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Association of Opioids Prescribed to Family Members With Opioid Overdose Among Adolescents and Young Adults

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Abstract

IMPORTANCE Family members are cited as a common source of prescription opioids used for nonmedical reasons. However, the overdose risk associated with exposure to opioids prescribed to family members among adolescents and young adults is not well established.

OBJECTIVE To assess the association of opioids prescribed to family members with pharmaceutical opioid overdose among youth.

DESIGN, SETTING, AND PARTICIPANTS This cohort study included 45 145 family units with a total of 72 040 adolescents and young adults aged 11 to 26 years enrolled in a Kaiser Permanente Colorado health plan in 2006 and observed through June 2018.

EXPOSURES Opioid prescriptions and dosage dispensed to family members and youth in the past month.

MAIN OUTCOMES AND MEASURES Fatal pharmaceutical opioid overdoses identified in vital records and nonfatal pharmaceutical opioid overdoses identified in emergency department and inpatient settings. Time to first overdose was modeled using Cox regression.

RESULTS The study population consisted of 72 040 adolescents and young adults (mean [SD] age across follow-up, 19.3 [3.7] years; 36 646 [50.9%] girls and women) nested in 45 145 family units. Youth were more commonly exposed to prescription opioids dispensed to a family member than through their own prescriptions. During follow-up, 26 284 youth (36.5%) filled at least 1 opioid prescription, and 47 461 youth (65.9%) had at least 1 family member with a prescription. Exposure to family members with opioid prescriptions in the past month was associated with increased risk of pharmaceutical opioid overdose (adjusted hazard ratio [aHR], 2.17; 95% CI, 1.24-3.79) independent of opioids prescribed to youth (aHR, 6.62; 95% CI, 3.39-12.91). Concurrent exposure to opioid prescriptions from youth and family members was associated with substantially increased overdose risk (aHR, 12.99; 95% CI, 5.08-33.25). High dosage of total morphine milligram equivalents (MME) prescribed to family members in the past month was associated with youth overdose (0 MME vs >0 to <200 MME: aHR, 1.39; 95% CI, 0.51-3.81; 0 MME vs 200 to <600 MME: aHR, 1.49; 95% CI, 0.59-3.77; 0 MME vs ≥600 MME: aHR, 2.93; 95% CI, 1.55-5.56).

CONCLUSIONS AND RELEVANCE In this study of youth linked to family members, exposure to family members' prescribed opioids was associated with increased risk of pharmaceutical opioid overdose, independent of opioids prescribed to youth. Further interventions targeting youth and families are needed, including counseling patients about the risks of opioids to youth in their families.

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Key Points

Question Are opioids prescribed to family members associated with pharmaceutical opioid overdose among adolescents and young adults?

Findings In this cohort study of 72 040 adolescents and young adults, exposure to family members with opioid prescriptions in the past month was associated with a 2-fold increase in the risk of overdose, and youth's own prescriptions were associated with a more than 6-fold increase in risk. Concurrent exposure to prescriptions of family members and youth themselves was associated with a nearly 13-fold increase in overdose risk.

Meaning In this study, opioid prescriptions to family members as well as to youth were associated with an increased risk of youth overdose.

+ Invited Commentary

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Introduction

Opioid exposure and overdoses among adolescents and young adults (ie, youth) represent a significant public health problem.[1-3] Despite state and national efforts to reduce opioid prescribing,[4-6] the volume of opioids prescribed to youth and adults remains substantial.[7-9] In 2017, more than 191 million opioid prescriptions were dispensed in the United States, more than 3-fold the number prescribed in 1999.[9] While overdose risks associated with a number of opioid prescribing patterns at the individual level, such as high dose, have been established,[10-13] less is known about exposures to opioids from family members.

