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Receipt of Preventive Care Services Among US Adults with Inflammatory Bowel Disease, 2015–2016

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Abstract

Background—Previous reports suggest that adults with inflammatory bowel disease (IBD) receive suboptimal preventive care.

Aims—The population-based study compared the receipt of these services by US adults with and without IBD.

Methods—Adults aged ≥ 18 years with IBD (1.2%) and without IBD were identified from the 2015 and 2016 National Health Interview Survey (n = 66,610). Age-standardized prevalence of doctor visits, receipt of medical advice, and selected preventive care was calculated for adults with and without IBD. The model-adjusted prevalence ratios were estimated for receipt of preventive care associated with IBD.

Results—The prevalence of a doctor visit in the past 12 months was significantly higher among adults with IBD than those without. IBD was also associated with significantly higher prevalence of receiving medical advice about smoking cessation (83.9% vs. 66.4%) and diet (42.9% vs. 32.1%), having colon cancer screening in the past 12 months (44.0% vs. 26.7%), having ever had an HIV test (51.5% vs. 45.4%) or pneumococcal vaccine (75.3% vs. 64.0%), having received a tetanus vaccine in the past 10 years (72.0% vs. 61.8%), and having received a flu vaccine in the past 12 months (48.4% vs. 41.0%), but was not significantly associated with receiving cervical cancer screening and hepatitis A and B vaccines.

Conclusions—Adults with IBD were more likely to receive many types of preventive care than adults without IBD. The findings can inform healthcare policy makers to make strategic decisions that enhance multidisciplinary coordination from various medical specialties to ensure optimal preventive care for IBD patients.

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Author's contribution FX drafted the paper. JMD and EPT conducted data analyses. FX, JMD, EPT, AGW, and JBC participated in the study design, interpreted the results, reviewed and edited the paper, and approved the final version.

Conflict of interest The authors have no conflict of interest to disclose.

Keywords

Inflammatory bowel disease; Crohn's disease; Ulcerative colitis; Preventive care services

Introduction

Inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis, is characterized by chronic inflammation of the gastrointestinal tract. In 2015 and 2016, an estimated 3.1 million (1.2%) US adults reported having received a diagnosis of IBD [1]. The disease onset is typically seen in one's 20 s and 30 s, with patients usually having considerable comorbidities as they age [1-4]. Comorbidities involve nearly all organ systems, of which the musculoskeletal, dermatologic, and ocular systems are most common [5]. In addition, patients with IBD have increased risk of venous thromboembolism [6] and cardiovascular disease [7]. IBD patients who are treated with immunomodulators, such as corticosteroids, may become immunocompromised and susceptible to opportunistic infection as well as to intestinal and extraintestinal cancers [8, 9].

Because IBD is associated with various chronic and infectious conditions, preventive care is an essential facet of lifelong disease management. For instance, some infections can be prevented with vaccines and some cancers can be detected early with cancer screening. Timely and routine preventive care among adults with IBD may reduce hospitalizations, surgeries, complications and could ultimately reduce healthcare costs [10]. Previous studies have shown that patients with rheumatoid arthritis or diabetes may not receive the same level of preventive services as the general population [11, 12]. It is not clear whether access to routine preventive care among adults with IBD is similar to that in the general population. For example, patients with IBD usually consider their gastroenterologist to be their primary care physician [13]. However, it has been reported that primary care physicians who render many of the preventive services may not feel comfortable providing routine preventive care to IBD patients because of their unfamiliarity with IBD medications [14].

Because of a high likelihood of infections resulting from the use of IBD medications [9], as well as a higher prevalence of comorbidities found among adults with IBD than those without IBD [1, 3], preventive care as part of overall disease management may be important for adults with IBD to prevent complications and to potentially reduce healthcare costs. To date, no population-based study has reported on the receipt of preventive care services among adults with IBD in the USA. Therefore, the objective of this study is to evaluate the extent to which adults with IBD, compared with adults without IBD, receive preventive medical care services in the USA. This study did not measure whether specific guidelines were met because the national health survey used in this study did not include measures designed to match definitions of official guidelines of preventive care.

Methods

Data Source

The study aggregated data from the 2015 and 2016 National Health Interview Survey (NHIS) to identify respondents with and without IBD and estimate receipt of preventive care among both populations. Conducted by the National Center for Health Statistics and established in 1957, the NHIS collects data on a broad range of health topics such as healthcare access, health status, health-risk behaviors, screenings, and vaccinations. NHIS is a cross-sectional, household, interview survey, representing the civilian non-institutionalized US population [15, 16].

Study Sample

A diagnosis of IBD was defined by an affirmative response to the question, “Have you ever been told by a doctor or other health professional that you had Crohn’s disease or ulcerative colitis?” The question about IBD status was asked of 66,610 adults aged ≥ 18 years in the 2015 and 2016 NHIS Sample Adult Core questionnaire. Data from both years were combined to ensure more precise estimates (2015 sample adult response rate = 55.2%; 2016 sample adult response rate = 54.3%) [15, 16].

