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Family member opioid prescriptions and opioid use disorder

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HIGHLIGHTS

- Having a family member with an opioid Rx increased odds of opioid addiction.
- Effect was greater in spouses and employees than in adolescents.
- Effect was greater in adults with pre-existing non-OUD substance use disorder.

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ABSTRACT

It is recognized that family members are a major source of diverted opioids. Yet it is not known how family member opioid prescriptions predict the development of an opioid use disorder (OUD).We conducted an observational study using commercial health care claims to investigate the association between a family member opioid prescription and an individual having an OUD-related claim in a large sample of patients with commercial insurance. We found that individuals had higher odds of having an OUD when a family member had an opioid prescription. This effect was magnified in spouses and employees compared with adolescents and young adult dependents. In addition, adult dependents with a pre-existing non-OUD substance use disorder had higher odds of having an OUD when a family member also had an opioid prescription. Given the high risk of opioid-related morbidity and mortality, more attention should be given to safeguard opioid diversion and to facilitate appropriate disposal of unused opioids.

1. Introduction

Opioid analgesics are the most commonly prescribed medications in the United States (Centers for Disease Control and Prevention, 2017). On an average day, approximately 650,000 opioid prescriptions are filled (United States Department of Health and Human Services, 2016). Although opioids are effective at providing relief for certain painful conditions, they are problematic when diverted and used improperly (Compton, Boyle, & Wargo, 2015).

Estimates from the 2016 National Survey on Drug Use and Health indicated that 3.6% of adolescents (aged 12–17), 7.3% of young adults (aged 18–25), and 4.0% of adults (aged 26 years and older) misused prescription opioids in the past year (Substance Abuse and Mental Health Services Administration, 2017). Among adults using opioids for nonmedical purposes, 60% reported not having a prescription and 41% obtained prescription opioids from friends or relatives (Jones, Mack, & Paulozzi, 2013). Among adolescents, a considerably higher rate—70%—reported obtaining prescription pain medications from friends or relatives (McCabe, Cranford, Boyd, & Teter, 2007). In a survey of secondary school students in Michigan, nearly a quarter of adolescents reported giving away or loaning scheduled prescription drugs to someone else, often a family member (e.g., parents and siblings) (Boyd, McCabe, Cranford, & Young, 2007).

Family members can be a major source of diverted opioids. Yet it is not known to what extent the presence of family member opioid prescriptions is associated with an individual's development of an opioid use disorder (OUD). This is an important question because there is evidence that opioids frequently are prescribed in greater quantities than a patient may require (Bartels et al., 2016). In addition, prescribed opioids often are insecurely stored, and leftover pills sometimes are not

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discarded (Bicket, Long, Pronovost, Alexander, & Wu, 2017; McDonald et al., 2017). These practices mean that individuals have access to family members' opioid medications, making the medications potentially available for diversion (when opioids are prescribed for one person, but are taken/used by another person in the family) and misuse. Individuals who divert prescription opioids from a family member may have an existing OUD or may be at risk of developing an OUD. That risk may be increased by access to poorly managed prescription opioids in the home.

In this study, we used medical and pharmacy claims data from enrollees with commercial insurance to estimate the association of family member opioid prescriptions with the development of an OUD in adolescent dependents, young adult dependents, and adult employees (i.e. the primary individual covered by the employer-sponsored insurance policy) and spouses.

2. Methods

We conducted a retrospective observational study using commercial health care claims data to investigate the predictors of OUD for individuals with employer-sponsored insurance and their family members. Specifically, we used generalized linear models to measure the association between family members' opioid prescriptions and individuals' diagnosis of an OUD.

2.1. Data

We used data from the 2013–2014 IBM® MarketScan® Commercial Claims and Encounters Database, the largest available proprietary convenience sample of commercial health insurance claims. MarketScan contains detailed patient-level enrollment, medical claims, and pharmacy claims data provided directly by employers and health plans.

