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Trends in De-facto Long-term Opioid Therapy for Chronic Non-Cancer Pain

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Abstract

Objective—To report trends and characteristics of long-term opioid use for non-cancer pain.

Methods—CONSORT (CONsortium to Study Opioid Risks and Trends) includes adult enrollees of two health plans serving over one-percent of the US population. Using automated data, we constructed episodes of opioid use between 1997 and 2005. We estimated age-sex standardized rates of opioid use episodes beginning in each year (incident) and on-going in each year (prevalent), and the percent change in rates annualized (PCA) over the 9 year period. Long-term episodes were defined as > 90 days with 120+ days supply or 10+ opioid prescriptions in a given year.

Results—Over the study period, incident long-term use increased from 8.5 to 12.1 per 1,000 at Group Health (GH) (6.0% PCA), and 6.3 to 8.6 per 1,000 at Kaiser Permanente of Northern California (KPNC) (5.5% PCA). Prevalent long-term use doubled from 23.9 to 46.8 per 1,000 at GH (8.5% PCA), and 21.5 to 39.2 per 1,000 at KPNC (8.1% PCA). Non-Schedule II opioids were the most commonly used opioid among patients engaged in long-term opioid therapy, particularly at KPNC. Long-term use of Schedule II opioids also increased substantially at both health plans. Among prevalent long-term users in 2005, 28.6% at GH and 30.2% at KPNC were also regular users of sedative hypnotics.

Conclusion—Long-term opioid therapy for non-cancer pain is increasingly prevalent, but the benefits and risks associated with such therapy are inadequately understood. Concurrent use of opioids and sedative-hypnotics was unexpectedly common and deserves further study.

Keywords

pain; opioids; trends; analgesic

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INTRODUCTION

Prescription opioid medications are widely used in the management of pain.[1,2] and millions of Americans receive opioid therapy for chronic non-cancer pain (CNCP).[3] While only a minority of these patients continue using opioids for long periods, our knowledge about the long-term efficacy and safety of opioid use for CNCP is limited.[4] Randomized trials of opioids are relatively short compared to real-world use of these agents.[5–9] There is also concern about potential risks of long-term opioid therapy for CNCP including iatrogenic addiction, accidental overdose, hyperalgesia, and diversion for non-medical use.[10] At the most basic level, there is little data on the prevalence and incidence of long-term opioid therapy on a population basis, so the extent and characteristics of exposure to long-term opioid use is poorly understood.[11–22]

CONSORT (<u>CON</u>sortium to <u>S</u>tudy <u>O</u>pioid <u>R</u>isks and <u>T</u>rends) was developed to improve understanding of trends in, and risks of, long-term opioid therapy for CNCP.[23] CONSORT defines de facto long-term opioid therapy as extended use of opioids for CNCP whether pre-planned or not, as opposed to treatment as envisioned by expert guidelines.[23] Here, we report CONSORT findings regarding overall trends in incident opioid use, trends in long-term opioid therapy, and characteristics of long-term opioid therapy over almost a decade in two large health plan populations.

METHODS

Details on CONSORT methods, including data quality, have been previously published.[23] We briefly describe the study population, data source, and measures of opioid exposure below.

Study setting and population

The current study describes trends in opioid use for non-cancer pain between 1997 and 2005 among adults age 18+ in Group Health (GH) and Kaiser Permanente of Northern California (KPNC). The two health plans provide comprehensive care on a pre-paid basis to about four million persons. The demographics of GH and KPNC enrollees closely resemble the larger communities in which they are located. Membership in the health plans is remarkably stable over time.[24,25] CONSORT was approved by the Institutional Review Boards at both health plans.

