Published in final edited form as:

Inflamm Bowel Dis. 2017 June ; 23(6): 1004–1010. doi:10.1097/MIB.0000000000001087.

Predictors of Chronic Opioid Use in Newly Diagnosed Crohn's Disease

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Abstract

Background and Aims—Patients with Crohn's disease (CD) are often prescribed opioids chronically to manage pain associated with their disease. However, little evidence exists to support this practice. Here, we examine newly diagnosed patients with CD with and without chronic opioid use (COU) and sought to identify predictors and consequences of COU.

Methods—A nationally representative administrative health care claims that data set identified newly diagnosed patients with CD. Their data were examined during the periods 6 months before and 2 years after diagnosis. Multivariable logistic regression was used to assess predictors of COU at diagnosis.

Results—The final study cohort consisted of 47,164 patients with CD. Of them, 3.8% were identified with new COU. Chronic opioid users were more likely women, older, and likely who had more surgeries, endoscopies, admissions, and medication usage compared with other patients. Features detected before CD diagnosis that correlated with COU after diagnosis included previous opioid use (odds ratio [OR] = 6.6), chronic pain (OR = 1.36), arthritis (OR = 1.95), and mental disorders (OR = 1.58). Interestingly, emergency department visits before CD Dx increased the risk of COU (OR = 1.11), whereas endoscopy reduced COU risk (OR = 0.88).

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N. J. Pauly, L. Michailidis, M. G. Kindred, D. Flomenhoft, M. R. Lofwall, S. L. Walsh, J. C. Talbert, T. A. Barrett: Predictors of Chronic Opioid Use in Newly Diagnosed Crohn's Disease.

The authors have no conflict of interest to disclose.

Conclusions—This study presents a nationally representative assessment of COU in newly diagnosed patients with CD. The results may be used to determine the impact of COU in this population and to alert clinicians to those patients with CD at high risk of COU. Chronic opioids are consistently associated with indicators of more severe disease; however, additional research is needed to determine whether COU drives disease severity or vice versa.

Keywords

epidemiology; opioid; Crohn's disease; chronic; narcotic

Chronic opioid analgesic use is a major public health issue in the United States. As opioid prescriptions have increased,[1,2] deaths from opioid overdoses have increased proportionally.[3,4] Recent policy statements from the Center for Disease Control[5] specifically question the legitimacy of long-term opioid treatment of chronic pain. Evidence suggests that chronic opioid therapy does not improve function or quality of life but is associated with considerable risks.[6]

Crohn's Disease (CD) leads to deep ulceration and stricture formation in the intestine, which may cause abdominal pain, diarrhea, nausea, and malaise. In many cases, patients require abdominal surgery to resect severely narrowed (obstructed) intestinal sections. Pain related to disease activity, complications, or surgeries is often treated with opioid analgesics. Whereas initial use of opioids can bring about effective pain relief, more prolonged usage leads to tachyphylaxis and tolerance, necessitating dose escalation of short- and long-acting opioids in an attempt to manage chronic pain.[7] In turn, recurrent use of short-acting medications rapidly induces hyperalgesia[8] or increased sensitivity to pain during periods of withdrawal. In short, patients "withdraw" multiple times a day when treated with commonly used oral opioid analgesics. Signs and symptoms of withdrawal include nausea, vomiting, cramping abdominal pain, diarrhea, anxiety, and a poor sense of well-being,[9] all symptoms that can mimic active CD, and thus complicate the management of such patients. Furthermore, multiple adverse effects are noted in the use of opioids in patients with CD: delayed transit occurs through m receptor activation in the gastrointestinal tract that can lead to constipation, bloating, nausea, toxic megacolon, and ileus.[10,11] "Narcotic bowel syndrome" is another recognized condition complicating opioid treatment for chronic abdominal pain, a form of opioid-induced hyperalgesia.[12,13]

Given these opioid analgesic adverse effects, we hypothesize that chronic opioid use (COU) in patients with CD leads to increased emergency room visits, hospitalizations, surgeries, and pharmaceutical utilization. All these events may lead to increased costs relative to patients with CD who are not treated with chronic opioids. Despite the potentially negative ramifications of long-term opioid use in this population, factors associated with chronic use are poorly understood. The objectives of this study are to assess the prevalence and baseline predictors of COU in the first 2 years after CD diagnosis.