Growing evidence suggests that the family plays an important role in the spread and consumption of prescription opioids by providing access to opioids and facilitating the sharing of information and practices related to their use.[14-18] Thus, opioids prescribed to youth and their family members represent 2 distinct but potentially linked sources of exposure that together put youth at risk of overdose. Prevention efforts may need to target both youth and their families to adequately address overdose risk. However, the relative associations of opioids prescribed to youth and their family members with overdose have not been well established. We conducted a retrospective cohort study that linked youth and their family members in a health plan and tested the association of opioid prescribing to the family with pharmaceutical opioid overdose among youth. Our objectives were to assess overdose risk associated with past-month opioid prescriptions to youth and to their family members as well as with opioid dosages and timing of exposures.

Methods

Study Design and Cohort

We conducted a retrospective cohort study of family units enrolled in a Kaiser Permanente Colorado health care plan. Kaiser Permanente Colorado is an integrated health care plan and delivery system that serves approximately 640 000 members. The cohort consisted of index youth and their family members. Index youth were all individuals aged 11 to 26 years currently or newly enrolled in a Kaiser Permanente Colorado health care plan in 2006 who obtained their insurance coverage as a dependent of a primary health plan member. Individuals up to age 26 years are typically eligible for insurance coverage as a dependent. We did not require youth health care utilization as a criterion for inclusion because our focus was on opioid exposure in the family. Index youth were linked to at least 1 family member using the primary subscriber's unique plan identifier. We excluded 124 youths who enrolled as a dependent member but did not match any family members. Youth were observed through age 26 years, first observed pharmaceutical opioid overdose, disenrollment from Kaiser Permanente Colorado, death, or the end of the observation period on June 30, 2018, whichever occurred first. Youth with gaps in insurance coverage reentered the cohort upon reenrollment, and time disenrolled was excluded from the analysis. The Kaiser Permanente Colorado institutional review board approved the study, with a waiver of informed consent because the data-only research activities were determined to pose minimal risk. The study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

Exposure

During each index youth's follow-up period, we identified opioid prescriptions dispensed in the past month to youth and to members of their family unit between study entry and June 30, 2018, using National Drug Codes in outpatient pharmacy dispensing and billing claims. For dosage, we summed the total morphine milligram equivalents (MME) of all prescription opioids dispensed in the past month to all family members and to index youth. Total MME in the past month was subsequently divided into approximate terciles separately for family members (ie, >0 to <200 MME, 200 to <600 MME, and ≥600 MME) and index youth (ie, >0 to <120 MME, 120 to <225 MME, and ≥225 MME).

Exposures were constructed as time-varying measures and updated each month of the index youth's follow-up period.

Covariates

We adjusted models for clinical factors shown to be associated with overdose in prior studies, including drug use disorder; alcohol use disorder; tobacco use; major depressive, anxiety, and mood disorders; and pain.[19-22] A history of each was treated as a time-varying measure and was updated monthly during follow-up as youth acquired a clinical diagnosis. Models also included time-varying measures of ever having 1 or more comorbidities in the Quan-Deyo Modified Charlson Comorbidities Index[23,24] during follow-up and separate indictors of common psychotropic medications (ie, benzodiazepines, stimulants, and antidepressants) dispensed to youth and family members in the past month. The comorbidity measure was dichotomized owing to little variation in the number of comorbidities among index youth. Models were also adjusted for demographic factors, including gender, race (ie, white, nonwhite [ie, black, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and other], and missing race), ethnicity (Hispanic and non-Hispanic), and age at each month of follow-up (ie, 11-15 years, 16-20 years, and 21-26 years). Youth with missing data on race (31 753 [44.1%]) were grouped in a separate category. Finally, models included subscriber unit size and tract-level median family income based on the 2006-2010 American Community Survey 5-year estimates.

Outcome

Among youth, we identified nonfatal pharmaceutical opioid overdoses in emergency department and inpatient settings from medical billing claims and fatal pharmaceutical opioid overdoses from state vital records using the *International Classification of Diseases, Ninth Revision* (*ICD-9*) *and ICD-10* codes. For nonfatal pharmaceutical opioid overdoses, we used *ICD-9* codes 965.0, 965.00, 965.02, 965.09, E850.1, and E850.2 and *ICD-10* codes T40.0X1 to T40.0X4, T40.2X1 to T40.2X4, T40.3X1 to T40.3X4, and T40.4X1 to T40.4X4. For fatal pharmaceutical opioid overdoses, we used *ICD-10* codes that indicate drug poisoning as the underlying cause of death (ie, X40-X44, X60-X64, X85, Y10-Y14) and pharmaceutical opioid involvement as a contributing cause (ie, T40.2-T40.3). The study analyzed the first incident pharmaceutical opioid overdose during follow-up.