Measures

Sociodemographic variables were defined by using data collected with the Household Module and Family Core components of the survey. Demographic characteristics included age-group (18–29, 30–39, 40–49, 50–64, or ≥ 65 years), sex, race and Hispanic origin (non-Hispanic white, non-Hispanic black, Hispanic, or non-Hispanic other), education level (less than high school, high school diploma or GED, some college, or bachelor’s degree or more), and marital status (married/cohabitating, never married, or divorced/separated/widowed). An employment status question was asked about the week before the interview. Working status was defined as “working” if respondents were working for pay at a job or business, having a job or business but not at work, or working but not for pay at a family-owned job or business, and other working statuses defined were “not working, but looking,” or “not working and not looking.” Health insurance coverage was defined separately for those aged < 65 years (private, Medicaid and other public coverage, other, or uninsured) and for those aged ≥ 65 years (private, Medicare and/or Medicaid, Medicare Advantage, Medicare only excluding Medicare Advantage, other, or uninsured), according to a hierarchy of mutually exclusive categories. On the basis of the US Census Bureau’s poverty thresholds, poverty status was defined as “poor” if family incomes were below the federal poverty level (FPL); “near poor” if family incomes were from 100% to less than 200% of the FPL; or “not poor” if family incomes were 200% of the FPL or greater. Regions of residence were Northeast, Midwest, South, and West.

All preventive care measures were defined by using questions asked in the Sample Adult Core questionnaire, including types of doctor visits, receipt of medical advice, preventive screenings, and vaccinations. Table 1 summarizes these measures, listed by types of preventive care services, original NHIS question, and variable definition. The American College of Gastroenterology (ACG) published clinical guidelines for preventive care for IBD

in January 2017 [13]. The goal of this analysis, however, was to measure preventive care access commonly assessed among the general population by IBD status, rather than to assess adherence to guidelines [13, 17].

Unless otherwise described, preventive care service measures used in this study were received within the past 12 months among adults aged ≥ 18 years. Doctor visits included having seen any doctor, a dentist, an eye doctor, a doctor specializing in women's health, a specialist, or a general doctor. Receipt of medical advice included discussing one's diet, smoking cessation among current cigarette smokers, and taking a low-dose aspirin (among adults aged ≥ 50 years). Receipt of preventive screenings included having one's cholesterol, blood pressure, or blood sugar checked; having received a Pap smear test among women aged 21–65 years; having received a mammogram among women aged 50–74 years; having received a colon cancer test among adults aged 50–75 years; and having ever received an HIV test among adults aged 18–65 years. The measures for receiving medical advice about smoking cessation, diet, and receipt of cancer screenings were limited to adults who answered a year or less to the question, "About how long has it been since you last saw or talked to a doctor or other health care professional about your own health? Include doctors seen while a patient in a hospital." Vaccinations included having received an influenza vaccine, having received a tetanus shot in the past 10 years, ever having received a hepatitis A or B vaccine, ever having received a pneumococcal vaccine (among adults aged ≥ 65 years), and ever having received a shingles vaccine (among adults aged ≥ 60 years).

Statistical Analysis

Age-group-specific and age-standardized (based on the projected 2000 US population distribution #10) weighted prevalence of preventive care measures with 95% confidence intervals (CIs) was calculated separately for adults with and without IBD. Multivariable logistic regressions were constructed to estimate the adjusted prevalence ratio (PR) and 95% CI for IBD status for each of the preventive care measures after adjusting for age, sex, race and Hispanic origin, education, employment status, marital status, health insurance coverage, poverty level, and US region [18]. Analyses were performed by using SAS-Callable SUDAAN 11.0.1 (Research Triangle Institute, Research Triangle Park, North Carolina) to account for the complex sample design of the NHIS. Estimates incorporated the final sample adult weights, adjusted for non-response and calibrated to population control totals, to generalize to the civilian non-institutionalized population aged ≥ 18 years. Prevalence and CIs were reported on the basis of NCHS' data presentation standards [19]. Differences were considered significant if P values were less than 0.05. This secondary data analysis was deemed exempt by the Centers for Disease Control and Prevention Institutional Review Board.

Results

For 2015 and 2016, 951 of 66,610 respondents (weighted prevalence = 1.2%) aged ≥ 18 years reported that they had received a diagnosis of IBD. Adults with IBD were more likely to be aged 50–64 years (34.3%) and ≥ 65 years (24.9%) than those without IBD (25.7% and 19.3%, respectively) and were less likely to be aged 18–29 years (9.1% vs. 21.1%) (Table 2).

The proportion of women was higher among those with IBD than those without IBD (62.1% vs. 51.5%). The proportions of non-Hispanic black adults (6.0%) and other non-Hispanic adults (5.6%) were lower among those with IBD than among those without IBD (11.9% and 8.3%, respectively). The proportion of adults without a high school diploma was higher among those with IBD than among those without IBD (16.8% vs. 12.4%). Furthermore, the proportion of married or cohabitating adults was also lower among those with IBD (54.8%) than among those without IBD (60.9%), whereas the proportion of adults who were divorced, separated, or widowed was higher among those with IBD (22.5%) than among those without IBD (16.0%). Finally, adults with IBD were less likely to be currently working (54.1%) than those without IBD (63.6%) and were more likely to not be working and not looking (39.1%) than those without the disease (32.2%). There was no significant difference in health insurance coverage, poverty status, and region between the two groups.

