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Do Patient-perceived Pros and Cons of Opioids Predict Sustained Higher-Dose Use?

Stephen M. Thielke, MD, MSPH, MA[*,†], **Judith A. Turner, PhD**[*], **Susan M. Shortreed, PhD**[‡], **Kathleen Saunders, JD**[‡], **Linda LeResche, ScD**[§], **Cynthia I. Campbell**[‖], **Constance C. Weisner**[‖], and **Michael V. Korff, ScD**[‡]

[*]From the Psychiatry and Behavioral Sciences, Seattle, WA

[§]From the Oral Medicine, University of Washington, Seattle, WA

[†]From the Geriatric Research, Education, and Clinical Center, Puget Sound Veterans Affairs Medical Center, Seattle, WA

[‡]From the Group Health Research Institute, Seattle, WA

[‖]From the Kaiser Permanente Division of Research, Oakland, CA

Abstract

Objectives—Chronic opioid therapy (COT) is associated with various adverse outcomes, especially at higher doses, yet little is known about predictors of sustained higher-dose COT. This study aimed to ascertain, among higher-dose COT patients, the association of patient-perceived pros and cons of opioids with continued higher-dose use 1 year later.

Methods—Patients (N = 1229) in 2 large health plans prescribed ≥ 50 mg morphine-equivalent dose (MED) per day for chronic non-cancer pain completed a survey assessing opioid benefits and harms. The Prescribed Opioid Difficulties Scale questionnaire assessed psychosocial problems, concerns, benefits, and side effects related to opioid use. Logistic regression models estimated the associations of the reported benefits and problems with higher-dose continuation (≥ 50 mg MED/d) versus dose reduction (< 50 mg MED/d) 1 year later.

Results—Over 80% of participants continued higher-dose opioid use at 1 year, regardless of reported problems, concerns, side effects, pain reduction, or perceived helpfulness. Higher scores on the Prescribed Opioid Difficulties Scale Problems subscale (odds ratio = 0.79, 95% confidence interval, 0.68–0.92) and Concerns subscale (odds ratio = 0.76, 95% confidence interval, 0.65–0.90) were negatively associated with higher-dose use 1 year later. Other baseline measures (opioid helpfulness, reduction in pain, number of side effects, and side effect bothersomeness) were not significantly associated with continued higher-dose use.

Discussion—The large majority of patients continued using higher-dose opioids regardless of baseline characteristics. These findings suggest the difficulty of reducing opioid dose among chronic higher-dose opioid users.

Keywords

opioid; chronic; continuation; discontinuation; chronic opioid therapy; benefits; aversive effects; side effects; pain reduction; dosing; problems; concerns

Reprints: Stephen M. Thielke, MD, MSPH, MA, Department of Psychiatry and Behavioral Sciences, University of Washington, P.O. Box 356560, Seattle, WA, (sthielke@u.washington.edu).

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Long-term use of opioid medications, also called chronic opioid therapy (COT), has been associated with a spectrum of adverse effects, including fatal overdose.[1–4] Recent epidemiologic research has revealed significant increases in the risk of adverse effects at 50mg or higher morphine-equivalent dose (MED) per day.[5–9] Only a few studies, however, have examined factors that predict which patients on opioid therapy will sustain use of opioids long term, and none have addressed sustained higher-dose use. A study of the workers' compensation pharmacy bills of 781 workers who received opioid prescriptions within the first year after a work-related back injury found that opioid dose in the first quarter after injury, greater injury severity, more severe pain, greater functional disability, lower recovery expectations, and higher catastrophizing reported 18 days (median) after claim submission were associated with sustained opioid use.[10] In another study of patients with back pain who were taking opioids (N = 892), patients who smoked and those who did not have surgery were more likely to continue to use opioids 12 and 24 months later; measures of pain, disability, and mental health were not predictive.[11] An analysis of 2 pharmacy databases found that, among adults with continuous chronic opioid use, those with opioid dose > 120 mg MED/d and those with possible opioid misuse were more likely to continue opioid use.[12] None of these studies examined the patient's assessment of benefits and negative effects of opioid medication as predictors of subsequent opioid use, or accounted for the dose of opioid prescribed.

Several models of health-related behavior propose that patients are more likely to continue to use medications if they experience benefits (pros) and less likely if they experience aversive effects or harms (cons).[13] First, the "decisional balance"[14] perspective holds that individuals weigh the pros and cons of alternative courses of action, preferring alternatives with the greatest net gain.[15] For instance, interventions that aim to maximize pros and minimize cons have been found to increase adherence to antihypertensive and lipid-lowering medications.[16,17] On the basis of this conceptual model, one might assume that COT users who experience problems or have concerns about taking opioids would be less likely to continue use. Second, learning theory and operant behavioral perspectives conceptualize medication-taking behavior as influenced by the consequences of actions.[18] From this view, individuals who experience aversive consequences should be less likely to sustain opioid use, whereas those who experience benefits should be more likely to sustain use. Neither decisional balance nor operant perspectives has been empirically tested around opioid use, and the extent to which specific aversive effects and benefits influence opioid continuation is unknown.