Statistical Analysis

To assess the association of exposure to prescription opioids with time to first pharmaceutical opioid overdose among index youth, we fitted Cox proportional hazards models to calculate adjusted hazard ratios (aHRs) and 95% CIs. We used the counting process method to model opioid prescriptions in the past month as a time-varying 4-level exposure, as follows: (1) no opioid prescription, (2) prescriptions to youth only, (3) prescriptions to family members only, or (4) prescriptions to both youth and family members. This allowed us to assess the association of prescribed opioids in the family in the past month with pharmaceutical opioid overdose among index youth, independent of and concurrent with opioid prescriptions to index youth. We also tested a dose-response association by examining total MME dispensed to all family members and youth in the past month in a separate model. Robust standard errors were calculated by clustering at the family-unit level to adjust for association of survival times among index youth in the same family. The proportional hazards assumption for time-constant covariates was assessed using tests of Schoenfeld residuals.

We conducted secondary analyses to examine the timing of exposure from most recent to more distant, defined as at least 1 opioid prescription dispensed to family members, youth, or both in the past 3, 6, and 12 months. To assess whether youth opioid disorder was associated with having a drug use disorder, we also conducted a sensitivity analysis that excluded youth with a drug use disorder before their first opioid prescription.

All statistical analyses were performed using Stata version 15.1 (Stata Corp). Statistical significance was based on 2-sided tests with a threshold of $P < .05$.

Results

The study consisted of 72 040 index adolescents and young adults aged 11 to 26 years (mean [SD] age across follow-up, 19.3 [3.7] years; 36 646 [50.9%] women) (**Table 1**) nested in 45 145 family units

Table 1. Demographic and Clinical Characteristics of Adolescents and Young Adults, Aged 11 to 26 Years, in Study Cohort, By Exposure