MATERIALS AND METHODS

Study Design and Population

This study used a retrospective cohort design to compare newly diagnosed patients with CD who did and did not use opioids chronically in the first 2 years after diagnosis. All individuals diagnosed with CD from June 2009 to December 2012 were identified using ICD-9 CM code 555.XX. An individual's index date was defined as the date of the first observed claim with a listed CD diagnosis. All individuals meeting the following criteria were included in the study cohort: (1) Age less than 65 years at index; (2) Fully enrolled with pharmaceutical and medical insurance benefits for at least 2 years after and 6 months before the index date; and (3) No diagnosis of CD or COU observed in the 6 months before the index date.

Data Source

Data for this study were obtained from the Truven Marketscan Commercial Claims and Encounters database and the Truven Marketscan Medicare Claims and Encounters database. Truven Marketscan (www.truvenhealth.com) offers fully integrated pharmaceutical and medical claims data with relevant health plan enrollment and demographic information. These data are nationally representative of the privately insured and employed US population, and include all provider, facility, and pharmaceutical claims for eligible beneficiaries. Truven collects data from a wide variety of insurance providers as well as large self-insured employers and includes data on approximately 20 million unique individuals each year.

Outcome and Covariate Measures

The main outcome of interest was (start of) chronic use of prescription opioids in the 2 years postindex. There is no standard definition for COU, so we chose to apply a definition that has been used in several previous studies.[14–19] COU was defined as having at least 90 days' supply of opioids in a 6-month period without any 30-day gaps between prescriptions. Claims for prescription opioids were identified using Generic Product Identifier codes beginning with "65."[20] COU was coded as a binary variable for any period of chronic use during the 2-year postindex period.

Covariates of interest included age at index date, sex, region of residence, health care utilization, use of prescription therapies, and comorbid diagnoses related to chronic pain, cancer, substance abuse, and mental disorders. Health care utilization was assessed as the number of abdominal surgeries, endoscopies, emergency department (ED) visits and hospital admissions in the postindex period. Abdominal surgeries and endoscopies were defined using Clinical Classification Software from the Agency for Healthcare Research and Quality.[21] ED visits were identified by inpatient and outpatient service claims with a place of service listed as ED. Relevant prescription therapies included opioids, steroids, immunomodulators, and biologics, and were identified using Generic Product Identifier codes. Inpatient use of pharmaceutical therapies was defined by Healthcare Common Procedure Coding System (HCPC) J-codes. Diagnoses of interest were identified using Clinical Classification Software and from previous literature assessing these conditions.[21,22]

Comorbid diagnoses were coded as binary indicators if an individual had at least 1 diagnosis at any point in the preindex or postindex period. Prescription therapies were compared by the number of users and nonusers, and also by mean number of prescription fills per person in each group.

Data Analysis

Clinical and demographic differences between patients with CD with and without COU were assessed using chi-square and *t* tests. Differences in clinical characteristics were examined in both the 6-month preindex and 2-year postindex periods. Multivariable logistic regression was used to determine significant predictors of COU in the 2 years after CD diagnosis. Only the characteristics assessed during the 6-month preindex period were included in the logistic regression model. Adjusted odds ratios (ORs) and 95% confidence intervals were reported. All statistical analyses were conducted using SAS Enterprise Guide 5.1 (SAS Institute, Cary, NC).

RESULTS

The final study cohort included 47,164 newly diagnosed patients with CD over the years from 2009 to 2012. In the 2 years after CD diagnosis, 8.2% (N = 3879) met criteria for COU. A total of 2070 (4.3%) individuals were excluded because they met the definition for COU in the 6-month preindex period. In total, 3.8% (N = 1809) of the final study population had at least 1 period of incident COU within the first 2 years after diagnosis with CD.