2.2. Sample population

We identified individuals between 12 and 64 years of age who were enrolled in employer-sponsored insurance that covered medical and pharmacy benefits during 2014. We included only enrollees who had a family member between ages 12 and 64 years who also was enrolled under the same insurance with continuous enrollment during the same time period. We excluded enrollees and family members who were aged 65 years and older because we did not have access to Medicare claims. We also excluded enrollees and family members under age 12 years because that age group typically has not started to experiment with drugs (Wagner & Anthony, 2002).

2.3. Opioid fills

We identified opioid prescriptions filled in 2014 using pharmacy claims. We included opioids used primarily for pain relief classified by the U.S. Drug Enforcement Administration as controlled substances: butorphanol, codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, levorphanol, meperidine, methadone, morphine, oxycodone, oxymorphone, pentazocine, tapentadol, and tramadol. Similar to previous work (Tehrani, Henke, Ali, Mutter, & Mark, 2018), we excluded individuals with opioid pharmacy claims that appeared invalid (days' supply ≤ 0 or > 365). We did not include methadone administered for substance use disorder (SUD) treatment because it is provided under supervision at an outpatient facility() and would not appear in our pharmacy claims but instead would appear under claims for treatment.

Our primary independent variable of interest was a dichotomous variable that measures whether an individual had a family member who filled an opioid prescription during the calendar year (i.e. between January – December of 2014). Enrollees were assigned a 0 for this variable if no member of their family had an opioid prescription fill. Enrollees who had a family member (i.e., spouse, child, sibling, parent) with an opioid prescription fill were assigned a 1.

We excluded enrollees who had their own opioid prescription fills because we were not able to link misuse to the family member opioid fill for this population. For individuals identified as having an OUD, we determined whether they had their own recent opioid prescription, defined as a prescription filled within 180 days prior to their OUD diagnosis, and if so, they were excluded. In some cases, this required using 2013 data.

2.4. Opioid use disorder

The primary dependent variable was diagnosis of OUD (using ICD9 codes) in 2014. An OUD was defined as a diagnosis of opioid abuse, dependence, poisoning, or adverse effects in medical claims (American Psychiatric Association, 2000) and includes misuse of prescription opioids and illicit opioids (e.g., heroin). We flagged the first OUD diagnosis that occurred after the family member's opioid prescription was filled (when relevant). To ensure that we were capturing an initial OUD diagnosis, not a continuation of a previous episode, we excluded individuals with an OUD diagnosis in the 180 days prior to the family member's fill. In some cases, capturing an initial OUD diagnosis required going back to 2013 data.

2.5. Covariates

The following clinical and sociodemographic characteristics were used as covariates in our models: age, sex, geographic region (West, Northeast, South, Midwest), health plan type (preferred provider organization [PPO], health maintenance organization [HMO], high deductible, or other), any mental health diagnosis, any previous non-OUD substance use disorder (SUD), any chronic pain, and any acute pain. Mental health diagnoses, non-OUD SUD, chronic pain, and acute pain were identified through inpatient and outpatient claims from the calendar year. Non-OUD SUD included dependence or abuse of alcohol, cannabis, sedatives, cocaine, other stimulant, hallucinogen, inhalant, and other psychoactive substance, excluding tobacco. Individuals with dependence on an unspecified drug were excluded from the study because we could not determine whether they had an OUD or a non-OUD SUD. Mental health diagnoses were identified using all listed diagnosis codes for psychotic conditions, schizophrenia, mood disorders, neurotic disorders, and personality disorders. We used the Chronic Condition Indicator, a diagnosis classification tool developed as part of the Healthcare Cost and Utilization Project (Healthcare Cost and Utilization Project, 2017) to classify conditions as acute or chronic. We reclassified open wounds of extremities from chronic to acute and osteoarthritis from acute to chronic based on clinical judgment. Finally, we included as a covariate an interaction term that identified individuals with a non-OUD SUD and a family member with an opioid prescription to assess whether enrollees with a non-OUD SUD had higher odds of having an OUD-related claim.