Data source

CONSORT relies on automated health plan data. Information on enrollment, demographics, and health care utilization including medication use, diagnoses, and procedures are recorded and maintained in automated databases that can be linked by a unique consumer number assigned to each enrollee. Information on medical encounters and pharmacy utilization is captured for all services provided directly by the health plan and for services provided by contracting providers and pharmacies that bill the health plans. The pharmacy database is considered a complete source of medication use and it is estimated that GH enrollees obtain about 97% of their medications at GH pharmacies.[24,26] Ninety-percent of medications dispensed for KPNC enrollees are captured in KPNC's pharmacy database and 100% are captured for the 94% of KPNC enrolles with a drug benefit.[25] Cancer status was determined from the Surveillance, Epidemiology, and End Results cancer registries available for both health plan populations.[26,27]

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Characteristics of population

Demographics—Age and gender were obtained from enrollment databases maintained by the two health plans.

Type of Pain Condition—We linked the first opioid prescription in the episode (see episode definition below) to visits to the prescribing doctor occurring during the two weeks prior to the episode start date (index visit). We evaluated the ICD9 codes on the visit nearest in time to the episode start date to determine the nature and frequency of pain conditions experienced by study subjects.

Measures of opioid exposure

Definition of episodes—CONSORT data on opioid use were developed using an episode approach. We defined the beginning of an opioid use episode as a dispensing for an oral or transdermal opioid with no such opioids dispensed in the prior six months. The start date of an episode was the date the first opioid in the episode was dispensed. The last dispensing in an episode was defined as the last opioid dispensed with no subsequent opioid dispensing in the following six months. The end date of an episode was the date of the last dispensing plus the days supply of the last dispensing. We defined *episode duration* as the difference between the start and end dates of the episode plus one. *Total days supply* was defined as the sum of prescribed days supply for each opioid dispensed during an episode. Days supply is calculated by the pharmacist when a prescription is dispensed and is based on the maximum dose permitted by the prescriber.

Definition of long-term episodes—Episodes lasting longer than 90 days that had 120+ total days supply of dispensed medication or 10+ opioid prescriptions dispensed within a given year were classified as *long-term opioid episodes*. This definition was based on our previous work showing that persons who surpassed this threshold were highly likely to continue frequent use of opioids in future years.[23]

Definition of average daily dose and average prescribed daily dose—We calculated morphine equivalents (MEqs) for each opioid dispensed by multiplying the quantity times the strength (i.e., milligrams per unit dispensed) times drug-specific conversion factors described previously.[23] Next, total MEqs in an episode were calculated by adding the MEqs for each opioid dispensed during the episode. *Average daily dose* for an episode was calculated as the total MEqs divided by episode duration. *Average prescribed dose* for an episode was calculated as the total MEqs divided by total days supply for the episode. Average daily dose is an estimate of mean daily consumption, while average prescribed dose approximates the maximum intended daily dose.

Predominant type of opioid in an episode—Opioid medications were divided into three types: 1) Non-Schedule II; 2) short-acting Schedule II; and 3) long-acting Schedule II.[23] For some analyses we classified episodes according to the predominant type of opioid used during the episode. If more than one type of opioid was dispensed over an episode, the predominant type was determined by greatest total days supply.

Trends analysis

For each study year (1997–2005), we calculated the age and sex standardized rate of opioid episodes per 1,000 individuals. Incident episodes were episodes beginning in the calendar year of interest. Prevalent episodes were episodes that are on-going in the year of interest. Rates are reported for any incident opioid use, incident long-term use, and prevalent long-term use. We only included subjects enrolled for the entire year of interest plus 182 days

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following the end of the year to ensure adequate follow-up time to observe long-term use after an episode began. In addition, we required subjects to be 18+ years at the beginning of the year of interest and to have no cancer diagnoses on or before the end of the year of interest.

To adjust for demographic changes over time, opioid use rates were age and sex standardized. We directly standardized rates to the 2005 population of each plan using 10 groups (sex and age categorized as: 18–34, 35–44, 45–64, 65–74, and 75+). We estimated the percent change annualized (PCA) across the study period with 95% confidence intervals for the rates using a linear regression method.[28] The linearized PCA estimates the constant annual (multiplicative) rate of change over a fixed time period. PCA is a useful measure to compare changes over time in outcomes, such as incidence and prevalence that have different underlying rates.