Statistically significant differences between patients with CD with and without COU were observed for all covariates assessed during the 6-month preindex period. These results are presented in Table 1. Most chronic opioid users (COUs) had some opioid use in the 6 months before diagnosis: 70.3% used opioids (versus 20.6% of other patients; $P < 0.001$) with a mean of 25.4 milligram morphine equivalents use/d (versus 7.8 of others; $P < 0.001$). Relative to other patients, patients who became COUs after CD diagnosis were significantly more likely to have been diagnosed with chronic pain, arthritis, mental disorders, substance use disorders, cancer, malnutrition, and abscesses or fistulas in the 6 months before CD diagnosis. COUs also had significantly greater overall health care utilization and twice the rate of abdominal surgeries, hospital admissions, and ED visits relative to other patients in the period before CD diagnosis.

Baseline demographics of study subjects are compared in Table 2. Postdiagnostic clinical comparison between patients with CD with and without COU can be seen in Table 3. COUs were also observed to be significantly different from other patients with CD on every variable assessed in the postindex period. A significantly greater proportion of COUs were women (62.9% versus 55.4%) and fell into the 2 highest age categories (61% versus 49.5%). On average, chronic users were nearly 5 years older than other patients: mean age 46.2 years versus 41.6 years ($P < 0.001$). Comorbid diagnoses related to chronic pain, arthritis, mental disorders, substance use disorders, cancer, malnutrition, and abscesses or fistulas were significantly more common in COUs in the 2-year postindex period relative to other patients. More specifically, 6.9% of COUs versus 1.8% of other patients were diagnosed with malnutrition in the 2 years after CD diagnosis ($P < 0.001$).

Given that opioid usage has been associated with increased health care utilization in general,[23] we posited that COU would identify a subset of high utilizers in newly diagnosed patients with CD. Results in Table 3 demonstrate that health care utilization was significantly greater among COUs relative to other patients. COUs accounted for a disproportionately high amount of ER visits and hospital admissions. With regard to ER visits and hospital admissions, COUs represented nearly 25% of the top 5% of utilizers, despite comprising only 3.8% of the entire CD population. COU patients also had more than triple the rate of ER visits and hospital admissions relative to other patients. Specifically, COUs had a mean of 2.91 ER visits in the 2 years postdiagnosis period, whereas other patients had a mean of 0.87 visits ($P < 0.001$). Notably, one patient in the COU group was noted to have over 150 ER visits in the 2-year period after CD diagnosis. Patients with COU also had twice the rate of abdominal surgeries. Furthermore, COUs had significantly greater use of both inpatient and outpatient steroids and biologic agents. On average, COUs had 3.21 steroid and 1.2 biologic agent outpatient prescriptions during the 2-year follow-up period. In contrast, other patients had 1.61 steroid and 0.77 biologic prescriptions ($P < 0.001$).

A multivariable logistic regression model was developed to determine baseline clinical and demographic characteristics significantly associated with COU in the postindex period. The final model, including adjusted ORs and 95% confidence intervals is presented in Table 4. Significant predictors in the fully adjusted model included age at diagnosis, region of residence, opioid use, ED visits, endoscopies, and diagnoses related to chronic pain, arthritis, mental disorders, or substance abuse disorders in the preindex period. Individuals who used opioids in the preindex period had 6.62 times the odds (95% CI, 5.93–7.40) of using opioids chronically in the postindex period relative to individuals who did not use any opioids in the preindex period. Individuals aged 55 to 64 had the greatest odds of COU relative to individuals aged 18 to 24 (OR: 1.52 [95% CI, 1.31–1.77]), whereas individuals aged 0 to 17 had decreased odds of COU relative to individuals aged 18 to 24 (OR: 0.21 [95% CI, 0.13–0.34]). Patients with CD residing in the Western US had the greatest odds of using opioids chronically relative to patients in the Northeast region (OR: 1.50 [95% CI, 1.28–1.76]). Of all diagnoses included in the model, arthritis had the strongest association with COU in the post-index period. Individuals diagnosed with arthritis in the preindex period had 95% increased odds (95% CI, 1.69–2.25) of using opioids chronically relative to other patients without arthritis. Finally, every ED visit in the preindex period increased odds of future COU by 11% (95% CI, 1.07–1.16) while having an endoscopy in the preindex period reduced odds of COU in the postindex period (OR: 0.89 [95% CI, 0.79–0.995]). The overall model c-statistic was 0.81, indicating a strong ability to differentiate COUs and other patients.