2.6. Analysis

Previous research has found that diversion of opioid prescriptions is important for all age groups but that it may be particularly relevant for adolescents (Boyd, McCabe, & Teter, 2005). Because different age groups may be impacted differently by opioid diversion, we separated our sample into three groups: adolescent dependents (12–17 years of age), young adult dependents (18–25 years of age), and adult employees and spouses (18–64 years of age). We used generalized linear models with a logit link and binomial distribution to estimate the relationship between family member opioid prescriptions and subsequent diagnosis of an OUD while controlling for all covariates. We calculated odds ratios of OUD comparing family member opioid prescription with

Table 1
Demographic and clinical characteristics of adolescent dependents, young adult dependents, and employees and spouses included in the sample.

Characteristic	Adolescent dependents aged 12–17 years	Young adult dependents aged 18–25 years	Employees and spouses aged 18–64 years
Number of observations	1,668,234	1,534,775	6,410,562
Male (%)	50.7	46.9	48.2
Age (years, mean)	14.5	20.8	46.1
Age group in years (%)			
12–17	100.0		
18–25		100.0	1.1
26–35			13.4
36–45			28.5
46–55			33.9
56–64			23.2
Health plan type (%)			
HDHP	20.5	19.2	20.0
PPO	63.0	63.9	63.3
HMO	16.5	16.9	16.7
Region (%)			
Midwest	24.2	23.7	23.7
Northeast	17.8	19.4	19.4
South	37.9	36.5	35.7
West	17.2	17.5	18.5
Unknown/other	3.0	3.0	2.6
Employee status (%)			
Child/other	100.0	100.0	
Employee			55.3
Spouse			44.7
Yearly Salary (vs. hourly wage)	36.2	34.7	37.1
Any mental health condition (%)	17.1	17.4	13.7
Any non-opioid substance use disorder (%)	0.9	3.9	3.3
Chronic pain (%)	3.1	3.9	11.8
Acute pain (%)	32.9	28.9	36.2
Own opioid prescription (%)	0.0	0.0	0.0
Family opioid prescription (%)	7.4	8.6	2.2

HDHP – High-Deductible Health Plan; HMO – health maintenance organization; PPO – preferred provider organization.
Data are from the IBM MarketScan Commercial Claims and Encounters Database, 2013–2014.

no family member opioid prescription. Because of the interaction term included in the models, we calculated the odds ratios separately for individuals with a prior non-OUD SUD and without a prior non-OUD SUD. We estimated the models including and excluding individuals who had their own opioid fill. All analyses were conducted using SAS® Analytics Software, Version 9.4 (Cary, NC).

3. Results

After applying the study inclusion/exclusion criteria, our sample consisted of 1,668,234 adolescents, 1,534,775 young adult dependents, and 6,410,562 employees and spouses. This sample excluded the 10%, 17%, and 24% of adolescent dependents, young adult dependents, and employee and spouses that had their own opioid prescription, respectively.

Table 1 provides demographic and clinical characteristics of the sample. The average age of the youngest group at the beginning of the calendar year was 14.5 years, and 50.7% of this group were male. The majority had a PPO health plan (63.0%). The largest share lived in the South (37.9%), followed by the Midwest (24.2%), the Northeast (17.8%), and the West (17.2%). Approximately 17% and 1% had been diagnosed with a mental health condition or a non-OUD SUD, respectively. A small percentage had a diagnosis for chronic pain (3.1%), and a higher percentage had a diagnosis for acute pain (32.9%). About 7% had a family member with an opioid prescription. As noted previously, we specifically excluded individuals with their own opioid prescription.

The average age of the young adult dependent group was 20.8 years. Less than half the sample (46.9%) was male. The young adult dependent group had a similar health plan and geographic distribution as the adolescent dependent group. Diagnoses of mental disorders and non-opioid SUDs were 17.4% and 3.9%, respectively. A small percentage had a diagnosis for chronic pain (3.9%); a higher percentage had a diagnosis for acute pain (28.9%). About 9% had a family member with an opioid prescription.

The average age of the employees and spouses in the sample was 46.1 years. This subset of the sample was 48.2% male. This group had similar health plan, geographic, and prevalence of mental illness characteristics as the younger groups. Similar to the young adult group, 3.3% of employees and spouses had a non-opioid SUD. Employees and spouses had a higher pain prevalence than the other two groups, with 11.8% having chronic pain and 36.2% having acute pain. About 2% had a family member with an opioid prescription.

