUE TO IBD
TOTAL	643.9 (2286.7)	740.9 (3617.4)
MEN	494.5 (2409.4)	530.9 (3661.8)
WOMEN	801.5 (2146.7)	955.4 (3571.9)
CD	762.5 (2652.4)	723.8 (2401.7)
CU	588.6 (2099.9)	749.5 (4100.6)
BIOLOGICS	1078.7 (2616)	932.9 (2406)
NO BIOLOGICS	563.8 (2217.4)	702.3 (3817.5)

**Table 3.** Patient characteristics ( $n = 320$ ).

	MEN	WOMEN	TOTAL
PATIENT CHARACTERISTICS			
SEX	162 (50.6%)	158 (49.4%)	320
AGE	47.0 years	45.4 years	46.2 years
CD	46 (28.4%)	56 (35.4%)	102 (31.9%)
CU	116 (71.6)	102 (64.6%)	218 (68.1%)
CLINICAL DATA			
BIOLOGICS	22 (13.6%)	27 (17.1%)	49 (15.3%)
HOSPITALIZATION	4	7	11
IBDQ SCORE	183.6 (27.2)	167.2 (33.5)*	175.5 (31.5)
SURGERY DUE TO IBD	29	29	58 (18.1%)
STOMA DUE TO IBD	10	8	18 (5.6%)
YEARS SINCE DIAGNOSIS	15.7 (10.1)	15.4 (9.6)	15.5 (9.8)
JOB ENTITIES AND PRODUCTIVITY LOSS			
BLUE-COLLAR	58	70	128
WHITE-COLLAR	59	76	135
MANAGEMENT	26	9	35
SELF-EMPLOYED	14	1	15
REPORTED ABSENTEEISM	21	51	72
ANNUAL ABSENTEEISM HOURS <sup>T</sup>	26.1 (170.5)	57.8 (224.5)	41.8 h (199)
ANNUAL PRESENTEEISM HOURS <sup>T</sup>	52.6 (160.3)	110 (268.5)	80.9 h (221.8)

Data are presented as percentage of patients with SD in parenthesis if not mentioned otherwise.

<sup>T</sup>Extrapolated to an annual level.

\* $p < .05$ .

patients not receiving biologics, but no statistically significant differences existed between the groups (Table 2). There were no significant differences between the biologics. CD patients were administered biologics more often (28.4%) compared to UC patients (9.2%). Biologics were administered equally between patients of different sexes and job entities.

Of this study group, 11 (3.4%) patients were hospitalized. There was no significant difference between sex, CD or UC. The mean hospitalization period was 7.4 days (SD  $\pm$  6.3). Hospitalized patients had high annual costs from absenteeism at €3078.60 (SD  $\pm$  7626.9,  $p = .34$ ). Of the hospitalized patients, none reported presenteeism due to IBD ( $p < .001$ ).

The mean total costs of presenteeism due to other medical reasons was €414.50/patient/year (SD  $\pm$  1825.5) for men and €932.2/patient/year (SD  $\pm$  3229.3) for women ( $p = .089$ ). The mean total cost of absenteeism due to other medical reasons was €1418.6/patient/year (SD  $\pm$  4042.6) for men and €2020.8/patient/year (SD  $\pm$  9684.9) for women ( $p = .488$ ).

## Discussion

The findings from the present study indicate that women working blue-collar jobs have higher costs from both presenteeism and absenteeism than male workers. This finding was distinct, even though women had significantly lower wages. Women working blue-collar jobs reported significantly more absenteeism due to IBD at a 15.5-fold greater value than men, and the presenteeism reported was 2.2-fold greater than men. Absenteeism due to other medical reasons was similar between sexes. Women working blue-collar jobs seemed to be affected the worst by IBD compared to other jobs or to that of men. To our knowledge, there are no earlier studies reporting the productivity loss that accounts for the types of job entities in IBD.

In the present study, the severity of the disease according to clinical assessments, such as laboratory results and the IBDQ score, both correlated with the generated economic costs regarding work. A worse QoL according to the IBDQ score accounted for higher costs, whilst only some laboratory results had a statistically significant correlation with costs. To our knowledge, no earlier studies tying costs to the IBDQ32 score have been conducted. The mean IBDQ scores are comparable to those in clinical remission [17]. Interestingly, surgery seemed to reduce presenteeism both in blue-collar workers and white-collar workers. In a Dutch study, the productivity loss estimated using absenteeism in various forms showed that the 3-month cost estimate of absenteeism was €288.57, which is comparable to this study [20]. However, as stated by various earlier studies, a comparison of the costs of presenteeism and absenteeism due to varying evaluations and methodologies as well as different social security policies may be problematic [21–24].