There was no significant difference in the prevalence of having visited a dentist or a doctor specializing in women's health (among women aged < 65 years) between adults with or without IBD (Table 3). However, compared with adults without IBD, adults with IBD had a significantly higher prevalence of seeing any doctor, a general doctor, an eye doctor, or a specialist in the past 12 months after adjusting for covariates. Adults with IBD were more likely to have received medical advice about smoking (83.9%; among current cigarette smokers) or diet (42.9%) than those without IBD (66.4% and 32.1%, respectively). Adults with IBD were 9% more likely to have had their cholesterol and blood sugar checked, 7% more likely to have had their blood pressure checked, and 65% more likely to have had a colon cancer test than those without IBD. The likelihood of ever having an HIV test was 20% higher among adults with IBD than among those without IBD. In addition, compared with adults without IBD, those with IBD were 15% more likely to have received a flu vaccine in the past 12 months or ever received a pneumococcal vaccine, and 13% more likely to have received a tetanus shot in the past 10 years than those without IBD.

Discussion

This is the first nationally representative study to assess the preventive care services received among US adults with IBD. The study highlighted several findings. First, receipt of many forms of preventive care services was more prevalent among adults with IBD than those without IBD. Second, there was no significant difference of receiving cervical cancer screenings and hepatitis A and B vaccines between adults with and without IBD. Third, the adjusted prevalences of preventive care such as specialist visits, dietary counseling, and colon cancer tests were much higher than those of the other preventive care services by IBD status.

The current study findings were contrary to a previous study by Selby et al. [20] that examined screenings for hypertension, high cholesterol, diabetes, osteoporosis, breast cancer, cervical cancer, colon cancer, dietary counseling, and receipt of pneumococcal or flu vaccines among IBD patients and controls at a hospital outpatient setting. Of the ten measures in that study, only three were significantly different for IBD patients compared with controls: Receipt of cholesterol check and dietary counseling were lower among the IBD patients, and receipt of colon cancer screening was higher among the IBD patients.

In contrast, the current study identified several differences in receipt of preventive services between adults with IBD and those without IBD, all of which were more prevalent among adults with IBD. Similar to the study of Selby and colleagues, the percentage of adults with IBD who had received a colon cancer screening was higher than among those without IBD; however, dietary counseling and having a cholesterol check were also significantly higher among those with IBD compared to those without IBD. The current study differed from the study of Selby and colleagues in at least two distinct ways. First, this is a population-based study assessing preventive care services received by IBD status using a large survey that is generalizable to civilian, non-institutionalized US adults. The study by Selby and colleagues was based on 117 IBD patients and 100 controls surveyed from outpatients at the University of Kentucky in 2006. Second, Selby and colleagues estimated preventive services by adjusting for age and sex. While this current study also adjusted for these variables, it included additional variables that might be correlated with the outcomes, including poverty level, race and Hispanic origin, and educational attainment.

In a study assessing healthcare utilization using a large claims database, some types of doctor visits were more frequent, especially those to gastroenterologists, among IBD patients than patients without IBD [21]. While the NHIS does not collect information on visits to a gastroenterologist specifically, this current study did find that the prevalence of having seen a specialist in the past 12 months was higher among adults with IBD than among adults without IBD. Furthermore, in the current study, the prevalence of a visit to an eye doctor in the past 12 months was 14% higher among adults with IBD than among those without the disease. Clinical research has indicated that adults with IBD were more likely to visit an eye doctor, which could be an indication that ocular complications were more prevalent among this population [5, 22].

The current study found that the prevalence of receiving medical advice about smoking was more prevalent among current cigarette smokers with IBD than among those without IBD, although in a study also using NHIS the prevalence of current cigarette smoking was similar by IBD status [1]. Although the causal association between smoking and IBD is unknown, smoking is known to be associated with disease progression, adverse treatment outcomes, increased medical costs among patients with Crohn’s disease, and a lower quality of life among patients with either Crohn’s disease or ulcerative colitis [13, 23]. ACG, therefore, recommends that patients with Crohn’s disease should be counseled to quit smoking [13].

Receipt of medical advice about one’s diet was also more prevalent among adults with IBD than among those without IBD in this study, possibly indicating that nutritional management is more frequently discussed among IBD patients. Maintaining a healthy diet and complete nutrition is important during IBD management [24]. Although some dietary advice is suggested for people with IBD [25], there are no official guidelines to date.

Adults with IBD are at increased risk of certain cancers, such as colorectal cancer and, in women, cervical cancer, due to chronic mucosal inflammation [26]. In the current study, the prevalence of colon cancer screening in the past 12 months was 65% higher among adults with IBD than among those without IBD, which could be explained by close colonoscopy surveillance among this disease population. ACG recommends annual

cervical cancer screening for women with IBD on immunosuppressive therapy [13]. While the current study did not have an indicator for immunosuppressive therapy, it found no significant difference in receipt of Pap smear tests between women with and without IBD. Consistent with this finding, there was no significant difference between the two groups in visiting a doctor that specializes in women's health in the past 12 months. A previous study that surveyed 150 women with IBD indicated that receipt of cervical cancer screening was suboptimal and knowledge level of the human papilloma virus vaccine was low [27].

The current study indicated higher rates of receipt of several preventive services among adults with IBD, which may be due to more frequent doctor visits among adults with IBD than those without IBD. The Advisory Committee on Immunization Practices within the Centers for Disease Control and Prevention recommends vaccination of persons at increased risk of hepatitis A or B virus infection [28], and the ACG also recommends these vaccinations among all IBD patients because they are at high risk of the infection [13]. However, the current study did not find any significant difference in receiving these vaccines by IBD status, indicating that vaccination coverage among adults with IBD remains suboptimal. Previous studies have suggested that knowledge of appropriate vaccination for adults with IBD is low for both gastroenterologists and primary care physicians, and who has responsibility for administering vaccines was not clear [29-31].