Among adolescents in our sample, 1.0% had an OUD diagnosis (Fig. 1). Of those with an OUD, 10.0% had a family member with an opioid prescription. Among young adult dependents and employees and spouses in our sample, 4% and 3%, respectively, had an OUD diagnosis. Among those with an OUD diagnosis, 11% of young adult dependents and 3% of employees and spouses had a family member who filled an opioid prescription.

We estimated the relationship between family opioid prescriptions and OUD diagnosis, controlling for all covariates (Table 2). For the purpose of brevity, we only present results of our main independent variable, but the full set of results are available upon request. We found that adolescents *without* a history of non-OUD SUD and with a family

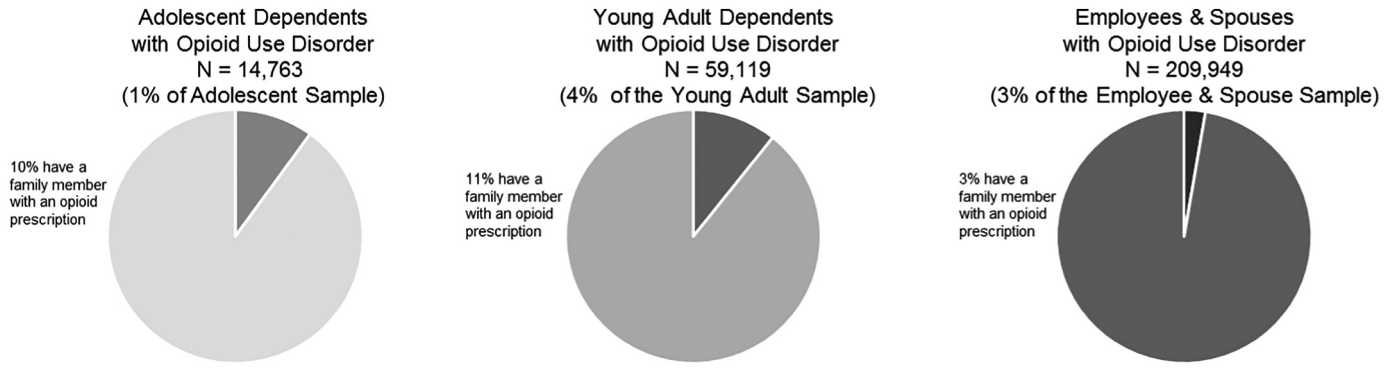

Fig. 1. Prevalence of family opioid prescriptions sample with opioid use disorder.

Table 2
Odds of opioid use disorder with a family member opioid prescription versus without a family member opioid prescription.

History of substance use disorder	Adolescent dependents aged 12–17 years (*N* = 1,668,234)		Young adult dependents aged 18–25 years (N = 1,534,775)		Employees and spouses aged 18–64 years (*N* = 6,410,562)	
	OR	95%CI	OR	95%CI	OR	95%CI
No previous non-OUD substance use disorder	1.42	1.02–1.99	1.27	1.15–1.41	2.40	2.29–2.52
Previous non-OUD substance use disorder	0.72	0.52–0.98	0.80	0.74–0.87	1.14	1.08–1.22

OUD – opioid use disorder.
Sample excludes individuals who had their own opioid prescriptions in the calendar year or on or prior to first diagnosed OUD. Models adjusted for age (employees and spouse model only), sex, health plan type, and any mental health condition.

member opioid prescription had odds of being diagnosed with an OUD that were 42% higher compared with adolescents without a family member opioid prescription (OR = 1.42, 95% CI = 1.02–1.99). However, adolescents *with* a history of non-OUD SUD and with a family member opioid prescription had odds of having an OUD- diagnosis that were 28% lower compared with similar adolescents without a family member opioid prescription (OR = 0.72, 95% CI = 0.52–0.98). Young adult dependents followed a similar pattern. Young adult dependents *without* a history of non-OUD SUD and with a family member opioid prescription had odds of having an OUD diagnosis that were 27% higher compared with young adults *without* a family member opioid prescription (OR = 1.27, 95% CI = 1.15–1.41). Young adult dependents *with* a history of non-OUD SUD and with a family member opioid prescription had odds of having an OUD that were 20% less than similar young adult dependents *without* a family member opioid prescription (OR = 0.80, 95% CI = 0.74–0.87).