We also estimated trends in the age-sex standardized mean average daily dose and prescribed dose of all incident long-term opioid use episodes by year the episode began. Similarly, we report trends in the type of opioid predominantly used during incident long-term episodes. Finally, we analyzed trends in the proportion of MEqs from long-acting Schedule II opioids and the mean average prescribed dose for incident long-term episodes, stratified by the most commonly used type of opioid in the episode. PCA was estimated for dose and type.

Medication Use Profiles

A core set of variables (i.e., medication profiles) that could be used to compare different populations and sub-populations was developed within CONSORT for prevalent and incident long-term opioid users in 2005. These profiles were restricted to 2005 because patient characteristics were similar for long-term opioid users across the study years. Prevalent users were persons in an episode of long-term opioid therapy on January 1, 2005 who also met the previously described criteria for long-term use in 2005. The medication use profile of prevalent users reflects their use of opioid and sedative-hypnotic medications in calendar year 2005. Incident users were persons who initiated an episode of long-term use during 2005. The medication use profile of incident users reflects their use of opioid and sedative-hypnotic medications in the first 365 days of their episode of opioid use. Frequent use of sedative hypnotics was defined as receiving 180+ days supply of benzodiazepines, barbiturates, and/or muscle relaxants in 2005.

RESULTS

Characteristics of persons initiating opioid therapy and persons initiating long-term opioid therapy in 2005 by study site are described in Table 1. Mean age of patients initiating any opioid in 2005 was 50 years at both health plans and mean age of incident long-term opioid users was 55 years. At both health plans, 60% of subjects initiating an opioid episode in 2005 were female. On average, opioid users were older and more likely to be female compared to non-users (mean age of non-users: 50 years at GH and 47 years at KPNC; % female among non-users: 54% at GH and 51% at KPNC) – data not shown. Three-quarters of GH incident long-term opioid users and 64% of KPNC incident long-term opioid users had a visit to the physician prescribing the opioid medication within 2 weeks prior to initiating opioids (index visit). Among subjects initiating long-term opioid therapy in 2005, the most common diagnoses received at the index visit were back pain, extremity pain, and osteoarthritis.

Table 2 shows that, overall, opioid use and long-term opioid use increased over the study period at both sites. At GH, the rate of overall opioid use increased from 155 per 1,000

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individuals in 1997 to 187 per 1,000 in 2005, a 2.2 PCA. A smaller increase in overall use was observed at KPNC (0.83 PCA). Over the study period, incident long-term use increased from 8.5 to 12.1 per 1,000 at GH (6.0 PCA), and 6.3 to 8.6 per 1,000 at KPNC (5.5 PCA). Prevalent long-term opioid use almost doubled at both health plans, from 23.9 to 46.8 per 1,000 at GH (8.1 PCA), and from 21.5 to 39.2 per 1,000 at KPNC (8.6 PCA). Over three-quarters of incident long-term episodes lasted >1 year at both health plans, a figure that remained relatively stable over the study period (data not shown).

Among incident long-term opioid users, dose in MEqs remained relatively stable over the study years. Average MEq daily dose among incident long-term opioid use episodes showed slight increases from 1997 to 2005, ranging from 19.6 mg to 22.1 mg at GH and from 20.2 mg to 22.6 mg at KPNC. Similarly, average prescribed MEqs per day among incident long-term opioid use episodes increased slightly from 31.4 mg to 39.5 mg at GH and from 41.7 mg to 42.2 mg at KPNC (data not shown).

Non-Schedule II opioids were the most common type of opioid used in long-term opioid therapy (Table 3), especially at KPNC. Almost 95% of long-term episodes beginning in 1997 at KPNC featured predominant use of non-Schedule II opioids compared to 70.7% of episodes at GH. The corresponding figures were lower in 2005 - 85.7% of episodes at KPNC were characterized by predominant use of non-Schedule II opioids versus 63.4% at GH. As use of non-Schedule II agents decreased as the predominant type of opioid used among long-term users, Schedule II opioid use increased, with the largest increases seen at KPNC (short-acting Schedule II: 2.9 PCA at GH and 10.0 PCA at KPNC; long-acting Schedule II: 2.0 PCA at GH and 12.9 PCA at KPNC). Average prescribed MEqs within episodes stratified by type of predominantly used opioid remained stable over the study period. Average daily doses were substantially higher among patients who predominantly used long-acting Schedule II opioids.