The study findings are subject to at least three limitations. First, NHIS responses are self-reported and therefore subject to recall bias. Second, the question about IBD status did not differentiate Crohn's disease from ulcerative colitis and did not measure severity of the disease or use of immunotherapeutic medications. Third, several other preventive services were not assessed because of unavailability of data or insufficient sample size, such as human papilloma virus vaccine, and screenings for osteoporosis, melanoma, non-melanoma skin cancer, anxiety and depression as also recommended by the ACG [13].

Overall, adults with IBD were more likely to receive preventive care services than adults without IBD. The findings can inform physicians and healthcare policy makers tasked with making strategic decisions that enhance systematic multidisciplinary coordination from various medical specialties to ensure optimal preventive care for IBD patients.

Acknowledgments

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References

1. Xu F, Dahlhamer JM, Zammitti EP, Wheaton AG, Croft JB. Health-risk behaviors and chronic conditions among adults with inflammatory bowel disease—United States, 2015 and 2016. MMWR Morb Mortal Wkly Rep. 2018;67:190–195. 10.15585/mmwr.mm6706a4. [PubMed: 29447146]
2. Ghosh S, Mitchell R. Impact of inflammatory bowel disease on quality of life: Results of the European Federation of Crohn's and Ulcerative Colitis Associations (EFCCA) patient survey. J Crohn's Colitis. 2007;1:10–20. 10.1016/j.crohns.2007.06.005. [PubMed: 21172179]
3. Roman AL, Munoz F. Comorbidity in inflammatory bowel disease. World J Gastroenterol. 2011;17:2723–2731. 10.3748/wjg.v17.i22.2723. [PubMed: 21734780]

4. Pizzi LT, Weston CM, Goldfarb NI, et al. Impact of chronic conditions on quality of life in patients with inflammatory bowel disease. Inflamm Bowel Dis. 2006;12:47–52. [PubMed: 16374258]
5. Williams H, Walker D, Orchard TR. Extraintestinal manifestations of inflammatory bowel disease. Curr Gastroenterol Reps. 2008;10:597–605.
6. Murthy SK, Nguyen GC. Venous thromboembolism in inflammatory bowel disease: an epidemiological review. Am J Gastroenterol. 2011;106:713–718. [PubMed: 21407182]
7. Filimon AM, Negreanu L, Doca M, Ciobanu A, Preda CM, Vinereanu D. Cardiovascular involvement in inflammatory bowel disease: Dangerous liaisons. World J Gastroenterol. 2015;21:9688–9692. 10.3748/wjg.v21.i33.9688. [PubMed: 26361415]
8. Chang M, Chang L, Chang HM, Chang F. Intestinal and extraintestinal cancers associated with inflammatory bowel disease. Clin Colorectal Cancer. 2018;17:e29–e37. 10.1016/j.clcc.2017.06.009. [PubMed: 28712945]
9. Rahier JF, Magro F, Abreu C, et al. Second European evidence-based consensus on the prevention, diagnosis and management of opportunistic infections in inflammatory bowel disease. J Crohn Colitis. 2014;8:443–468. 10.1016/j.crohns.2013.12.013.
10. Abegunde AT, Muhammad BH, Ali T. Preventive health measures in inflammatory bowel disease. World J Gastroenterol. 2016;22:7625–7644. 10.3748/wjg.v22.i34.7625. [PubMed: 27678347]
11. Kremers HM, Bidaut-Russell M, Scott CG, Reinalda MS, Zinsmeister AR, Gabriel SE. Preventive medical services among patients with rheumatoid arthritis. J Rheumatol. 2003;30:1940–1947. [PubMed: 12966594]
12. Owens MD, Beckles GL, Ho KK, Gorrell P, Brady J, Kaftarian JS. Women with diagnosed diabetes across the life stages: under-use of recommended preventive care services. J Women Health (Larchmt). 2008;17:1415–1423. 10.1016/10.1089/jwh.2008.1125.
13. Farraye FA, Melmed GY, Lichtenstein GR, Kane SV. ACG clinical guideline: preventive care in inflammatory bowel disease. Am J Ggastroenterol. 2017;112:241–258. 10.1038/ajg.2016.537.
14. Selby L, Hoellein A, Wilson JF. Are primary care providers uncomfortable providing routine preventive care for inflammatory bowel disease patients? Dig Dis Sci. 2011;56:819–824. 10.1007/s10620-010-1329-8. [PubMed: 20668942]
15. National Center for Health Statistics. Survey Description, National Health Interview Survey. 2015. Hyattsville, Maryland. 2016. Avaiable at: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2015/srvydesc.pdf. Accessed July 13, 2018.
16. National Center for Health Statistics. Survey Description, National Health Interview Survey. 2016. Hyattsville, Maryland. 2017. Avaiable at: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2016/srvydesc.pdf. Accessed July 13, 2018.
17. U.S. Preventive Service Task Force. U.S. Preventive Service Task Force published recommendations. 2017. https://www.uspreventiveservicestaskforce.org/BrowseRec/Index. Accessed February 27, 2018.
18. Bieler GS, Brown GG, Williams RL, Brogan DJ. Estimating model-adjusted risks, risk differences, and risk ratios from complex survey data. Am J Epidemiol. 2010;171:618–623. 10.1093/aje/kwp440. [PubMed: 20133516]
19. National Center for Health Statistics. National Center for Health Statistics data presentation standards for proportions. 2017; Available from https://www.cdc.gov/nchs/data/series/sr_02/sr02_175.pdf. Accessed Feburary 23, 2018.
20. Selby L, Kane S, Wilson J, et al. Receipt of preventive health services by IBD patients is significantly lower than by primary care patients. Inflamm Bowel Dis. 2008;14:253–258. 10.1002/ibd.20266. [PubMed: 17932966]
21. Kappelman MD, Porter CQ, Galanko JA, et al. Utilization of healthcare resources by U.S. children and adults with inflammatory bowel disease. Inflamm Bowel Dis. 2011;17:62–68. 10.1002/ibd.21371. [PubMed: 20564532]
22. Mady R, Grover W, Butrus S. Ocular complications of inflammatory bowel disease. ScientificWorldJournal. 2015;2015:438402. 10.1155/2015/438402. [PubMed: 25879056]
23. Severs M, Mangen MJ, van der Valk ME, et al. Smoking is associated with higher disease-related costs and lower health-related quality of life in inflammatory bowel disease. J Crohn's Colitis. 2017;11:342–352. 10.1093/ecco-jcc/jjw160. [PubMed: 27647859]