DISCUSSION

Within the first 2 years of a CD diagnosis, most patients will be prescribed opioid analgesics at least once, and 3.8% of patients will have at least one period of COU. Patients with CD with COU use more health care services and have more indicators of severe CD (hospitalization, surgery, steroid, and biologic use). Data to predict which patients develop COU and its attendant complications are needed. Results presented here indicate that the

strongest predictor of future COU is previous opioid use (OR = 6.62). We also found that the relative risk of COU in patients with CD was substantially impacted by preexisting arthritis, substance abuse disorder, and ED visits before diagnosis. This may be indicative of the difficulty in stopping opioid therapy even if it was originally prescribed as a short course—particularly in patients with chronic conditions—for example, arthritis and pain diagnoses. Previous research shows that some providers will continue to prescribe opioids in the wake of an opioid overdose.[24] This does not suggest that providers are irresponsible in their prescribing practices, but rather highlights that long-term opioid prescribing in chronically ill patients is a complex and multifaceted clinical conundrum influenced by an array of individual patient and health care system characteristics. Based on these findings, we propose that identification of these risk factors in a newly diagnosed patient with CD should warrant a serious conversation with the patient about the risks and benefits of opioid therapy.

The findings presented here are directly relevant to the national health care crisis surrounding COU. Recent statements from the Center for Disease Control clearly raise concern over the clinical efficacy of COU as a treatment for pain.[25] Despite these concerns, the long-term use of opioids to treat chronic pain has increased dramatically in recent years.[1,26] Increases in COU raise the risk of dependence, abuse, overdose, and death.[17,27] There is consensus that initial use of opioids presents an appropriate option for control of severe acute pain (e.g., postoperative). The most complex challenge clinicians face is choosing the optimal treatment approach for chronic pain. These challenges are magnified in the case of CD, a chronic, relapsing-remitting disease associated with pain and nonspecific abdominal symptoms such as bloating, nausea, and diarrhea. Empathetic practitioners often face distressed patients seeking urgent relief of unrelenting symptoms. Interestingly, algorithms designed to optimize treatment of patients with CD with chronic pain often include addressing and eliminating COU.[25]

“Unplanned care” before diagnosis is associated with significantly greater odds of COU after diagnosis. Our study observed that both intermittent opioid use and ED visits in the 6 months before CD diagnosis increased odds of COU in the 2 years after diagnosis. It is possible that early administration of opioids can delay delivery of care, especially in the ED or primary care setting. On the other hand, opioid withdrawal can enhance the impression of clinical severity and may be mistaken for active disease. Tellingly, endoscopy within 6 months of documentation of diagnosis was protective against COU in the 2 years after diagnosis. To reduce the number of patients with CD with COU, we advocate early endoscopic evaluation of symptoms relevant to their suspected diagnosis. We posit that objective endoscopic data inform gastroenterologists who are then better equipped to differentiate CD flares from opioid withdrawal. The discrimination of the cause of the patient’s symptoms allows focus to be shifted from reactive to proactive management of the disease.

Beyond a call for early evaluation and diagnosis, the results of our study can impact clinical practice by increasing awareness of the baseline clinical and demographic characteristics associated with COU in the years after a CD diagnosis. Female sex and older age were identified as risk factors for COU. Preexisting diagnoses such as arthritis, substance abuse, and mental disorders were associated with COU in CD. Identification of these risks supports

observations in other fields, where similar variables were observed to increase risk of COU in chronic back pain[28] and hip arthroplasty.[16] Physicians treating patients with CD should assess these factors when considering using opioids for pain to identify patients at-risk for COU early in the course of the disease. Of interest, we also observed that some patients were diagnosed with colorectal abscesses and fistulas, and some even underwent abdominal surgeries in the 6-month period before diagnosis. These are likely sequelae of undiagnosed disease; however, regression analysis using these variables was not significantly predictive of future COU.