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Medication use profiles for prevalent and incident opioid users in 2005 are shown in Table 4. Less than half of the patients in prevalent episodes were receiving average daily doses of 20+ mg in MEqs (average daily dose ~ 50 mg MEqs). The average days supply received by prevalent users suggests that they were typically daily or near daily users of opioid medications. The percent of patients in prevalent episodes who were predominately using Schedule II opioids and long-acting Schedule II opioids was higher at GH (45.5 % and 23.7%) than at KPNC (17.7% and 13.1%). Among patients in prevalent episodes of long-term opioid use, over one in four received 180+ days supply of sedative-hypnotic medications in 2005 (28.6% at GH and 30.2% at KPNC). The profiles among incident episodes of long-term opioid use were characterized by lower average daily doses, lower days supply in a year, and somewhat lower use of Schedule II and sedative-hypnotic medications.

DISCUSSION

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Using an empirically-based classification of opioid use episodes,[23] we found a steady increase in incident and prevalent de facto long-term opioid therapy for CNCP over a nine year period in two large health plans. Among long-term opioid users, use of Schedule II agents consistently increased during the study period, but non-Schedule II opioids remained the most common type of opioid used. We observed only slight increases in average daily dose in MEqs over the study period. Increases in long-term opioid therapy were considerably greater than increases in any opioid therapy, suggesting that continuation of opioid use is increasing more rapidly than initial prescribing. Our results confirm other studies in both the public and private sector that report increases in opioid use,[12] and that increases are concentrated in Schedule II opioid use.[3,29]

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One possible explanation for these results is the increasing interest in the provision of better pain therapies.[30] It is also possible that the increase in opioid use we observed was due to an accompanying increase in the number of enrollees diagnosed with pain conditions that are commonly treated with opioids. Although our study data cannot answer this question,[14] a parallel study of opioid prescribing patterns in a large commercially insured population observed modest increases in non-cancer pain diagnoses contrasted with opioid use increases at twice the rate of diagnoses.[29] It is likely that increased patient and health provider attention to pain (e.g., pain as the fifth vital sign) are driving increases in pain management with opioids,[31–33] as opposed to increases in the underlying prevalence of non-cancer pain.

While non-Schedule II opioids remained the most common type of opioid used among patients initiating long-term opioid therapy, we observed increases in both short-acting and long-acting Schedule II opioids over the study period. Schedule II opioids were used frequently among patients engaged in long-term opioid therapy in 2005, especially at GH. Sullivan and colleagues also reported that non-Schedule II opioids were the most commonly prescribed type of opioid for CNCP among patients with frequent use of opioid medications in commercially insured populations.[29] Use of non-Schedule II opioids among long-term users was especially prevalent at KPNC, likely reflecting California law which required use of triplicate prescribing forms for prescribing Schedule II opioids until 2004. Triplicate forms deter prescribing Schedule II medications because the serialized state-printed forms are burdensome to fill out, and prescribers must send one copy to the pharmacy, retain one for their records, and forward the third to the state Justice Department. Washington State requires triplicate forms only in conjunction with a disciplinary program. Other variations between the health plans and states, including patient populations and culture of care, may account for differences in the use of Schedule II opioids. A study of geographic variation in opioid claims reported large differences in overall opioid claims between Washington and California (89.4 versus 16.9 per 1000 claims) and claims for Schedule II controlled-release Oxycontin (13.5 versus 3.7 per 1000 claims).[34]