Patients may experience, perceive, and report benefits and harms in several ways. The main assumed benefit of opioid is reduction in pain, but other behavioral and emotional consequences (such as improvements in functioning or creation of euphoria or sedation) may also occur. Physiological side effects such as nausea or constipation are harms that can be attributed directly to opioid medications, and there may be other drawbacks related to their use, such as social stigma or financial costs. Addiction, dependence, or abuse of opioids may have important effects on perspectives and behaviors,[19] and may alter how patients evaluate risks and benefits and make decisions about continuing use. Addiction may impair social or vocational functioning, which is likely to be perceived as aversive, but patients may or may not attribute such harms directly to opioids. Many patients fear addiction,[20,21] and concern about becoming addicted to opioids may itself be considered a harm related to them.

The objective of this study was to examine, among a group of patients taking higher-dose opioids long-term for chronic noncancer pain, the relationships between patients' perceptions of the benefits and aversive effects of opioids and continuation of higher-dose

opioid use 1 year later. On the basis of the theories of pain-related behavior, we expected that those perceiving greater benefit and fewer problems and concerns would be more likely to remain on opioid medications at higher doses. Specifically, we hypothesized that, after controlling for other relevant variables, (1) greater perceived benefits of opioids at baseline would be positively associated with continuation of higher-dose opioid use 1 year later; and (2) greater perceived aversive effects of opioids at baseline would be negatively associated with continuation of higher-dose opioid use 1 year later. We explored the association of specific problems and concerns at baseline with sustained use of opioids. We also examined the association of expressed desire to cut down on opioid use with continued higher-dose use.

PATIENTS AND METHODS

Setting and Participants

The Consortium to Study Opioid Risks and Trends (CONSORT) study examined long-term use of opioids for noncancer pain among adults aged 21 to 80 years in 2 health plans, Group Health (GH), located in Washington State, and Kaiser Permanente, in Northern California (KPNC). The research protocols were reviewed and approved by the institutional review boards of both health plans. Details of the CONSORT study design have been published previously[22]; we briefly review the study design as it pertains to our question of interest.

Eligible health plan members were identified using automated pharmacy data and medical records according to 4 criteria. First, they must have filled an opioid prescription within 30 days of the sample selection date (to ensure that they were currently using opioids). Second, they must have filled at least 10 opioid prescriptions and/or received at least 120 days' supply of opioids in a 1-year period before the sample selection date (to ensure that they were chronic users). Third, at least 90 days must have passed between the first and last opioid dispensing in that year (to select for episodes of long-term opioid use that exceeded 90 days).[22] Fourth, in order to ensure completeness of data, participants must have been continuously enrolled in the health plan for at least 1 year before sampling. Exclusion criteria included receiving a cancer diagnosis (except for nonmelanoma skin cancer) in local cancer registries or having ≥ 2 cancer diagnoses in automated visit records in the year before sampling. Average daily dose was calculated using electronic pharmacy data by dividing the total MED dispensed in the 90-day period before sampling by 90.[22] To ensure equal number of individuals on low-dose, medium-dose, and high-dose opioid regimens, equal numbers of eligible participants within 3 daily opioid dosage ranges were sampled. The 3 opioid dose categories were defined as < 50, 50 to 99, and 100+ mg MED/d.

From June 2008 through October 2009, experienced survey interviewers used computer-assisted telephone interview technologies to conduct 25- to 30-minute interviews with eligible and willing study participants. At the time of the interview, participants were asked to give permission for study staff to access their electronic health record data from the time they enrolled in the health plan until 3 years after the date of the interview.

Because our scientific question of interest was opioid continuation among prevalent higher-dose users, our analysis sample was limited to CONSORT participants whose average daily dose in the 90 days before the telephone interview was at least 50 mg MED, and who were continuously enrolled in the health plan for 1 year following the survey. We further limited the original sample to those who reported in the telephone interview that they used opioids every day in the previous 2 weeks.

Outcome Measure

Using health plan electronic pharmacy data, we calculated MED for the 90-day period immediately preceding the 1-year anniversary of the telephone interview (days 275 to 365 following the telephone interview). Our outcome of interest was a dichotomized measure of daily opioid dose at follow-up: taking < 50mg MED/d (including taking no opioids) versus taking ≥ 50mg MED/d. We chose 50mg MED/d as the threshold for higher-dose use because prior research has found that dosages exceeding this level are associated with negative health outcomes.[5–9]

Predictors of Interest

We selected the predictors of interest as those measures on the baseline CONSORT questionnaire that were directly related to aversive effects and benefits of opioids as perceived by the participant. We considered that benefits would stem from either pain reduction or overall report of benefits, and that harms could take a number of different forms related to perceived problems, concerns, or side effects.

Perceived Helpfulness

We defined perceived helpfulness of opioid medication using the response to a single question asked as part of the CONSORT survey: “over the past month, how helpful have you found opiate pain medicines in relieving your pain?” Response choices were not at all, a little, moderately, very, and extremely helpful.

