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Toward Primary Prevention of Extra-Medical OxyContin® Use Among Young People

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Abstract

Objective—The prevention research context includes current epidemic levels of hazards associated with extra-medical use of OxyContin® (to get high or otherwise outside prescribed boundaries) among teenagers and young adults, and a recent OxyContin® reformulation with an intent to reduce these hazards, plus hope for possibly beneficial primary prevention impact. The aim is to create a benchmark of risk estimates for the years just prior to OxyContin® reformulation in anticipation of potential public health benefit in future years, with a focus on teens and the youngest adults in the United States, and to compare two methods for estimating peak risk.

Method—The data are from nationally representative probability sample surveys of 12–21 year olds, yielding estimates for incidence of extra-medical OxyContin® use. Samples are of the non-institutionalized United States population, recruited and assessed in National Surveys on Drug Use and Health (NSDUH), each year from 2004 through 2008. In aggregate, the sample includes 135,552 young people who had not used OxyContin® extra-medically prior to their year of survey assessment.

Results—The main outcome was the estimated population-level age-specific incidence of extra-medical OxyContin® use, 2004–2008. We found that during the 2004–2008 interval the estimated risk accelerated from age 12 years, reached a peak value in mid-adolescence at roughly five newly incident users per 1000 persons per year (95% confidence intervals, 0.3%, 0.7%), and then declined. A meta-analysis approach to year-by-year data differentiated age patterns more clearly than a pooled estimation approach.

Conclusion—Studying young people in the United States, we have discovered that the risk of starting to use OxyContin® extra-medically rises to a peak by mid-adolescence and then declines. From a methods standpoint, the meta-analysis serves well in this context; there is no advantage to pooling survey data across years. We also discovered that during any given year a pediatrician might rarely see even one patient who has just started to use OxyContin® to get high or for other extra-medical purposes. Implications for screening are discussed.

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Introduction

In the United States (US), unexpected ‘epidemic’ growth has been seen in the occurrence of unintentional overdose and related harms when young people have started to use OxyContin® or other prescription opioid pain relievers extra-medically -- i.e., to ‘get high’ and for other reasons beyond boundaries intended by prescribers (e.g., Joranson et al., 2000; US, 2012). This opioid-caused harm largely is driven by each year’s number of young active extra-medical (EM) users (i.e., 3–4 million, or 7%–9%, of 12–21 year olds), a number determined by (i) persistence of such use, once it starts, and (ii) annual incidence rates for EM opioid use of 12–21 year olds, recently estimated at 1%–2% per year (Meier et al., 2012). If primary prevention initiatives are to be effective, they must cut back on annual incidence rates (Gordis, 2008). Otherwise, hazards due to EM opioid use will tend to remain at present levels.

Given their importance for prevention planning and evaluation, US nationally representative age-specific incidence rates for prescription opioids use among 12–21 year olds in recent years (2004–2008) are the primary focal points in this study, with a specific look at EM use of OxyContin®. Focus on OxyContin® now is needed for three key reasons. First, original OxyContin® controlled dose release formulations seem to have been an important driver of the current epidemic (Cicero et al., 2012; Grau et al., 2007; Griffin & Spillance, 2012). Second, Martins et al. (2009) recently showed that EM OxyContin® users are more affected by conduct problems (theft, physical assault, drug dealing) and by mental disturbances, as compared to other EM prescription opioids users. Third, starting in 2010, the OxyContin® manufacturer replaced the original formulation with a reformulation “designed to help discourage misuse and abuse of the medication” (US, 2010). For these reasons, we must study OxyContin® in 2004–2008 to gain benchmark risk estimates just prior to substituting the re-formulation, creating a metric for evaluation of impact on incidence in future years.

Recently, Meier et al. (2012) used an incidence estimation approach to study youthful EM use of prescription opioids in the US, discovering peak risk at age 16 years. For comparability, we now apply that same estimation approach for OxyContin® specifically, and compare two summarization methods: meta-analysis (Harris et al., 2008) treating each year’s independent sample as a separate study, versus a more conventional ‘pooled analysis’ estimation approach with sample aggregation across years (Muhuri & Gfroerer, 2009). Focus on incidence is an important novel project feature here. Prior articles offered just prevalence proportions (e.g., Martins et al., 2009; McCabe et al., 2012; Wu et al., 2008).

Methods

Data are from National Surveys on Drug Use and Health (NSDUH), 2004–2008, with annual independently drawn nationally representative probability samples of US community residents age 12+ years, acceptable participation levels, and standardized EM drug use assessments described thoroughly in appendix 1 and recent papers (e.g., Meier et al., 2012). Pooled across years, the sample includes 135,552 at age 12–21 years; a confidential multi-item EM opioids assessment with color Oxycontin® photographs identified 485 newly incident EM Oxycontin® users (see appendix 2). Year- and age-specific incidence rates are estimated with weighting and survey estimation appropriate for the NSDUH complex survey data (Stata, version 11).

Results

Table 1, Panel A, presents novel incidence estimates, specific for year and age, with 95% confidence intervals in Panel B. When Table 1A is viewed row-by-row (year by year) and in

Figure 1, an age-specific pattern of peak risk can be seen -- e.g., at the peak, just under 0.006 per year (6000 newly incident EM Oxycontin® users per million at risk). The figure shows generally congruent age-specific patterns in meta-analytic and pooled summaries. The former had generally smaller standard errors (SE not shown).

When viewing Table 1A rightward down diagonal traces, experiences of each re-sampled cohort can be seen, birthday by birthday (e.g., as 13 year olds in 2004 turned 14 in 2005), almost always with acceleration to peak risk at ages 16–18. Estimated risk is seen to drop from age 18 to 19, viewed either row-wise or on right-diagonals; 2005 is a lone exception. Risk at age 21 is at levels seen for 14–15 year olds.