24. Crohn's & Colitis Foundation. Nutrition, diet, and inflammatory bowel disease. 2013; Available from: http://www.crohnscolitisfoundation.org/resources/diet-nutrition-ibd-2013.pdf. Accessed October 25, 2018.

25. Halmos EP, Gibson PR. Dietary management of IBD-insights and advice. Nat Rev. Gastroenterol Hepatol. 2015;12:133–146. 10.1038/nrgastro.2015.11. [PubMed: 25645969]

26. Axelrad JE, Lichtiger S, Yajnik V. Inflammatory bowel disease and cancer: the role of inflammation, immunosuppression, and cancer treatment. World J Gastroenterol. 2016;22:4794–4801. 10.3748/wjg.v22.i20.4794. [PubMed: 27239106]

27. Waszczuk E, Waszczuk K, Bohdanowicz-Pawlak A, Florjanski J. Women with inflammatory bowel diseases have a suboptimal cervical cancer screening rate and are not aware of the recommended human papilloma virus vaccine. Gynecol endocrinol. 2018;34:656–658. 10.1080/09513590.2017.1416466. [PubMed: 29475388]

28. Centers for Disease Control and Prevention. The Advisory Committee on Immunization Practices. 2018; Avaiable at: https://www.cdc.gov/vaccines/acip/index.html. Accessed July 16, 2018.

29. Gurvits GE, Lan G, Tan A, Weissman A. Vaccination practices in patients with inflammatory bowel disease among general internal medicine physicians in the USA. Postgrad Med J. 2017;93:333–337. 10.1136/postgradmedj-2016-134266. [PubMed: 27733673]

30. Wasan SK, Calderwood AH, Long MD, Kappelman MD, Sandler RS, Farraye FA. Immunization rates and vaccine beliefs among patients with inflammatory bowel disease: an opportunity for improvement. Inflamm Bowel Dis. 2014;20:246–250. 10.1097/01.mib.0000437737.68841.87. [PubMed: 24374881]

31. Malhi G, Rumman A, Thanabalan R, et al. Vaccination in inflammatory bowel disease patients: attitudes, knowledge, and uptake. J Crohn's Colitis. 2015;9:439–444. 10.1093/ecco-jcc/jjv064. [PubMed: 25908717]

Table 1

List of survey questions and variable definition of selected preventive care measures

Preventive care	2015–2016 NHIS question[a]	Variable definition
Doctor's visit[b]		
Any doctor visit	About how long has it been since you last saw or talked to a doctor or other health care professional about your own health? Include doctors seen while a patient in a hospital. (Question asked of adults aged ≥ 18 years)	Participant had seen or talked to a doctor or other health professional during the past 12 months, among adults aged ≥ 18 years
Dentist visit	About how long has it been since you last saw a dentist? Include all types of dentists, such as orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists. (Question asked of adults aged ≥ 18 years)	Participant had seen a dentist during the past 12 months, among adults aged ≥ 18 years
Eye doctor visit	[During the past 12 months, have you seen or talked to any of the following health care providers about your own health?…] An optometrist, ophthalmologist, or eye doctor (someone who prescribes eyeglasses)? (Question asked of adults aged ≥ 18 years)	Participant had seen or talked to an eye doctor during the past 12 months, among adults aged ≥ 18 years
Visit to doctor specializing in women's health	[During the past 12 months, have you seen or talked to any of the following health care providers about your own health?…] A doctor who specializes in women's health (an obstetrician/gynecologist)? (Question asked of all women aged ≥ 18 years)	Participant had seen or talked to an obstetrician or gynecologist during the past 12 months, among women aged < 65 years
Specialist visit	[During the past 12 months, have you seen or talked to any of the following health care providers about your own health?…] A medical doctor who specializes in a particular medical disease or problem (other than obstetrician/gynecologist, psychiatrist, or ophthalmologist)? (Question asked of adults aged ≥ 18 years)	Participant had seen or talked to a specialist during the past 12 months, among adults aged ≥ 18 years
General doctor visit	[During the past 12 months, have you seen or talked to any of the following health care providers about your own health?…] A general doctor who treats a variety of illnesses (a doctor in general practice, family medicine, or internal medicine)? (Question asked of adults aged ≥ 18 years)	Participant had seen or talked to a general doctor during the past 12 months, among adults aged ≥ 18 years
Receipt of medical advice		
Smoking cessation	During the past 12 months, has a doctor or other health professional talked to you about your smoking? (Question asked of adults aged ≥ 18 years who are current every day or someday smokers)	Participant received medical advice about smoking during the past 12 months, among adults aged ≥ 18 years who were current smokers and had seen or talked to a doctor or other health professional during the same period
Dietary counseling	During the past 12 months, has a doctor or other health professional talked to you about your diet? (Question asked of adults aged ≥ 18 years)	Participant received medical advice about diet during the past 12 months, among adults aged ≥ 18 years who had seen or talked to a doctor or other health professional during the same period
Low-dose aspirin intake	Has a doctor or other health professional ever told you to take a low-dose aspirin each day to prevent or control heart disease? (Question asked of adults aged ≥ 40 years)	Participant ever received medical advice to take a low-dose aspirin, among adults aged ≥ 50 years
Receipt of preventive screenings		
Cholesterol check	During the past 12 months, have you had your blood cholesterol checked by a doctor, nurse, or other health professional? (Question asked of adults aged ≥ 18 years)	Had cholesterol checked during the past 12 months, among adults aged ≥ 18 years