Short-term Changes in Pain

CONSORT participants were asked to use a 0 to 10 scale, where 0 was “No pain” and 10 was “Pain as bad as could be,” to rate their usual pain level just *before* taking opioid medication and 2 to 3 hours *after* taking opioid medication. We defined the short-term change in pain as the rating after minus the rating before; a negative difference indicates an improvement.

Problems and Concerns

Problems and concerns attributed to opioids by the user were measured using the Prescribed Opioid Difficulties Scale (PODS).[23–25] This instrument has 2 subscales, Problems and Concerns, that assess psychosocial problems and concerns related to opioid use from the user’s perspective (in the past 2wk for common problems, or in the past month or year for less common problems). Each subscale item is rated on a scale of 0 (strongly disagree/never/not bothersome) to 4 (strongly agree/always or almost every day/extremely bothersome), and the subscale score is calculated as the mean of the items on the subscale. Higher scores indicate more psychosocial problems or concerns.

Modified PODS Problems Subscale

The PODS Problems subscale includes 8 items: loss of interest in usual activities; trouble concentrating or remembering; feeling slowed down, sluggish, or sedated; feeling depressed, down, or anxious; interference with work, family or social responsibilities; difficulty thinking clearly; feeling sleepy or less alert while completing tasks like driving; and bothersomeness of side effects. For the purposes of the present study, we excluded the side effect bothersomeness item when scoring the subscale and investigated this item separately (see below).

Modified PODS Concerns Subscale

The Concerns subscale assesses the degree to which the respondent endorses various types of worries about opioid use: preoccupation with or constantly thinking of opioids; inability to control amount or frequency of use; needing to use a higher dose of medication to get the same effect (tolerance); and dependence or addiction. This subscale also asks about problems with family, friends, or coworkers that are caused by opioids, and concerns that family or friends have about the respondent's being dependent on or addicted to them. One item from the PODS Concerns Subscale, about intention to cut back or stop opioids, was excluded when scoring the subscale because it did not directly reflect perceived aversive effects. It was investigated separately (see below).

Bothersomeness of Side Effects

We analyzed as a separate predictor the item on the PODS Problems subscale that asked respondents to rate the bothersomeness of side effects experienced due to opioids in the last month, on a scale of 0 to 4, with 4 being the most bothersome.

Number of Side Effects

During the interview, CONSORT participants were asked whether they had experienced any of the following 9 side effects because of opioid medications in the last month: constipation, nausea, feeling sedated or sluggish, difficulty urinating, less interest in sex or other sexual difficulties, feeling confused or disoriented, nightmares, dizziness, and itching. Participants answered yes, no, or that they had experienced this symptom but were unsure if it was a side effect of opioids; only the first of these (yes) was considered a positive response. We summed the number of positive responses to create a variable indicating the total number of opioid-related side effects.

Desire to Stop/Cut Down Opioid Use

The PODS Concerns subscale includes an item about intent: "I have wanted to stop using opiate pain medications or to cut down on the amount of opiate medications that I use." This item does not directly measure benefit or aversive effect, so we did not include it in the PODS Concerns subscale score used for this study. Research indicates that behavioral intention is a strong predictor of future actions,[26] and because intention may be a proxy for the outcome, controlling for it could overwhelm the influence of other predictors. We therefore analyzed this item separately as a predictor, controlling only for study site.

Covariates

We controlled for patient-level and system-level variables that could plausibly be associated with both higher-dose continuation and perceived pros and cons. The baseline variables used as covariates included health plan site (GH or KPNC); participant age and sex, obtained from health plan electronic data files; self-report variables of education, smoking status, pain, and depression; and history of substance use disorder obtained from both self-report and electronic data. Pain was assessed by a 0 to 10 rating of average pain intensity in the past 3 months from the Graded Chronic Pain Scale.[27] Scores on the Patient Health Questionnaire-8 (PHQ-8) were used to measure depressive symptoms; this scale has 8 questions, each rated 0 to 3, with a maximum score of 24.[28] Substance use disorder history was assessed through a combination of self-report and health plan electronic data. A participant was classified as having a substance use disorder history if she or he received at least 1 diagnosis of drug or alcohol abuse or dependence according to electronic data in the 3 years before the survey date, or answered yes to the survey question, "Have you ever had an alcohol or drug problem?"

Other covariates included characteristics of opioid prescriptions before the baseline interview, derived from electronic health plan pharmacy data. In addition to calculating average daily MED in the 90 days preceding the baseline interview, we identified the predominant type of opioid used (long-acting or short-acting) in that period. Long-acting opioids include methadone, transdermal fentanyl, and sustained release formulations of oxycodone, morphine, hydromorphone, oxymorphone, and levorphanol tartrate. Study participants were classified as predominant users of either short-acting or long-acting opioids depending on which type had the larger total days' supply in the 90 days before the interview. In case of ties, the opioid type with the larger MED was chosen. We calculated the number of days' supply of opioids in the year before the interview date separately for long-acting and short-acting opioids, and analyzed days' supply using an individual's maximum of these 2 amounts.