Employees and spouses *without* a history of non-OUD SUD and with a family member opioid prescription were 2.4 times more likely to have an OUD than employees and spouses without a family member opioid prescription (OR = 2.40, 95% CI = 2.29–2.52). Employees and spouses *with* a history of non-OUD SUD and with a family member opioid prescription had higher odds of having an OUD than employees and spouses without a family member opioid prescription (OR = 1.14, 95% CI = 1.08–1.22).

4. Discussion

This study investigated the association between family member opioid prescription and an individual having an OUD among individuals with commercial insurance. Most individuals in our sample did not have a previous claim for a non-opioid substance use disorder. These individuals had higher odds of having an OUD diagnosis if they had a family member with an opioid prescription. Spouses and employees had higher odds of having an OUD diagnosis than adolescent and young adult dependents.

There are many reasons that having a family member with an opioid prescription may increase the likelihood of an individual having an OUD. Family members may share the same health care providers or facilities, which can vary greatly in their propensity to prescribe opioids. They also may share similar approaches to using specific types of medications to treat acute and chronic pain. However, another possible explanation is that our findings reflect diversion. Specifically, prior literature has shown that family members' prescriptions can be a major source of diverted opioids (Boyd et al., 2005; McCabe et al., 2007; Shei et al., 2015). However, our study is the first to link family members' opioid prescriptions to diagnoses of an OUD.

Our findings are also consistent with surveys of teens and college students that found a large percentage of misusers reported using opioids prescribed to friends or family members (Boyd et al., 2005; McCabe et al., 2007). Evidence suggests that patients prescribed opioids are not always aware of or paying attention to instructions for safe storage and disposal of prescriptions (Friese, Moore, Grube, & Jennings, 2013; Lewis, Cucciare, & Trafton, 2014; Reddy et al., 2014; Tanabe, Paice, Stancati, & Fleming, 2012). A nationwide survey found that fewer than half of adults with opioid prescriptions recalled receiving information about safe storage and disposal of prescriptions (Kennedy-Hendricks et al., 2016). One-fifth of adults with an opioid prescription surveyed reported sharing their medication with others (Kennedy-Hendricks et al., 2016). Only 9% of survey respondents reported securing opioids, and 61% of adults with leftover medication planned to keep them for future use (Kennedy-Hendricks et al., 2016).

Another finding in our study was that individuals with a previous non-OUD SUD were in general at a considerably elevated risk of having an OUD compared with those without prior non-OUD SUDs. However, having a family member with an opioid prescription slightly lowered the likelihood of developing an OUD for adolescents and young adults. Although we were not able to directly determine the reason for this, one explanation is that parents with a dependent who has a known history of substance abuse may fill an opioid script only if they are reasonably certain that they can be vigilant about safeguarding the prescription. The families that filled opioid prescriptions despite a family member having a non-OUD SUD may have been more protective in general of exposure of family members to opioids.

A qualitative study of 40 parents of teens found that few parents take precautions against teens accessing prescription drugs that could be used to get “high” (Friese et al., 2013). The most common rationale provided was that the parents did not think that their teens would be interested in using the drug or that their teens would be successful in obtaining a high. Parents with teens with a non-OUD SUD may be more concerned about misuse. Some parents said that they were not concerned because their drugs were expired and, they believed, not likely to be effective (Friese et al., 2013). A survey of 300 cancer patients in Texas with opioid prescriptions found that three-quarters were unaware of safe disposal methods (Reddy et al., 2014). Only 9% of the patients who were surveyed locked their opioids to ensure safety, and over half of them reported not disposing of their unused opioid prescriptions. A full 39% reported being unaware that their pills could be fatal when taken by others, and 9% reported sharing pills. The study did find that a subset of these patients who were living with adult children were more likely to keep their opioids securely locked.