Preventive care	2015–2016 NHIS question[a]	Variable definition
Blood pressure check	During the past 12 months, have you had your blood pressure checked by a doctor, nurse, or other health professional? (Question asked of adults aged ≥ 18 years)	Had blood pressure checked during the past 12 months, among adults aged ≥ 18 years
Diabetes	Have you had a fasting test for high blood sugar or diabetes during the past 12 months? (Question asked of adults aged ≥ 18 years)	Had blood sugar checked during the past 12 months, among adults aged ≥ 18 years
Cervical cancer	Have you had a Pap smear or Pap test during the past 12 months? (Question asked of women aged ≥ 18 years)	Received Pap smear during the past 12 months, among women aged 21–65 years who had seen or talked to a doctor or other health professional during the same period
Breast cancer	Have you had a mammogram during the past 12 months? (Question asked of women aged ≥ 30 years)	Received a mammogram during the past 12 months, among women aged 50–74 years who had seen or talked to a doctor or other health professional during the same period
Colorectal cancer	During the past 12 months, have you had any test done for colon cancer? (Question asked of adults aged ≥ 40 years)	Received colon cancer test during the past 12 months, among adults aged 50–75 years who had seen or talked to a doctor or other health professional during the same period
HIV test	Except for tests you may have had as part of blood donations, have you ever been tested for HIV? (Question asked of adults aged ≥ 18 years)	Ever tested for HIV, among adults aged 18–65 years
Immunization		
Influenza vaccine	In 2015: During the past 12 months, have you had a flu shot? A flu shot is usually given in the fall and protects against influenza for the flu season. (Question asked of adults aged ≥ 18 years) AND During the past 12 months, have you had a flu vaccine sprayed in your nose by a doctor or other health professional? A health professional may have let you spray it. This vaccine is usually given in the fall and protects against influenza for the flu season. (Question asked of adults aged ≥ 18 years) In 2016: During the past 12 months, have you had a flu vaccination? A flu vaccination is usually given in the fall and protects against influenza for the flu season. (Question asked of adults aged ≥ 18 years)	Received flu vaccine during the past 12 months, among adults aged ≥ 18 years
Pneumococcal vaccine	Have you ever had a pneumonia shot? This shot is usually given only once or twice in a person's lifetime and is different from the flu shot. It is also called the pneumococcal vaccine. (Question asked of adults aged ≥ 18 years)	Ever received a pneumococcal vaccine, among adults aged ≥ 65 years
Hepatitis B vaccine	Have you ever received the hepatitis B vaccine? (Question asked of adults aged ≥ 18 years)	Ever received hepatitis B vaccine, among adults aged ≥ 18 years
Hepatitis A vaccine	The hepatitis A vaccine is given as a two dose series routinely to some children starting at 1 year of age, and to some adults and people who travel outside the United States. Although it can be given as a combination vaccine with hepatitis B, it is different from the hepatitis B shot, and has only been available since 1995. Have you ever received the hepatitis A vaccine? (Question asked of adults aged ≥ 18 years)	Ever received hepatitis A vaccine, among adults aged ≥ 18 years
Shingles vaccine	Have you ever had the Zoster (ZOSS-ter) or Shingles vaccine, also called Zostavax®? (Question asked of adults aged ≥ 50 years)	Ever received the shingles vaccine, among adults aged ≥60 years
Tetanus shot	Have you received a tetanus shot in the past 10 years? (Question asked of adults aged ≥ 18 years)	Had a tetanus shot in the past 10 years, among adults aged ≥ 18 years

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[a] More information about the survey questionnaire is available at the following Web sites

2015 National Health Interview Survey: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2015/english/qadult.pdf.

2016 National Health Interview Survey: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2016/english/qadult.pdf

[b] Doctor's visit may include phone consultations

Table 2

Distribution of selected characteristics by inflammatory bowel disease status among US adults aged ≥ 18 years