Statistical Analyses

We used descriptive statistics to characterize the sample. For continuous-scaled variables, we used 2 ways of describing the sample: (1) means and SDs; and (2) dividing the continuous scale into meaningful categories. Percentages were calculated for these derived categories as well as for other categorical and dichotomous variables. We constructed logistic regression models to examine the association between the predictors of interest and continuation of higher-dose opioids (≥ 50mg MED/d) at 1 year. We first performed univariate analyses of each of the predictors of interest and covariates (adjusting only for health plan site), then constructed multivariate models that included all predictors and covariates. To further explore the influence of specific reported harms, individual PODS items were examined separately in logistic regression models controlling only for health plan site. All tests were two-sided, and we considered a P-value < 0.05 to indicate statistical significance.

RESULTS

Sample Characteristics

Overall, 3790 potential participants (2185 at GHC and 1605 at KPNC) were approached for the CONSORT study; 185 of these were ineligible (76 at GHC and 109 at KPNC). Interviews were completed for 2163 (1191 at GHC and 972 at KPNC), for an overall response rate of 60%. Among the 2163 survey respondents, 1883 (87%) reported using opioid medication every day for the last 2 weeks. Of these, 1335 (70.8%) had an average daily dose in the 90 days before the telephone interview of least 50mg MED/d. Among those participants, 1229 (92.1%) were continuously enrolled in the health plan for the year following the interview and were included in the sample for the current study.

As seen in Table 1, the sample was predominantly female (62%) and most participants (69%) had completed some education beyond high school. At baseline, the large majority (92%) of study participants reported a moderate to severe level of pain intensity in the past month. About half of participants (54%) had an opioid dose between 50 and 120mg MED/d in the 90 days before the baseline interview, and the remainder (46%) had a dose over 120 mg MED/d. The mean (SD) daily dose in the sample was 178.2 (220.0) mg MED. Somewhat more than one third (39%) were identified as having a history of substance abuse (14.2% by self-report alone, 14.4% by electronic medical record diagnosis only, and 10.8% by both). More than half (55%) had moderate to severe depressive symptom levels as measured by the PHQ-8 (score ≥ 10). Almost two thirds (63%) reported that opioid medications were very or extremely helpful in relieving their pain. On both the PODS Problems and the PODS Concerns subscales, about one third of the participants endorsed no problems/concerns. Somewhat more than one fifth (23%) of participants rated side effects of

opioids as moderately bothersome and another 18% reported being very or extremely bothered by side effects. Almost half (49%) agreed or strongly agreed that they would like to cut down or stop taking opioids.

Associations of Baseline Covariate and Predictor Variables with Higher-Dose Opioid Use at 1 Year

Overall, 83.8% of participants (n = 1030) continued to receive opioid prescriptions averaging ≥ 50mg MED/d 1 year after the baseline telephone interview. Sixty participants (4.9% of the whole sample) were not prescribed any opioid medication during the 90-day follow-up period. Among the 139 participants who received some opioids but < 50mg MED/d, the mean MED was 28.6mg (SD = 15.6) per day.

Table 2 shows the results of the univariate and multivariate logistic regression models examining the associations of the covariates and predictors with continued higher-dose opioid use at 1 year. In univariate analyses, adjusting for health plan site, all 3 baseline opioid medication variables were associated significantly with continuation of higher-dose opioids at 1 year. Participants using predominantly long-acting opioids at baseline, relative to those using predominantly short-acting opioids, had higher odds of continued higher-dose use [adjusted odds ratio (OR) from multivariate models = 1.54, 95% confidence interval (CI) = 1.07, 2.21; $P = 0.02$]. Higher baseline opioid dose was significantly and positively associated with greater odds of continuation of higher-dose opioid use at 1 year in both the univariate and multivariate models [adjusted OR (95% CI) = 1.004 (1.002, 1.006), $P <= 0.001$]. Days' supply of opioids at baseline was associated significantly and positively with continued higher-dose opioid use at 1 year in the univariate analysis, but this relationship was not significant in the multivariate analysis.

Baseline scores on both the modified PODS Problems subscale and the modified PODS Concerns subscale were significantly negatively associated with continued higher-dose use at 1 year in the univariate and multivariate models. Adjusting for all other predictors and covariates, participants who reported greater opioid-related problems and concerns at baseline were less likely to sustain higher-dose opioid use 1 year later [adjusted OR (95% CI) = 0.77 (0.62, 0.96), $P = 0.02$; and 0.79 (0.64, 0.97), $P = 0.02$, for Problems and Concerns, respectively]. Nevertheless, even among participants with high levels of problems or concerns related to use of opioids (ie, a score of ≥ 0.7 on the Problems subscale or ≥ 1.0 on the Concerns subscale), 80% sustained opioid use at higher dosage levels 1 year later. The other potential predictor variables did not predict sustained higher-dose opioid use in either unadjusted or adjusted models: depression scores [adjusted OR (95% CI) = 1.01 per point on PHQ-8 (0.98, 1.04), $P = 0.66$]; reported change in pain intensity after taking opioid medication [adjusted OR (95% CI) = 1.01 per point on pain scale (0.92, 1.11), $P = 0.81$]; number of side effects [adjusted OR (95% CI) = 1.05 (0.93, 1.1), $P = 0.81$]; side effect bothersomeness ($P = 0.66$ for trend among 4 categories); and perceived opioid helpfulness ($P = 0.31$ for trend among 4 categories).