It was beyond the scope of this analysis to determine whether the observed increases in long-term opioid therapy are appropriate, or provide net benefit to patients. However, the rise in long-term use of opioids, especially Schedule II opioids, may be a public health concern for multiple reasons. There are no placebo-controlled, long-term trials on the efficacy and safety of opioids for CNCP, and existing data from open-label, uncontrolled studies are inconclusive.[4,35,36] The trends we found in long-term use of opioids may constitute an extension of the palliative care ethos from patients with terminal conditions to those with CNCP. Some experts argue for such an extension,[37] while others argue against this.[38] Health risks, implications for functioning in work and family life, and potential for diversion are more of a concern among CNCP patients than among terminal patients receiving palliative care, as CNCP patients are younger, more likely to be working, and more likely to have adolescents living in the same household. The generalization of long-term opioid therapy from terminal patients to much larger numbers of patients with CNCP in the absence of adequate empirical research and surveillance systems to monitor risk has resulted in exposure of millions of Americans to unknown risks. We do not know if the benefits of long-term opioid therapy for CNCP exceed risks associated with this treatment regimen. Expert guidelines do not fully reflect the realities of managing these medications in community practice. Prescription opioid abuse is the second most common type of illicit drug abuse after marijuana,[39] and increases in opioid use are associated with increases in drug poisoning deaths.[20,21,39] Diversion of prescription opioids for non-medical use is worrisome and there is evidence that the medicine cabinet is where many adolescents obtain opioids for illicit use.[40,41]

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There are significant potential risks associated with concomitant use of opioids and other sedating medications, such as benzodiazepines and muscle relaxants.[42] We found a high percentage of long-term opioid users who were also regular users of sedative hypnotic medications. This is consistent with previous studies documenting high rates of psychiatric disorders and psychological distress in persons reporting regular use of prescribed opioids.[43]

Our study has several limitations. Both health plans were integrated delivery systems in the Western region of the US, with pre-paid, capitated insurance plans. Our results may not be generalizable to care delivered and /or financed in other types of health care systems and other regions of the US. The participating plans in this study have medical cultures and pharmacy policies that actively influence physician prescribing. Health plan pharmacists review physician prescribing in both settings. Both health plans have formularies and evidence review procedures for determining which medications are placed on the formulary. Access of pharmaceutical sales representatives to physicians is more restricted in both plans than in fee-for-service settings. These similarities tend to reduce variability in prescribing patterns. Even so, notable differences in prescribing of Schedule II opioids were observed between sites. While GH and KPNC pharmacy data are considered an accurate and complete source of pharmacy utilization,[24,25] we did not have information from patients on actual consumption of opioids. Relying on ICD9 codes and an index visit to determine the chronic condition for which opioids were prescribed is a further limitation.

Pain is an important medical concern and opioid analgesics provide short-term benefits when used properly. However, it is important to recognize that there is little evidence documenting the benefits of long-term opioid therapy for CNCP and there are significant risks associated with this form of therapy for chronic pain. As such, the increase in defacto long-term opioid therapy and Schedule II opioids may be of public health concern. It is urgent that we accumulate evidence regarding the benefits and risks of long-term opioid therapy among the 4–5% of adults that this research indicates are exposed to long-term opioid use.

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Table 1

Characteristics of opioid users initiating therapy in 2005 at Group Health (GH) and Kaiser Northern California (KPNC)

Characteristics	Incident opioid use episodes in 2005*			
	Any use		Long term use**	
	GH n=46,475	*KPNC n=292,170*	*GH n=2,999*	*KPNC n=15,776*
Mean age (SD)	50.4 (16.7)	49.3 (16.9)	54.6 (16.7)	55.5 (16.1)
% Female	58.2	57.9	61.6%	60.2
Percent with index visit to prescribing MD within 2 weeks prior to episode start date***	75.0	61.3	75.3	64.3
Diagnoses at index visit				
Back pain	17.2 %	16.9 %	29.9 %	27.2 %
Extremity pain	17.8	17.1	22.6	21.2
Osteoarthritis	5.1	4.6	11.1	10.4
Fractures, contusions	8.0	8.3	6.4	4.9
Neck pain	4.6	4.5	5.2	5.4
Headache	3.3	3.3	4.1	4.3
Abdominal pain/hernia a	6.7	5.2	4.5	3.7
Chest pain	1.0	1.1	1.0	1.5
Kidney/gall stones	2.1	1.9	0.6	0.7
Menstrual pain	1.4	1.1	2.0	0.8
Rheumatoid arthritis	0.3	0.4	1.4	1.2
Neuropathy	0.5	1.2	1.5	2.7
Temporomandibular pain	0.2	0.3	0.1	0.3
Other pain	6.6	5.9	6.2	5.4
Any pain diagnosis above	65.5	62.7	80.0	73.1