Sociodemographics	Adults with IBD (unweighted *N* = 951)	Adults without IBD (unweighted *N* = 65,659)
	%[a] (95% CI)	%[a] (95% CI)
Age-groups (years)		
18–29	**9.1 (6.7–12.0)**	21.1 (20.6–21.7)
30–39	15.2 (12.3–18.5)	17.3 (16.9–17.7)
40–49	16.5 (13.2–20.3)	16.6 (16.2–17.0)
50–64	**34.3 (30.2–38.6)**	25.7 (25.2–26.1)
≥ 65	**24.9 (21.4–28.6)**	19.3 (18.9–19.7)
Sex		
Men	**37.9 (33.0–43.0)**	48.5 (47.9–49.0)
Women	**62.1 (57.0–67.0)**	51.5 (51.0–52.1)
Race and Hispanic origin		
Non-Hispanic white	**72.4 (67.6–76.8)**	63.4 (62.6–64.1)
Non-Hispanic black	**6.0 (4.1–8.4)**	11.9 (11.5–12.4)
Hispanic	16.1 (12.3–20.4)	16.4 (15.8–17.1)
Non-Hispanic other[b]	**5.6 (3.5–8.4)**	8.3 (7.9–8.6)
Education level		
Less than high school	**16.8 (12.6–21.6)**	12.4 (12.0–12.8)
High school diploma/GED	22.5 (18.7–26.8)	24.6 (24.1–25.1)
Some college	32.3 (27.7–37.1)	31.1 (30.5–31.6)
Bachelor’s degree or more	28.4 (24.3–32.9)	32.0 (31.3–32.6)
Current marital status		
Married/cohabitating	**54.8 (49.6–60.0)**	60.9 (60.4–61.4)
Never married	22.7 (18.7–27.2)	23.1 (22.6–23.5)
Divorced/separated/widowed	**22.5 (18.6–26.7)**	16.0 (15.7–16.4)
Current working status[c]		
Working	**54.1 (49.2–58.9)**	63.6 (63.1–64.1)
Not working, but looking	6.8 (4.0–10.6)	4.2 (4.0–4.5)

Sociodemographics	Adults with IBD (unweighted *N* = 951)	Adults without IBD (unweighted *N* = 65,659)
	%[a] (95% CI)	%[a] (95% CI)
Not working and not looking	**39.1 (34.6–43.8)**	32.2 (31.7–32.7)
Health insurance coverage[d]		
Age < 65 years		
Private	67.6 (62.2–72.7)	69.5 (68.9–70.1)
Medicaid and other public coverage	15.6 (11.8–20.1)	13.6 (13.1–14.1)
Other	5.8 (4.0–8.0)	4.5 (4.2–4.8)
Uninsured	11.0 (7.8–14.9)	12.4 (11.9–12.8)
Age ≥ 65 years		
Private	44.7 (37.3–52.2)	42.2 (41.0–43.3)
Medicare and/or Medicaid	8.1 (4.8–12.8)	6.9 (6.4–7.4)
Medicare Advantage	27.2 (20.5–34.8)	24.7 (23.7–25.7)
Medicare only, excluding Medicare Advantage	12.9 (8.3–18.9)	17.2 (16.3–18.1)
Other	7.0 (3.9–11.5)	8.3 (7.7–8.9)
Uninsured	0.0 (0.0–1.3)[e]	0.7 (0.5–0.9)
Poverty status[f]		
Poor	15.6 (12.4–19.4)	12.8 (12.4–13.2)
Near poor	17.9 (14.1–22.2)	18.2 (17.8–18.7)
Not poor	66.5 (61.5–71.3)	68.9 (68.3–69.6)
Region[g]		
Northeast	19.4 (15.6–23.7)	17.7 (17.2–18.3)
Midwest	23.4 (19.2–27.9)	22.2 (21.6–22.8)
South	34.8 (30.0–39.7)	36.3 (35.7–37.0)
West	22.5 (18.4–26.9)	23.7 (23.1–24.2)

Boldface indicates that the difference between the estimate among adults with IBD and that among adults without IBD was statistically significant ($p < 0.05$)

IBD inflammatory bowel disease; *CI* confidence interval; *GED* general education development

[a] Estimates are weighted and, with the exception of those for age-groups, are age-standardized using the projected 2000 US population distribution #10 (https://www.cdc.gov/nchs/data/statnt/statnt20.pdf)

[b] "Non-Hispanic other" includes non-Hispanic American Indian and Alaska Native only, non-Hispanic Asian only, non-Hispanic Native Hawaiian and Pacific Islander only, and non-Hispanic multiple races

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[c] Responses referred to employment status the week prior to the survey interview. Adults who were “working for pay at a job or business,” “with a job or business but not at work,” or “working but not for pay at a family-owned job or business” were defined as “Working.” Adults who were “not working for pay at a job or business, but looking for work” were defined as “Not working, but looking.” Finally, adults who were “not working at a job or business and not looking for work” were defined as “Not working and not looking”

[d] According to a hierarchy of mutually exclusive categories. Adults with more than one type of health insurance were assigned to the first appropriate category in the hierarchy. “Uninsured” includes adults who had no coverage and those who had only Indian Health Service coverage or had only a private plan that paid for one type of service, such as accidents or dental care

[e] In the survey sample, there were zero adults aged ≥ 65 years and uninsured who had ever been told by a doctor or other health professional that they had Crohn’s disease or ulcerative colitis