The results of the exploratory analyses examining the associations between each of the individual PODS items and continued opioid use (adjusted for health plan site) are presented in Table 3. The PODS responses associated with significantly lower likelihood of continued use of higher-dose opioids at 1 year were: loss of interest in activities; difficulty concentrating; feeling anxious or depressed; difficulty controlling opioid use; worry about dependence; problems with family, friends, or coworkers; belief that friends/family thought the opioid user may be dependent or addicted; and wanting to stop or cut down opioid use. Even those who endorsed any of these problems or concerns, however, showed a high rate of continuation, with between 72% and 80% sustaining higher-dose opioid use at 1 year.

Among those who agreed that they wanted to stop or cut back, approximately 80% were still using higher-dose opioids 1 year later.

DISCUSSION

We hypothesized, based on theories of pain-related behaviors, that greater perceived benefits and fewer perceived harms from opioids would predict continued higher-dose use among chronic users. Although reported problems and concerns were significantly associated with reduced odds of continued higher-dose use at 1 year, the majority of patients continued high-dose use regardless of reported pros and cons, and none of the other factors was a significant predictor. In particular, we did not find a significant association between continued higher-dose use and the following factors: perceived helpfulness; reduction in pain: number of side effects: or side effect bothersomeness. Almost half of COT users in the current study agreed or strongly agreed at baseline that they would like to cut down or stop using opioids, but 80% of these patients continued higher-dose opioid use 1 year later. The picture that emerges is of chronic users who, despite the presence of side effects and the lack of substantial pain relief, as well as an expressed desire to cut down or stop using opioids, nevertheless continue using these medications.

Our results suggest that, although concerns about and perceived problems related to opioid use are modestly associated with future use, in general, once patients are on COT at higher doses, the great majority continue long-term at higher doses. The rate of sustained higher-dose use in our sample (84%) was even higher than rates previously reported from national (67%) and Arkansas Medicaid (65%) medical and pharmacy claims records[12]; the latter study followed COT recipients for up to 5 years and was not limited to patients already on higher doses. Together, these studies contradict previous reports that many patients discontinue long-term opioid therapy because of adverse events or insufficient pain relief.[29–31]

The reported short-term reduction in pain from opioids at baseline was not significantly associated with continued higher-dose use at 1 year. Although we had expected that patients who experienced reductions in pain after taking opioids would be more likely to continue using opioids, this finding may reflect patients' use of opioids (particularly long-acting opioids) on a regular schedule, with the goal of an overall decrease in pain without wide variation in pain levels. Very few participants (6.6%) reported that opioid medications were not at all or only a little helpful for them, and over 60% reported that the medications were very or extremely helpful. This is somewhat surprising, because at baseline, the average pain in this sample of COT users was moderately high (mean 6.0 on a 0 to 10 scale). Similarly high pain reports have been found in other studies of patients on COT.[10,24,32] In our clinical experience, patients on COT often report that opioids do not cause substantial *reductions* in pain; rather, they believe that using opioids prevents *increases* in pain. It is likely that patients who did not perceive opioids as being helpful would have already cut back or quit; such patients would not have been included in our sample of chronic opioid users. The phenomenon of general satisfaction from opioids with little specific effect of opioids on pain has been characterized as the "paradox of satisfaction with inadequate pain treatment."[32] One possible explanation for this phenomenon is that patients on COT may have withdrawal symptoms that are alleviated by opioid intake, independent of other benefits.[33]

Several clinical factors may influence the continuation of opioids. First, opioids are selected in the context of other alternatives to treating chronic pain, such as nonopioid medications or nonpharmacologic approaches. For patients with chronic pain, most of these alternatives may have been exhausted, leaving opioids as the apparent treatment of last resort. A decision to discontinue opioids may thus be jeopardized by the lack of any alternative

therapies that the provider can recommend. Our results are consistent with this interpretation, as it appears that marginally effective therapy is continued for most patients. Second, the lack of clinical protocols around or incentives for opioid tapering may make it more difficult for providers to initiate and sustain dose reduction. Third, addiction or dependence may change how patients approach continued use of opioids. An individual who is addicted would be expected to continue using a medication indefinitely, even without perceived benefits or absence of harms. Addiction may thus be more than just a harm: it may fundamentally alter the way that patients assess benefits and harms and make decisions. Neither decision balance nor operant conditioning theory provide good explanations for the observed predictors of continued use, perhaps because these theories fail to account for potential addiction or the lack of clinical alternatives to opioids.