* Episode defined by an initial dispensing for oral or transdermal opioid with no dispensing of opioids in prior six months. If more than one episode per year, episode of highest degree was selected.

** Long term use defined as episodes with duration of 90+ days, 10+ fills or days supply of fills 120+ days.

*** Index visit defined as visit with prescribing doctor in 2 weeks prior to episode start date. Visit closest to 1st dispensing was used if more than 1 visit in 2 weeks prior to episode start.

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Table 2

Age-sex standardized rates of opioid use per 1,000 individuals by year among adult non-cancer subjects enrolled in Group Health and Kaiser Permanente Northern California

	Type of opioid use episode*		
Year (n)	**Any incident use**	**Incident long term use****	**Prevalent long term use****
	Group Health rate per 1,000 (95% CI)		
1997 (n=267,206)	155.4 (153.9, 156.9)	8.5 (8.1, 8.8)	23.9 (23.3, 24.6)
1998 (n=264,218)	158.7 (157.1, 160.2)	8.3 (7.9, 8.7)	26.9 (26.2, 27.5)
1999 (n=262,522)	166.3 (164.8, 167.9)	8.6 (8.2, 8.9)	29.1 (28.4, 29.7)
2000 (n=260,571)	166.1 (164.5, 167.6)	9.4 (9.0, 9.8)	31.3 (30.7, 32.0)
2001 (n=263,895)	174.4 (172.8, 176.0)	10.1 (9.7, 10.5)	33.8 (33.1, 34.5)
2002 (n=265,798)	174.4 (172.8, 176.0)	10.7 (10.3, 11.1	36.1 (35.4, 36.9)
2003 (n=253,987)	179.3 (177.6, 180.9)	11.6 (11.2, 12.0)	39.8 (39.0, 40.6)
2004 (n=252,251)	179.9 (178.3, 181.6)	12.8 (12.4, 13.3)	43.8 (43.0, 44.6)
2005 (n=248,391)	187.1 (185.4, 188.8)	12.1 (11.6, 12.5	46.8 (46.0, 47.7)
% change annualized***	2.2 (2.1, 2.3)	6.0 (5.4, 6.5)	8.6 (8.3, 8.8)
	Kaiser Permanente Northern California rate per 1,000 (95% CI)		
1997 (n=1,519,831)	148.9 (148.2, 149.5)	6.3 (6.2, 6.5)	21.5 (21.2, 21.7)
1998 (n=1,585,984)	149.7 (149.0, 150.2)	6.6 (6.5, 6.8)	23.5 (23.3, 23.8)
1999 (n=1.624,649)	153.6 (153.0, 154.2)	7.3 (7.1, 7.4)	25.6 (25.4, 25.9)
2000 (n=1.656,266)	153.5 (152.9, 154.1)	7.8 (7.6, 7.9)	27.8 (27.5, 28.0)
2001 (n=1,701,789)	154.4 (153.9, 155.0)	8.3 (8.2, 8.5)	29.8 (29.6, 30.1)
2002 (n=1,766,717)	156.0 (155.4, 156.6)	9.6 (9.5, 9.8)	32.4 (32.2, 32.7)
2003 (n=1,800,450)	157.6 (157.0, 158.2)	9.7 (9.6, 9.9)	35.34 (35.1, 35.7)
2004 (n=1,811,384)	157.1 (156.5, 157.7)	9.8 (9.6, 9.9)	38.2 (37.9, 38.5)
2005 (n=1,827,979)	159.8 (159.2, 160.4)	8.6 (8.5, 8.8)	39.2 (38.9, 39.5)
% change annualized***	0.83 (0.79, 0.88)	5.5 (5.3, 5.7)	8.1 (8.0, 8.2)

* Episode defined by an initial dipensing for oral or transdermal opioid with no dispensing of opioids in prior six months. If more than one episode per year, episode of highest degree was selected.