It is uncertain whether COU reflects or impacts severity of disease. COU patients have more complicated courses and use more health care resources. It is possible that COU patients have more severe CD than other patients, which increases morbidity and utilization. However, it is also possible that misinterpretation of opioid-related withdrawal signs and symptoms leads to increased CD treatment. Lastly, opioid therapy itself may adversely affect the course of disease. Neuropeptides can regulate the gut inflammatory process by interactions with the enteric nervous system.[29–31] Opioids regulate substance P and other neuropeptides involved in neurogenic inflammation and thus, may impact the inflammatory process itself.[30,32] Further studies are needed to clarify whether COU may alter the underlying inflammatory process.

The data presented have several advantages relative to existing studies assessing opioid analgesic use in the CD population. Primarily, the CD cohort used in this study is substantially larger than those examined in previous studies of patients with CD[33–36] and is nationally representative of the privately insured population residing in the US. Previous studies of opioid analgesic use in patients with CD have relied on substantially smaller sample sizes in relatively confined geographic areas. We believe that the size of the patient population studied allowed for a more realistic estimate of the prevalence of COU in newly diagnosed patients with CD. Furthermore, our study is the first of its kind to specifically assess long-term opioid therapy in this population. Targownik et al[36] conducted a similar study in newly diagnosed patients with CD; however, their definition of “heavy opioid use” had a relatively low threshold and does not inform the prevalence of long-term opioid use in this population.

Despite the strengths of this study, there are several limitations. Our study relied on administrative health care claims data, which are real world data collected for reimbursement and not research purposes. It is possible that not all medication use or services were appropriately recorded in the claims data, potentially biasing our findings. In addition, given the retrospective nature of this study, we were only able to examine associations with COU and not evaluate causality. Individuals in our study were classified as having COU if they had any period of chronic use in the 2 years after CD diagnosis. This definition was applied irrespective of timing of exposures and outcomes, meaning that it was impossible to assess whether COU was driving disease severity or vice versa or whether the COU was intended to treat a separate comorbid pain or condition. Finally, opioid use in this study was assessed using only pharmacy dispensing data, and therefore it was not possible to verify whether patients actually ingested prescribed medications. Thus, an individual may

have filled 90 days' supply of opioids over a 6-month period but may not have actually used the medication chronically in that time.

In conclusion, our study applied a robust epidemiological study design with a nationally representative cohort of newly diagnosed patients with CD to assess the prevalence and baseline predictors of COU in the first 2 years after CD diagnosis. We showed that patients who use opioids chronically after diagnosis have significantly higher health care utilization and likely, more severe disease. We recommend that abdominal pain resulting from CD be treated with nonopioid medications initially; reserving opioids for acute exacerbations of the disease. Evidence suggests that antispasmodics, tricyclic antidepressants, SSRIs, SNRIs, atypical antidepressants, and anticonvulsive medications are effective in treating chronic abdominal pain in patients with CD.[37,38] Furthermore, it is important that patients with CD receive care for episodes of increased abdominal pain in the appropriate care setting to avoid unnecessary use of opioids. We recommend that clinicians try to follow the Center for Disease Control guidelines when treating chronic pain and in the case of CD, focus should be placed on identifying and treating active disease with the intent to achieve pain-free remission.

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TABLE 1

Comparison of Health care Utilization and Comorbidities in the 6 Months Before CD Diagnosis Between COUs and Other Patients