In the present study, patients receiving biologics had a higher productivity-related loss in economic costs. In Finland, biologics are mainly administered to IBD patients with a more severe disease presentation, and when other treatment methods are insufficient. Whilst the patients receiving biologics had higher costs in the present study, it can be

accounted for by a more severe disease presentation. Without the administration of biologics, the costs generated by these patients would have most likely been higher, or they could have been forced to early retirement or DP. In a recent Hungarian study with comparable administration of biological agents to this study, the cost of absenteeism annually per patient was €430 using HCA. The costs for presenteeism were significantly higher at €2605 and €2410 per patient per year for CD and UC, respectively [13]. A US study conducted in 2008 reported that the annual cost of absenteeism was US\$5332.76 for CD and US\$6020.50 for UC per patient [12]. In a systemic review, the indirect costs from lost productivity in European countries were €5128 to €14,136 for CD and €6583 for UC [11]. Varying results can partly be explained by a different approach and methodology, such as different costs included in absenteeism. However, some of the differences may be accounted for by an overestimation or a total estimation of costs. The goal of the present study using a disease-specific approach of assessing costs was to mitigate non-IBD-related costs and to present a more accurate estimate of the economic burden of IBD.

A major strength in our study was combining data from multiple sources. A structured questionnaire, data from the hospital and data from the Social Insurance Institution of Finland were all evaluated. The structured questionnaire included the IBDQ32-questionnaire, which has been well validated [16]. Earlier cost-of-illness studies provide valuable data on the economic costs of IBD, but workplace presenteeism and absenteeism have seldomly been reported in detail [5,11]. The present study had a novel approach accounting for the presenteeism costs in IBD, although this approach has been used also for assessing economic costs due to other chronic diseases [25]. Indirect costs are generally harder to quantify, and the methodology varies greatly. Indirect costs in Europe can be accounted to be as much as 54–68% of the total costs of IBD and being able to account for the sources of those costs is important [5]. One of the strengths of this study was also that the researchers separated the patients according to their reported jobs into four groups, which provided a more detailed view on assessing how presenteeism and absenteeism affect different job entities.

There were limitations in this study. The method of combining the three sources of data limited the possibility of answering anonymously in the present study. The questionnaire was also only presented in Finnish. These factors may have reduced the response rate and led to the smaller subgroup sizes. The decision of excluding multiple language options was made to minimize possible translational, syntax and interpretational errors and thus affecting the reliability of the questionnaire data. Having both UC and CD patients may have skewed the total costs toward the larger subgroup, but when differentiated, the costs were quite similar between the groups. The current study represents a real-life situation, and thus patients may have been recruited to the study during their remission or relapse. There was no exact method to determine the patient's grouping.

There is no consensus about the timeframe the questionnaire should span. A 2-week timeframe is estimated to minimize recall bias of patients regarding costs of workplace presenteeism [7]. In this study, the combination of data from multiple sources was estimated to further reduce the overestimation of costs and to give a more accurate estimation of the actual costs. Using the reported wages from the questionnaire allowed a more individual cost assessment of both presenteeism and absenteeism than using average wages. The reported average wages did not differ significantly from median Finnish wages [26]. It would also seem that patients with IBD attain a similar level of education and maintain similar employment as those in the general population without IBD [27]. This seems to be corroborated by the similarity of wages reported in this study and the national average.

To our knowledge, no earlier studies of presenteeism- or absenteeism-related costs regarding IBD have been conducted in Finland. The mean total cost of IBD annually was €643.9/patient due to presenteeism and €740.9/patient for absenteeism. The figures are comparable to those reported in other chronic diseases. According to a recent Finnish study, the annual mean cost of presenteeism due to psoriasis was €1037 and €1105 for absenteeism [25]. Their study findings corroborated the present study findings of the importance of a disease-specific cost approach. In the present study, other medical reasons were also a major driving factor for cost in people with IBD. Compared to healthy patients, those with chronic diseases are more likely to report presenteeism and absenteeism [28]. Comorbidities may also be a significant factor when accounting for the total costs.

## Conclusions

In summary, women, working blue-collar jobs, have higher productivity-loss costs. This study presents a more disease-specific method of accounting for costs. The significant differences of productivity-related loss in costs between sexes and job entities were an interesting new finding and should be considered in future studies. Our approach provided an in-depth picture of the costs due to presenteeism and absenteeism in IBD patients. This disease-specific analysis also warrants further studies and could possibly be a valuable protocol when developing future related studies assessing cost-effective practices.

## Authors' contributions

Concept and design: RR, AM, KM, MV; acquisition of data: RR, AM, KM; analysis and interpretation of data: RR, AM, KM; drafting of manuscript: RR; critical revision: RR, AM, KM, MV; final approval: RR, AM, KM, MV.

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## Disclosure statement

The authors have no conflicts of interest to declare.

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