** Long term use defined as episodes with duration of 90+ days, 10+ fills or days supply of fills 120+ days.

*** Percent change annualized with 95% confidence intervals for age-sex standardized opioid use rates using the linear regression methods described by Fay and colleagues.[28] The linearized PCA estimates the constant annual (multiplicative) rate of change over a fixed time period.

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Table 3

Predominant type of opioid used among incident long term users by year episode began, 1997–2005

Year (n=incident long-term opioid use episodes)	Predominant type of opioid*								
	Non-Schedule II**			Short-acting schedule II***			Long-acting schedule II†		
	% incident long-term opioid users	% of total MEqs from long-acting Schedule II opioid (SD)	Mean prescribed MEqs in mg (SD	% incident long-term opioid users	% of total MEqs from long-acting Schedule II opioid (SD)	Mean prescribed MEqs in mg (SD)	% incident long-term opioid users	% of total MEqs from long-acting Schedule II opioid (SD)	Mean prescribed MEqs in mg (SD)
Group Health									
1997 (n=2,156)	70.7	3.9	26.7 (24.2)	20.6	10.6	28.6 (27.5)	8.7	83.2	79.5 (80.3)
1998 (n=2,107)	68.7	5.0	29.2 (26.0)	19.1	9.4	29.8 (25.9)	12.2	85.1	82.1 (89.5)
1999 (n=2,189)	66.4	5.4	27.6 (23.2)	20.0	10.2	29.3 (19.4)	13.6	83.1	77.1 (66.5)
2000 (n=2,409)	65.6	5.9	26.7 (22.2)	19.9	11.4	30.0 (22.1)	14.5	81.4	72.6 (53.4)
2001 (n=2,623)	64.7	5.0	26.3 (19.4)	20.1	12.1	32.7 (22.5)	15.1	83.2	76.9 (66.1)
2002 (n=2,796)	66.0	5.4	26.2 (19.0)	20.9	11.8	33.4 (24.1)	13.1	83.1	76.1 (82.0)
2003 (n=2,929)	62.7	4.3	26.8 (20.8)	23.7	10.6	34.6 (19.6)	13.6	79.7	72.8 (78.9)
2004 (n=3,224)	64.4	3.3	28.3 (19.7)	23.3	8.9	36.2 (19.8)	12.3	78.0	72.7 (69.0)
2005 (n=2,999)	63.4	3.3	30.1 (19.5)	24.6	7.3	40.9 (22.5)	12.0	79.1	85.9 (230.0)
% change annualized‡	−1.2 (−1.8, 0.6)	−0.2 (−0.2, 0.1)	0.2 (0.02, 0.3)	2.9 (1.8, 3.9)	−0.2 (−0.4, −0.1)	1.4 (1.1, 1.6)	2.0 (0.6, 3.5)	−0.7 (−1.0, −0.5)	−0.1 (−1.9, 1.6)
Kaiser Permanente Northern California									
1997 (n=9,277)	94.4	2.6	38.5 (33.8)	2.6	11.7	52.0 (45.9)	3.1	79.8	132.4 (117.0)
1998 (n=10,158)	94.3	2.7	39.1 (33.4)	2.3	10.5	61.2 (65.0)	3.4	77.0	127.8 (122.4)
1999 (n=11,481)	93.5	2.8	38.8 (34.0)	2.5	13.8	57.4 (39.4)	4.1	80.2	120.1 (101.0)
2000 (n=12,675)	92.4	3.1	38.2 (35.0)	2.7	16.3	62.0 (60.6)	4.9	81.1	119.6 (122.4)
2001 (n=13,905)	91.8	3.2	38.2 (33.3)	2.7	14.6	55.4 (50.3)	5.5	80.1	116.5 (136.7)
2002 (n=16,804)	90.9	3.3	39.4 (34.0)	3.0	15.6	62.6 (100.6)	6.1	79.8	110.5 (99.3)
2003 (n=17,365)	90.0	3.1	39.3 (33.3)	3.2	13.4	52.1 (37.0)	6.8	79.7	98.9 (88.3)
2004 (n=17,690)	89.1	2.9	38.5 (31.9)	4.1	10.9	53.7 (44.2)	6.8	78.3	104.0 (132.0)
2005 (n=15,776)	85.7	2.6	36.4 (29.3)	6.0	10.4	51.3 (37.3)	8.3	79.0	97.1 (91.7)
% change annualized‡	−1.1 (−1.3, −0.9)	0.02 (−0.01, 0.05)	−0.1 (−0.2, −0.06)	10.0 (8.6, 11.4)	−0.1 (−0.4, 0.2)	−0.6 (−1.2, 0.1)	12.9 (11.7, 14.1)	−0.02 (−0.2, 0.2)	−4.4 (−5.6, −3.2)