[f] Federal poverty level was based on family income and family size, using the US Census Bureau’s poverty thresholds. “Poor” persons are defined as those with incomes below the poverty threshold; “near poor” persons have incomes of 100% to less than 200% of the poverty threshold; and “not poor” persons have incomes of 200% of the poverty threshold or greater

[g] Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming

Table 3

Receipt of preventive care by inflammatory bowel disease status among US adults aged ≥ 18 years

Preventive care[a]	%[b] (95% CI)		Model-adjusted prevalence ratio[c] (95% CI)
	Adults with IBD	Adults without IBD	
Doctor's visit during the past 12 months			
Any doctor	**92.6 (89.7–94.9)**	83.2 (82.7–83.6)	**1.08 (1.05–1.11)**
Dentist	61.0 (56.1–65.8)	63.9 (63.3–64.5)	0.96 (0.90–1.02)
Eye doctor	**46.6 (41.6–51.7)**	39.7 (39.1–40.2)	**1.14 (1.04–1.25)**
Doctor specializing in women's health (among women aged < 65 years)	36.0 (30.1–42.1)	41.5 (40.7–42.2)	0.95 (0.82–1.10)
Specialist	**57.9 (52.6–62.9)**	25.6 (25.2–26.1)	**1.98 (1.82–2.14)**
General doctor	**79.9 (75.7–83.6)**	68.4 (67.9–69.0)	**1.13 (1.08–1.18)**
Receipt of medical advice			
Received medical advice about smoking, past 12 months[d,e]	**83.9 (77.0–89.3)**	66.4 (64.8–67.9)	**1.14 (1.02–1.27)**
Received medical advice about diet, past 12 months[e]	**42.9 (37.5–48.5)**	32.1 (31.6–32.7)	**1.31 (1.18–1.45)**
Ever received medical advice to take a low-dose aspirin (adults aged ≥ 50 years)	44.6 (39.1–50.2)	39.3 (38.6–40.0)	1.07 (0.95–1.21)
Receipt of preventive screenings			
Cholesterol checked, past 12 months	**70.3 (65.4–74.9)**	63.3 (62.7–63.8)	**1.09 (1.03–1.15)**
Blood pressure checked, past 12 months	**92.4 (89.6–94.6)**	82.5 (82.1–83.0)	**1.07 (1.04–1.11)**
Blood sugar checked, past 12 months	49.8 (45.1–54.5)	46.0 (45.4–46.5)	**1.09 (1.00–1.18)**
Pap smear, past 12 months (women aged 21–65 years)[e]	61.7 (53.9–69.1)	61.2 (60.3–62.1)	1.04 (0.94–1.16)
Mammogram, past 12 months (women aged 50–74 years)[e]	61.5 (53.4–69.2)	65.1 (63.9–66.2)	1.00 (0.90–1.12)
Colon cancer test, past 12 months (adults aged 50–75 years)[e]	**44.0 (37.5–50.8)**	26.7 (25.9–27.5)	**1.65 (1.44–1.89)**
HIV test, ever (adults aged 18–65 years)	**51.5 (45.9–57.1)**	45.4 (44.7–46.1)	**1.20 (1.09–1.32)**
Receipt of vaccinations			
Flu vaccine, past 12 months	**48.4 (43.6–53.2)**	41.0 (40.5–41.5)	**1.15 (1.05–1.25)**
Pneumococcal vaccine, ever (adults aged ≥ 65 years)	**75.3 (68.1–81.6)**	64.0 (62.9–65.0)	**1.15 (1.05–1.25)**
Hepatitis B vaccine, ever	**39.1 (34.3–44.0)**	31.6 (31.0–32.2)	1.11 (0.99–1.26)
Hepatitis A vaccine, ever	19.6 (15.0–24.9)	16.0 (15.5–16.5)	1.13 (0.91–1.40)
Shingles vaccine, ever (adults aged ≥ 60 years)	34.2 (27.7–41.0)	32.6 (31.7–33.5)	1.01 (0.84–1.21)

Preventive care[a]	%[b] (95% CI)		Model-adjusted prevalence ratio[c] (95% CI)
	Adults with IBD	Adults without IBD	
Tetanus shot, past 10 years	**72.0 (67.0–76.6)**	61.8 (61.2–62.4)	**1.13 (1.06–1.20)**

Boldfaced percentages indicate that the difference between the estimate among adults with IBD and that among adults without IBD was statistically significant ($p < 0.05$) from the bivariate analysis. Boldfaced prevalence ratios indicate that the difference between the estimate among adults with IBD and that among adults without IBD was statistically significant ($p < 0.05$) after adjusting for covariates in the models

IBD inflammatory bowel disease; *CI* confidence interval

[a] Definitions of preventive care variables are listed in Table 1

[b] Estimates are weighted and age-standardized using the projected 2000 US population distribution #10 (https://www.cdc.gov/nchs/data/statnt/statnt20.pdf)

[c] Model adjusted for age, race and Hispanic origin, sex, marital status, education, employment status, health insurance coverage, poverty level, and region

[d] Limited to current smokers, defined as those who had smoked ≥ 100 cigarettes in their life and were currently smoking cigarettes some days or every day

[e] Limited to those who responded a year or less to the question, “About how long has it been since you last saw or talked to a doctor or other health care professional about your own health? Including doctors seen while a patient in a hospital”