Side effects were commonly reported among participants at baseline, with 74% reporting at least 1 side effect directly attributed to opioids. Yet neither the number of side effects nor side effect bothersomeness was found to be associated with continued higher-dose use. Similarly, the PODS Problems subscale items of trouble thinking clearly and sedation were not found to be associated with continuation. It is plausible that patients who had experienced very bothersome side effects would have discontinued opioid medication before becoming chronic users.

Two opioid medication factors considered as covariates for this study—higher doses and receipt of predominantly long-acting (vs. short-acting) opioids—were significantly associated with continued higher-dose use. This is consistent with previous research,[10,12] although most of the previous research about continuation has been confined to nonchronic or low-dose to moderate-dose users. Our findings suggest that opioid medication regimens may be more important than perceived helpfulness or side effects in influencing future use, once patients are on higher-dose COT.

This study had several limitations. First, the sample consisted of chronic higher-dose users, who may already have experienced more pros and fewer cons than those who had quit. Findings may not generalize to patients who use opioids at lower doses or for shorter durations. Second, we did not capture events between the baseline survey and the 1-year assessment that might have influenced use at 1 year, such as major health events attributed to medications. Third, the extent to which social desirability may have influenced baseline survey responses (eg, to the questions about desire to cut down and about addiction) is unknown. Fourth, we did not examine prescriber factors, which likely play a large role in chronic opioid prescription continuation. Fifth, we were not able to ascertain the total duration of opioid therapy, which may influence continuation. Finally, we included all continuous-scaled variables, including those measuring problems and concerns, as linear predictors of continued higher-dose opioid use. It is possible the relationship for some or for all of these variables is more complex.

CONCLUSIONS

The prevalence of continued higher-dose opioid use among noncancer COT patients was very high 1 year after the baseline interview, despite the fact that half of the study participants said they wanted to cut down or stop use of opioids. Some patient-reported problems with, and concerns about, opioid use predicted reduced rates of sustained opioid use, but absolute rates of continuation were high across all categories of baseline variables. These findings suggest the difficulty of tapering opioid dose once patients are on chronic higher-dose opioid therapy.

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TABLE 1

Sample Characteristics at Baseline (N = 1229)

Characteristics	n (%)	Mean (SD)
Health plan site		
Kaiser Permanente Northern California	623 (50.7)	
Group Health	606 (49.3)	
Age (y)		53.9 (11.3)
21–40	151 (12.3)	
41–60	744 (60.5)	
> 60	334 (27.2)	
Sex		
Female	767 (62.4)	
Male	462 (37.6)	
Education		
High school or less	377 (30.7)	
Vocational/some college	612 (49.8)	
College graduate	240 (19.5)	
Average pain, past month, 0–10 scale		6.0 (1.9)
0–3	92 (7.6)	
4–6	652 (53.7)	
7+	470 (38.7)	
Pain interference with usual activities, 0–10 scale		6.2 (2.5)
0–3	166 (13.6)	
4–6	454 (37.2)	
7+	600 (49.2)	
Current smoker		
Yes	353 (28.7)	
No	876 (71.3)	
Substance abuse history (self-report or EMR data)		
Yes	479 (39.5)	
No	733 (60.5)	
Predominant type of opioid medication in last 90 d		
Short-acting	418 (34.0)	
Long-acting	811 (66.0)	
MED, last 90d (mg)		178.2
50− < 120mg/d	663 (54.0)	(220.0)
120− < 250 mg/d	347 (28.2)	
≥ 250 mg/d	219 (17.8)	
Days' supply of opioid in last year*		407.9
0–300	178 (14.5)	(141.0)
301–365	325 (26.4)	
366–405	319 (26.0)	

Characteristics	n (%)	Mean (SD)
> 405	407 (33.1)	
PHQ-8		10.8 (6.2)
< 10	547 (44.5)	
≥ 10	682 (55.5)	
Side effect bothersomeness		
Not at all	400 (32.6)	
A little	319 (26.0)	
Moderately	283 (23.1)	
Very/extremely	226 (18.4)	
Side effects, number		2.0 (1.9)
0	321 (26.1)	
1–2	516 (42.0)	
≥ 3	392 (31.9)	
Perceived helpfulness of medications		
Not at all/a little	81 (6.6)	
Moderately	369 (30.0)	
Very	445 (36.2)	
Extremely	334 (27.2)	
Change in pain, after minus before opioid, using 0–10 scale†		−2.4 (1.8)
−4 to −10	302 (25.0)	
−3 to −1	699 (57.8)	
0 (no change) or positive (worsening)	209 (17.3)	
PODS Problems Score (mean score per item)		
0	417 (34.8)	0.74 (0.96)
0.01–0.7	350 (29.2)	
> 0.7	433 (36.1)	
PODS Concerns Score (mean score per item)		
0	449 (36.6)	0.84 (0.89)
0.01–1	362 (29.5)	
> 1	417 (34.0)	
Want to stop or cut down opioid use		
Agree/strongly agree	595 (48.6)	
Strongly disagree/disagree/neutral	630 (51.4)	

*Defined by total number of days for which the participant received a prescription for either long-acting or short-acting opioids (maximum of the 2) in the year before baseline. A number > 365 signifies either overlapping prescriptions of the same or different medications, or multiple medications.