Variable (N = 47,164)	Other Patients, N = 45,355 (96.2%)	Chronic Users, N = 1809 (3.8%)	P
Hospital admissions			
Mean (SD)	0.10 (0.39)	0.27 (0.71)	<0.001
ED Visits			
Mean (SD)	0.26 (0.73)	0.72 (1.91)	<0.001
Ab surgeries			
Yes	512 (1.1)	73 (4.0)	<0.001
No	44,843 (98.9)	1736 (96.0)	
Mean (SD)	0.02 (0.18)	0.07 (0.41)	<0.001
Endoscopies			
Yes	10,237 (22.6)	496 (27.4)	<0.001
No	35,118 (77.4)	1313 (72.6)	
Mean (SD)	0.35 (0.75)	0.46 (0.89)	<0.001
Pain Dx			
Yes	20,607 (45.4)	1210 (66.9)	<0.001
No	24,748 (54.6)	599 (33.1)	
Arthritis Dx			
Yes	2411 (5.3)	295 (16.3)	<0.001
No	42,944 (94.7)	1514 (83.7)	
Mental disorder			
Yes	5213 (11.5)	422 (23.3)	<0.001
No	40,142 (88.5)	1387 (76.7)	
Substance abuse disorder			
Yes	1214 (2.7)	174 (9.6)	<0.001
No	44,141 (97.3)	1635 (90.4)	
Cancer			
Yes	1628 (3.6)	109 (6.0)	<0.001
No	43,727 (96.4)	1700 (94.0)	
Colorectal cancer			
Yes	248 (0.6)	26 (1.4)	<0.001
No	45,107 (99.4)	1783 (98.6)	
Malnutrition			
Yes	200 (0.4)	25 (1.4)	<0.001
No	45,155 (99.6)	1784 (98.6)	
Abcess/fistula			
Yes	683 (1.51)	47 (2.60)	<0.001
No	44,672 (98.49)	1762 (97.40)	
Past opioid use			
Yes	9355 (20.6)	1272 (70.3)	<0.001

Variable (N = 47,164)	Other Patients, N = 45,355 (96.2%)	Chronic Users, N = 1809 (3.8%)	P
No	36,000 (79.4)	537 (29.7)	
Mean milligram morphine equivalents per day	7.75 (20.16)	25.36 (28.39)	<0.001

TABLE 2

Demographic Comparisons of COUs and Other Patients

Variable (N = 47,164)	Other Patients, N = 45,355 (96.2%)	Chronic Users, N = 1809 (3.8%)	P
Sex			
Male	20,243 (44.6)	672 (37.1)	<0.001
Female	25,112 (55.4)	1137 (62.9)	
Age			
0–17	3890 (8.6)	17 (0.9)	
18–34	9930 (21.9)	320 (17.7)	
35–44	9111 (20.1)	367 (20.3)	<0.001
45–54	11,774 (26.0)	567 (31.3)	
55–64	10,650 (23.5)	538 (29.7)	
Mean (SD)	41.6 (15.0)	46.2 (11.9)	<0.001
Median (Q1–Q3)	44 (31–54)	48 (38–56)	<0.001
Region			
Northeast	12,505 (27.6)	349 (19.3)	
North Central	10,613 (23.4)	466 (25.8)	
South	14,837 (32.7)	646 (35.7)	<0.001
West	6904 (15.2)	326 (18.0)	
Unknown	496 (1.1)	22 (1.2)	

TABLE 3

Comparison of Health care Utilization and Comorbidities in the 2 Years After CD Diagnosis Between COUs and Other Patients