Discussion

Among young people in the US, we see peak risk of starting extra-medical use of Oxycontin® at age 16–18 years, modestly later than Meier et al. (2012) found for all prescription opioids, and just under 0.6% becoming newly incident users each year at the peak. Such low level incidence raises issues for primary prevention: most individual pediatricians or family medicine practitioners treating teen or young adult patients might see no newly incident affected cases during any given year of the current epidemic, which now is regarded as a major public health challenge. At these levels of incidence, any primary care doctor seeing 1000 different teenage patients across several years might not meet even see one who is just starting OxyContin® use to get high or for other extra-medical purposes. For this reason, efforts focused solely on clinician detection or screening with brief interventions for newly incident cases early in the course of EM Oxycontin® use might well fall far short of the yield to be gained by other initiatives.

As counterpoint, if we are to face this public health challenge, special vigilance and actions by clinicians who prescribe opioids are needed, irrespective of ages of patients they serve. Carise and colleagues (2007) found that treatment-seeking cases with OxyContin® dependence generally acquired or diverted this drug from supplies prescribed for family or friends -- not directly from a prescriber. Physicians for Responsible Opioid Prescribing (PROP) argue cogently that striking the term ‘moderate’ from the FDA-approved ‘moderate and severe pain’ indication for opioids prescribing can reduce diversion and associated societal harm (PROP, 2012). Narrowed indications imply fewer family members and friends with opioids to be diverted, and the most effective primary prevention of EM OxyContin® use and associated problems may rest upon standard public health interventions tending to limit unregulated contact of the drug ‘agent’ and susceptible young ‘hosts’ (e.g., via surreptitious diversion; Paulozzi et al., 2012), or via innovative product reformulations (Baum et al., 1987; Senay et al., 1985).

Noteworthy research limitations include possibly fallible self-reports, even with robust NSDUH efforts to enhance validity. Here, as in Meier et al. (2012), we constrained recall and reporting problems by focusing on newly incident users no more than a short span of time since onset of first use. Even so, possible under-ascertainment of EM OxyContin® use is acknowledged.

Notwithstanding its limitations, this study’s benchmark values can be used in prevention planning and provide a metric for future analyses of comparable NSDUH data in the years after Oxycontin® reformulation. For example, if errors in NSDUH data remain relatively constant across 2004–2015, re-analysis of NSDUH annual incidence might disclose whether Oxycontin® reformulation in 2010 was followed by fairly rapid reductions in demand. To control for other concurrent public health initiatives (e.g., narrowed indications for opioids prescribing), a multiple interrupted time series design may be needed, with comparator

opioids selected from among products with no recent reformulation (e.g., see Anthony, 1979).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Age of initiation of extra-medical use of Oxycontin ® in the US is estimated.
- Estimates indicate that practitioners are unlikely to see a new user each year.
- Given the above, truly effective prevention initiatives must be more broadly based.
- Oxycontin ® has been recently reformulated to reduce extra-medical use.
- Pre-reformulation use estimates are provided for post-reformulation comparison

Figure 1.

Extra-Medical Use of Oxycontin® in the United States, 12–21 year olds, 2004–2008: Comparison of Age-Specific Incidence Rate Estimation Approaches. Data from the National Survey on Drug Use and Health, United States, 2004–2008.

■ Meta-Analysis Approach: Each year's NSDUH sample is an independent replication sample. For this reason, a meta-analysis summary estimate of the age-specific incidence has been derived via a random effects meta-analysis summary estimate.

◆ Pooled Estimation Approach: Individual-level survey data from all five years are pooled for a single analysis to create the weighted age-specific estimates shown here.

Year-specific and age-specific incidence rate estimates (with 95% Confidence Intervals) for newly incident extra-medical use of OxyContin® per million persons per year. Data from US National Surveys on Drug Use and Health, 2004–2008.

Table 1

Age	2004	2005	2006	2007	2008	* Meta-estimate
13 yr.	940 (300, 2800)	310 (100, 1000)	1500 (400, 5500)	760 (200, 2500)	940 (300, 3200)	500 (200, 800)
14 yr.	1500 (400, 5300)	640 (200, 1700)	1900 (700, 4900)	2200 (800, 6200)	3400 (1500, 7800)	1500 (600, 2400)
15 yr.	5300 (2800, 10100)	5600 (2800, 11200)	4300 (2000, 9200)	1700 (800, 3900)	3900 (2000, 7500)	3700 (2000, 5400)
16 yr.	6300 (3700, 10700)	4500 (2000, 10000)	7700 (4800, 12200)	4100 (2300, 7100)	4200 (2100, 8500)	5000 (3700, 6300)
17 yr.	6300 (3400, 11900)	4900 (2800, 8500)	5600 (2800, 11400)	8600 (5000, 14800)	2800 (1400, 5700)	5100 (3100, 7000)
18 yr.	5800 (2800, 12000)	2200 (800, 6000)	8300 (4700, 14700)	4600 (2600, 8100)	5000 (2900, 8900)	4600 (2800, 6400)
19 yr.	4000 (1700, 9000)	3100 (1600, 6100)	1600 (620, 3900)	3400 (1600, 7100)	4000 (1800, 8800)	3000 (1000, 4900)
20 yr.	5300 (2400, 11500)	2300 (1000, 5500)	2700 (1600, 4700)	4800 (1800, 12900)	1300 (400, 4200)	2100 (700, 3600)
21 yr.	3000 (1400, 6700)	1800 (700, 4800)	1700 (700, 4500)	5600 (2700, 11800)	2000 (1000, 5100)	2300 (2100, 2500)

* Age-specific summary estimates based on meta-analysis of estimates; each year provides an independent sample.