†Negative score indicates reported improvement in pain.

EMR indicates electronic medical record; MED, morphine-equivalent dose; PHQ-8, Patient Health Questionnaire-8; PODS, Prescribed Opioids Difficulties Scale.

TABLE 2

Results of Logistic Regression Analyses Predicting Continuation of Higher-Dose Opioid Medication Use at 1 Year

Baseline Variables	Participants With ≥ 50mg MED/d at 1 y (%)	OR (95% CI) Univariate Analysis*	*P*	Adjusted OR (95% CI) Multivariate Model‡	*P*
Health plan site					
Kaiser (KPNC)	82.0	—	0.09	—	0.24
Group Health (GH)	85.6	1.31 (0.96–1.78)		1.24 (0.87–1.77)	
Age (y)†					0.33
21–40	74.2	1.0 (0.99–1.02)	0.62	1.01 (0.99–1.02)	
41–60	86.2	Per unit of analysis: 10y of age†		Per unit of analysis: 10 y of age	
> 60	82.9				
Sex					
Female	84.1	—	0.66	—	0.34
Male	83.3	0.93 (0.68–1.28)		0.84 (0.59–1.20)	
Education					
High school or less	84.4	—	0.85	—	0.98
Vocational/some college	83.2	0.92 (0.65–1.30)		1.00 (0.68–1.47)	
College graduate	84.6	1.00 (0.64–1.57)		1.05 (0.65–1.73)	
Average pain, past month, 0–10 scale†					
0–3	89.1	1.00 (0.92–1.08)	0.98	0.97 (0.88–1.07)	0.55
4–6	82.4	Per unit of analysis: 1-point difference†		Per unit of analysis: 1-point difference	
7+	84.5				
Pain interference with activities, 0–10 scale†					
0–3	86.1	1.007 (0.95–1.07)	0.83	1.03 (0.95–1.11)	0.52
4–6	82.6	Per unit of analysis: 1-point difference†		Per unit of analysis: 1-point difference	
7+	84.3				
Current smoker					
No	82.9	—	0.17	—	0.15
Yes	86.1	1.28 (0.91–1.83)		1.34 (0.90–2.01)	
Substance abuse history, by self-report or EMR data					
No	83.8	—	0.82	—	0.58

Baseline Variables	Participants With ≥ 50mg MED/d at 1 y (%)	OR (95% CI) Univariate Analysis*	P	Adjusted OR (95% CI) Multivariate Model‡	P
Yes	83.9	1.04 (0.76–1.43)		1.11 (0.77–1.60)	
Predominant type of opioid medication in past 90d					
Short-acting	78.2	—	0.000	—	0.02
Long-acting	86.7	1.76 (1.28, 2.40)	4	1.54 (1.07–2.21)	
Opioid MED, last 90d†					
50–120mg/d	77.4	1.004 (1.003–1.006)	< 0.0001	1.004 (1.002–1.006)	0.0001
120–250 mg/d	90.8	Per additional unit of analysis: 10mg MED/d		Per additional unit of analysis: 10mg MED/d	
250+ mg/d	92.2				
Days' supply of opioid, past year†					
0–300	69.7	1.002 (1.001–1.003)	0.004	1.00 (1.00–1.002)	0.22
301–365	84.0	Per additional unit of analysis: 1-day supply		Per additional unit of analysis: 1-day supply	
366–405	88.1				
≥ 406	86.5				
PHQ-8 (24 points maximum) †					
< 10	86.5	1.0 (0.97–1.02)	0.80	1.01 (0.98–1.04)	0.66
≥ 10	81.7	Per additional unit of analysis: 1 point on scale		Per additional unit of analysis: 1 point on scale	
Predictors of Interest Side effect bothersomeness					
Not at all	86.7	—	0.28	—	0.66
A little	81.8	0.71 (0.47–1.07)		0.76 (0.47–1.23)	
Moderately	84.1	0.85 (0.55–1.31)		0.95 (0.55–1.64)	
Very/extremely	81.0	0.69 (0.44–1.08)		0.84 (0.47–1.51)	
Side effects (out of 9 maximum)†					
0	85.4	0.95 (0.88–1.03)	0.20	1.05 (0.93–1.19)	0.43
1–2	84.5	Per additional unit of analysis: 1 side effect		Per additional unit of analysis: 1 side effect	
≥ 3	81.6				
Perceived helpfulness of medications					
Not at all/a little	77.8	—		—	0.31
Moderately	83.7	1.46 (0.79–2.59)		1.67 (0.86–3.17)	
Very	83.1	1.39 (0.76–2.44)	0.30	1.45 (0.75–2.72)	