Variable (N = 47,164)	Other Patients, N = 45,355 (96.2%)	Chronic Users, N = 1809 (3.8%)	P
Hospital admissions			
0	32,999 (72.8)	793 (43.8)	<0.001
1–4	11,789 (26.0)	839 (46.4)	
5+	567 (1.3)	177 (9.8)	
Mean (SD)	0.46 (1.07)	1.62 (2.57)	<0.001
ER visits			
0	27,415 (60.5)	665 (36.8)	<0.001
1–5	16,910 (35.9)	904 (50.0)	
6+	1030 (2.3)	240 (13.3)	
Mean (SD)	0.87 (2.03)	2.91 (7.06)	<0.001
Abdominal surgeries			
Yes	3049 (6.7)	311 (17.2)	<0.001
No	42,306 (93.3)	1498 (82.8)	
Mean (SD)	0.13 (0.61)	0.43 (1.25)	<0.001
Endoscopies			
Yes	30,060 (66.3)	1275 (70.5)	<0.001
No	15,295 (33.7)	534 (29.5)	
Mean (SD)	1.24 (1.42)	1.74 (2.0)	<0.001
Use inpatient steroids			
Yes	5454 (12.0)	550 (30.4)	<0.001
No	39,901 (88.0)	1259 (69.6)	
Mean Rx (SD)	0.27 (1.20)	0.85 (2.10)	<0.001
Use outpatient steroids			
Yes	19,963 (44.0)	1205 (66.6)	<0.001
No	25,392 (56.0)	604 (33.4)	
Mean Rx (SD)	1.61 (3.23)	3.21 (4.97)	<0.001
Mean Equivalent Dosing (in milligram of oral prednisone)	1001.9 (2694.8)	1749.1 (3596.8)	
Use outpatient biologics			
Yes	3248 (7.2)	222 (12.3)	<0.001
No	42,107 (92.8)	1587 (87.7)	
Mean Rx (SD)	0.77 (3.43)	1.20 (4.10)	<0.001
Use immunomodulator			
Yes	7442 (16.4)	327 (18.1)	0.061
No	37,913 (83.6)	1482 (81.9)	
Mean Rx (SD)	1.57 (4.57)	1.28 (3.72)	<0.001
Outpatient opioids use			
Yes	22,345 (49.3)	1809 (100)	<0.001
No	23,010 (50.7)	0 (0)	

Variable (N = 47,164)	Other Patients, N = 45,355 (96.2%)	Chronic Users, N = 1809 (3.8%)	P
Mean milligram morphine equivalent per day (SD)	17.35 (23.62)	35.05 (30.35)	<0.001
Pain Dx			
Yes	32,894 (72.5)	1699 (93.9)	<0.001
No	12,461 (27.5)	110 (6.1)	
Arthritis Dx			
Yes	6201 (13.7)	662 (36.6)	<0.001
No	39,154 (86.3)	1147 (63.4)	
Mental disorder			
Yes	11,628 (25.6)	980 (54.2)	<0.001
No	33,727 (74.4)	829 (45.8)	
Substance use disorder			
Yes	3750 (8.3)	495 (27.4)	<0.001
No	41,605 (91.7)	1314 (72.6)	
Cancer			
Yes	3604 (8.0)	240 (13.3)	<0.001
No	41,751 (92.0)	1569 (86.7)	
Colorectal cancer			
Yes	609 (1.3)	60 (3.3)	<0.001
No	44,746 (98.7)	1749 (96.7)	
Abscess or fistula			
Yes	1951 (4.3)	133 (7.4)	<0.001
No	43,404 (95.7)	1676 (92.7)	
Malnutrition			
Yes	820 (1.8)	125 (6.9)	<0.001
No	44,535 (98.2)	1684 (93.1)	

TABLE 4

Logistic Regression Results Predicting Chronic Opioid Use in 2 Years After CD Diagnosis

Effect	Point Estimate	95% Wald Confidence Limits	
Sex (ref: male)	1.045	0.943	1.158
Age Group (ref: 18–24)			
0–17	0.206	0.126	0.336
35–44	1.251	1.068	1.465
45–54	1.513	1.306	1.752
55–64	1.523	1.309	1.773
Region (Ref: Northeast)			
West	1.499	1.277	1.759
North Central	1.429	1.234	1.655
Unknown	1.351	0.851	2.146
South	1.322	1.152	1.517
Diagnoses/procedures in 6 mo preceding CD (Ref: No diagnosis/procedure)			
Any opioid use in 6 mo preceding CD Dx	6.634	5.936	7.413
Arthritis Dx	1.952	1.693	2.250
Substance abuse disorder	1.874	1.559	2.252
Mental disorder	1.577	1.394	1.783
Malnutrition	1.428	0.894	2.282
Pain Dx	1.356	1.213	1.516
Abdominal surgery	1.176	0.871	1.586
Cancer	1.053	0.849	1.305
Abscess/fistula	0.934	0.679	1.284
Endoscopy (per procedure)	0.884	0.788	0.993
ED visits (per visit)	1.114	1.069	1.160
Hospital admissions (per admission)	0.990	0.901	1.087