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[*] Long term use defined as episodes with duration of 90+ days, 10+ fills or days supply of fills 120+ days. Type (schedule III, schedule II short acting, and schedule II long acting) is mutually exclusive and based on longest prescribed days supply if more than one type per episode.

[**] Non-schedule II = propoxyphene, codeine plus acetaminophen, aspirin, or butalbital; hydrocodone; tramadol; dihydrocodeine; and pentazocine

[***] Short acting schedule II = morphine sulfate; codeine sulfate; hydromorphone;, meperidine; fentanyl transmucosal; and oxymorphone, oxycodone

[†] Long acting schedule II= morphine sulfate SR; fentanyl transdermal; levorphanol; oxycodone CR; and methadone, hydromorphone SR, oxymorphone SR

[‡] Percent change annualized with 95% confidence intervals for age-sex standardized opioid use rates using the linear regression methods described by Fay and colleagues.[28] The linearized PCA estimates the constant annual (multiplicative) rate of change over a fixed time period.

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Table 4

Profiles of opioid and sedative-hypnotic use among persons with incident and prevalent episodes of long-term opioid use during 2005 at Group Health (GH) and Kaiser Permanente Northern California (KPNC).

Patient group	%Higher Dose*	Average Prescribed Dose**	Average Daily Dose***	Average Days Supply	% Mainly Schedule 2†	% Mainly Long-Acting Schedule II	% with 180+ Days Supply Sedative-Hypnotics
Prevalent episodes							
GH (N= 6,216)	45.2 %	48.7 mg	45.4 mg	292 days	45.5 %	23.7 %	28.6 %
KPNC (N=37,581)	49.0 %	54.3 mg	48.0 mg	284 days	17.7 %	13.1 %	30.2 %
Incident episodes							
GH (N= 2,999)	23.9 %	38.5 mg	20.3 mg	157 days	36.2 %	11.1 %	17.3 %
KPNC (N=15,776)	24.1 %	41.1 mg	21.0 mg	156 days	12.7 %	7.0 %	18.5 %

*Defined as average daily dose of 20+ mg morphine equivalents (MEqs)

**Average prescribed dose is the total MEqs for an episode divided by total days supply for the episode, that is, the estimated average daily dose prescribed as opposed to the average daily dose consumed.

***Average daily dose is the total MEqs for an episode divided by episode duration in days.

†Schedule II=morphine sulfate; codeine sulfate; hydromorphone;, meperidine; fentanyl transmucosal; and oxymorphone, oxycodone, morphine sulfate SR; fentanyl transdermal; levorphanol; oxycodone CR; and methadone, hydromorphone SR, oxymorphone SR