Baseline Variables	Participants With ≥ 50mg MED/d at 1 y (%)	OR (95% CI) Univariate Analysis*	P	Adjusted OR (95% CI) Multivariate Model‡	P
Extremely	86.2	1.78 (0.95–3.23)		1.82 (0.91–3.55)	
Change in pain after-before opioid, using 0–10 scale†					
−4 to −10	82.1	1.004 (0.92–1.09)	0.93	1.01 (0.92–1.11)	0.81
−3 to −1	83.8	Per additional unit of analysis: 1-point change		Per additional unit of analysis: 1-point change	
0 or worsening	85.2				
PODS Problems Score (mean score per item)§†					
0	86.6	0.79 (0.68–0.92)	0.002	0.77 (0.62–0.96)	0.02
0.01–0.7	84.9	Per additional unit of analysis: 1 point		Per additional unit of analysis: 1 point	
> 0.7	80.4				
PODS Concerns (mean score per item)§†					
0	86.0	0.76 (0.65–0.90)	0.0009	0.79 (0.64–0.97)	0.02
0.01–1	85.4	Per additional unit of analysis: 1 point		Per additional unit of analysis: 1 point	
> 1	80.1				

*All variables except health plan site are adjusted for health plan site.

†Analyzed as a continuous variable. Categories are reported for descriptive purposes only.

‡Adjusted for all other covariates and predictors listed in the table.

§Bothersomeness of side effects was removed from the Problems subscale, and Intent to Cut Down was removed from the Concerns subscale.

EMR indicates electronic medical record; CI, confidence interval; OR, odds ratio; MED, morphine-equivalent dose.

TABLE 3

Association of Individual PODS Items at Baseline With Continuation on Higher-Dose (≥ 50mg MED/d) Opioids 1 Year Later: Results of Univariate Logistic Regression Analyses

Responses at Baseline (Prevalence)	Participants With ≥ 50mg MED/d at 1y (%)	OR (95% CI)*	*P*
Lost interest in activities			
Neutral/disagree (89.0%)	85.1	—	0.002
Agree/strong agree (11.0%)	74.4	0.52 (0.34–0.79)	
Hard to concentrate			
Neutral/disagree (78.8%)	84.9	—	0.037
Agree/strong agree (21.2%)	79.1	0.69 (0.49–0.98)	
Felt sluggish			
Neutral/disagree (78.3%)	84.8	—	0.09
Agree/strong agree (21.7%)	80.0	0.74 (0.52–1.06)	
Felt anxious/depressed			
Neutral/disagree (88.6%)	85.0	—	0.01
Agree/strong agree (11.4%)	75.9	0.58 (0.38–0.9)	
Preoccupied with opioid use			
Neutral/Disagree (92.3%)	84.2	—	0.18
Agree/strong agree (7.7%)	78.7	0.70 (0.43–1.21)	
Hard to control opioid use			
Neutral/disagree (93.6%)	84.6	—	0.005
Agree/strong agree (6.4%)	71.8	0.48 (0.29–0.81)	
Neutral/disagree (63.2%)	84.7	—	0.33
Agree/strong agree (36.8%)	82.1	0.86 (0.63–1.17)	
Neutral/disagree (57.5%)	86.2	—	0.01
Agree/strong agree (42.5%)	80.5	0.67 (0.49–0.91)	

Responses at Baseline (Prevalence)	Participants With ≥ 50mg MED/d at 1y (%)	OR (95% CI)*	*P*
Opioids cause problems with family, friends, or coworkers			
Neutral/disagree (90.3%)	84.8	—	0.01
Agree/strong agree (9.7%)	74.8	0.56 (0.36–0.89)	
How often opioid side effects interfered with work			
Never (49.9)	86.6	—	0.059
Rarely (23.5%)	82.6	0.73 (0.5–1.08)	
Sometimes (15.2%)	80.1	0.64 (0.42–0.99)	
Often (6.6%)	82.7	0.76 (0.42–1.47)	
Always (4.7%)	74.1	0.45 (0.24–0.87)	
How often you think unclearly due to opioids			
Never (60.7%)	86.0	—	0.15
Rarely (18.8%)	80.4	0.66 (0.45–0.99)	
Sometimes (13.6%)	80.4	0.68 (0.44–1.06)	
Often (4.3%)	78.4	0.61 (0.31–1.29)	
Always (2.7%)	81.3	0.72 (0.31–1.99)	
How often opioids made you sleepy when you should be alert			
Never (66.6%)	84.3	—	0.17
Once or twice (19.4%)	86.0	1.16 (0.78–1.78)	
≥ 3 times (14.0%)	78.8	0.72 (0.48–1.10)	
Friends/family thought you may be dependent/addicted in last year			
Neutral/disagree (77.3%)	85.1	—	0.03
Agree/strong agree (22.7%)	79.4	0.69 (0.49–0.98)	
You want to stop/cut down opioid use†			
Neutral/disagree (51.4%)	87.6	—	0.0004
Agree/strong agree (48.6%)	79.8	0.57 (0.42–0.78)	

*Adjusted for health plan site

†Not included as item in PODS scales in main analysis

CI indicates confidence interval; OR, odds ratio; PODS, Prescribed Opioids Difficulties Scale.