Other studies have found support for the idea that some parents do not view prescription drugs as dangerous. For example, the Partnership Attitude Tracking Study conducted in 2006 and 2007 found that about 25% of parents perceived prescription drugs as safer than street drugs and that parents were much less likely to talk to their children about the dangers of prescription drug abuse than they were to talk to them about illicit drugs such as marijuana, heroin, or cocaine (Partnership for a Drug Free America, 2006). However, attitudes may have changed since this study was conducted in 2006 and 2007 as a result of the increased attention being paid to the opioid crisis.

Our findings suggest that the risk of opioid prescribing can extend beyond individuals who were prescribed a drug and could potentially impact their family members. Prescribers should consider this risk when making decisions about pain management. Prescribers,

pharmacists, and other health care professionals who care for patients should take significant steps to alert individuals about the importance of safeguarding their prescriptions and properly disposing of unused pills. Some health systems and communities have launched education campaigns, disposal areas, and drug disposal days to facilitate proper disposal of unused medications, but more research is needed to determine which interventions are most effective (Haegerich, Paulozzi, Manns, & Jones, 2014).

Our findings also highlight the importance of prescribing the shortest duration of opioids possible to minimize the amount of leftover medication that can be diverted. This supports the Centers for Disease Control and Prevention guidelines that recommend opioid use duration be as limited as possible (Dowell, Haegerich, & Chou, 2016). Several studies have shown that patients receiving prescriptions for acute pain often have leftover pills (Harris et al., 2013; Rodgers, Cunningham, Fitzgerald, & Finnerty, 2012; Voepel-Lewis, Wagner, & Tait, 2015). One study specifically noted that leftover pills from a minor procedure were sufficient to cause an accidental overdose in children (Voepel-Lewis et al., 2015). Future studies should investigate the health conditions and provider specialties associated with overprescribing of opioids.

Given the importance of the physician's role, education, training, and tools that enable providers to be more cautious in these practices are necessary. Several interventions to increase provider education around opioid prescribing have been tested and have shown promising results (Haegerich et al., 2014).

Our study had several strengths to highlight. First, we connected enrollees to the claims of their family members in the MarketScan database to observe how prescriptions provided to one person could affect another member of the family – something that was not done in any of the previous literature using healthcare claims database. Second, we isolated a specific population of individuals who did not have their own opioid prescription or an OUD diagnosis prior to the family opioid fill. Third, we had a large commercial sample that included enrollees in all 50 states.

Despite the rich data set utilized in this study, the results should be interpreted in the light of a few limitations applicable to administrative claims data. Claims data are imperfect at identifying individuals with an OUD. If a person has an OUD but never seeks care or treatment from providers who are reimbursed by their insurance, we would not be able to identify them as having an OUD in our claims. Because of this bias, the association between family member opioid prescription and individual's development of OUD might be even greater than our estimate. Another limitation is that only OUD diagnoses that occurred in the period between the family opioid fill and the end of year (December 31, 2014) were identified as potentially linked to the family opioid fill. OUDs may take many months to develop and may not have been captured within this short window. If opioid misuse preceded a family member's opioid prescription fill(s) but was not detectable through claims, it could be that an individual facilitated or encouraged the family member to request opioids from providers with the intent of diversion. We were also not able to identify prescriptions that were paid for outside of the pharmacy benefit. In addition, it is possible that our data did not include all family members if some had insurance coverage not captured in MarketScan. For example, we would not have observed the prescriptions of family members who were aged 65 years or older, because we could not connect our data to Medicare pharmacy data. Taking into account the type of opioid prescribed (e.g., long-acting/extended release, abuse-deterrent formulation), number of days supplied, morphine milligram equivalents, or number of prescriptions filled may allow the identification of the specific type of family opioid fills that are problematic or risky, and could be an important avenue for future studies to consider.

5. Conclusions

Opioids prescribed to family members are associated with an elevated risk of developing OUD for other members of the family. More attention should be given to ensuring proper safeguards to avoid diversion and to facilitate appropriate disposal of opioids.

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