Characteristic	No. (%)			
	Full cohort	Youth with ≥1 opioid prescription[a]	Youth with ≥1 family opioid prescription[a]	Youth with ≥1 own and family opioid prescription[a]
Opioid prescriptions during follow-up	72 040 (100)	26 284 (36.5)	47 461 (65.9)	4278 (5.9)
Social and demographic factors				
Women and girls	36 646 (50.9)	14 338 (54.6)	23 408 (49.3)	2344 (54.8)
Race/ethnicity				
White	31 092 (43.2)	10 935 (56.2)	16 175 (47.3)	2432 (56.8)
Nonwhite	9195 (12.8)	3809 (14.5)	6538 (13.8)	593 (13.9)
Missing[b]	31 753 (44.1)	7704 (29.3)	18 473 (38.9)	1253 (29.3)
Hispanic	8739 (12.1)	3836 (14.6)	6275 (13.2)	658 (15.4)
Baseline age, y				
11-15	31 135 (43.2)	12 875 (49.0)	23 647 (49.8)	2189 (51.2)
16-20	28 018 (38.9)	10 377 (39.5)	18 765 (39.5)	1738 (40.6)
21-26	12 887 (17.9)	3032 (11.5)	5049 (10.6)	351 (8.2)
Subscriber unit size, mean (SD)	4.4 (1.5)	4.4 (1.5)	4.6 (1.5)	4.7 (1.6)
Tract-level median family income, $				
<50 000	13 026 (18.1)	4114 (15.7)	8152 (17.2)	715 (16.7)
50 000-64 999	10 113 (14.0)	3653 (13.9)	6710 (14.1)	644 (15.1)
65 000-79 999	15 000 (20.8)	5518 (21.0)	9919 (20.9)	977 (22.8)
80 000-94 999	13 295 (18.5)	4931 (18.8)	8827 (18.6)	828 (19.4)
≥95 000	20 606 (28.6)	8068 (30.7)	13 853 (29.2)	1114 (26.0)
Diagnoses during follow-up				
≥1 CCI condition	14 944 (20.7)	8244 (31.4)	11 773 (24.8)	1760 (41.1)
Drug use disorder	4347 (6.0)	2694 (10.2)	3616 (7.6)	658 (15.4)
Alcohol use disorder	944 (1.3)	612 (2.3)	790 (1.7)	144 (3.4)
Tobacco use	6032 (8.4)	3846 (14.6)	4885 (10.3)	978 (22.9)
Major depressive disorder	9498 (13.2)	5566 (21.2)	7688 (16.2)	1269 (29.7)
Anxiety disorder	9365 (13.0)	5639 (21.5)	7671 (16.2)	1308 (30.6)
Mood disorder	2778 (3.9)	1586 (6.0)	2234 (4.7)	430 (10.1)
Pain[c]	31 357 (43.5)	17 804 (67.7)	24 639 (51.9)	3329 (77.8)
Psychotropic medications				
Benzodiazepines				
Youth with ≥1 prescription	4980 (6.9)	3643 (13.9)	4076 (8.6)	982 (23.0)
Youth with family members with ≥1 prescription	18 554 (25.8)	8912 (33.9)	16 576 (34.9)	2423 (56.6)
Stimulants				
Youth with ≥1 prescription	3851 (5.3)	2057 (7.8)	3172 (6.7)	438 (10.2)
Youth with family members with ≥1 prescription	3184 (4.4)	1539 (5.9)	2763 (5.8)	403 (9.4)
Antidepressants				
Youth with ≥1 prescription	11 634 (16.1)	7083 (26.9)	9292 (19.6)	1664 (38.9)
Youth with family members with ≥1 prescription	29 073 (40.4)	12 903 (49.1)	24 217 (51.0)	3106 (72.6)

Abbreviation: CCI, Quan-Deyo Modified Charlson Comorbidity Index.

[a] Exposure is time varying, and groups are not mutually exclusive.

[b] In the full cohort, 3974 patients (12.5%) with missing race information identified as Hispanic.

[c] Represents at least 1 chronic or acute pain diagnosis.

(mean [SD] number of family members, 4.4 [1.5]). The mean (SD) length of follow-up for index youth was 4.9 (3.8) person-years. During the entire follow-up, 4347 (6.0%) youth had drug use disorder, 9498 (13.2%) had a major depressive disorder, 9365 (13.0%) had an anxiety disorder, and 31 357 (43.5%) had 1 or more acute or chronic pain diagnoses. The chief pain diagnoses were headaches or migraines, low back pain, and knee pain. Comorbidities were more common among youth exposed to opioid prescriptions (their own or from family members) compared with the full cohort (eg, ≥1 comorbidity among youth with concurrent exposure vs full cohort: 1760 [41.1%] vs 14 944 [20.7%]).

Opioid Prescriptions

There were 647 767 total opioid prescriptions dispensed to index youth (103 489 [16.0%]) or members of their family (544 278 [84.0%]) during follow-up. The most common opioids prescribed to index youth were hydrocodone (47 623 [46.0%]), short-acting oxycodone (33 789 [32.7%]), and tramadol (7160 [6.9%]). Similarly, among family members, the leading opioids were hydrocodone (213 259 [39.2%]), short-acting oxycodone (179 364 [33.0%]), and tramadol (57 832 [10.6%]). During follow-up, 26 284 youth (36.5%) filled at least 1 opioid prescription, 47 461 (65.9%) had a family member with at least 1 prescription, and 4278 (5.9%) filled their own prescription and had a family member with a prescription in the same month. Among youth with at least 1 family member who had an opioid prescription, the median (interquartile range) total MME in the family during the past month was 300 (150-896), and among youth who had at least 1 prescription themselves the median (interquartile range) total MME during the past month was 150 (100-300).

Pharmaceutical Opioid Overdose Incidence Rate

Among index youth there were 103 incident prescription opioid overdose events during follow-up (incidence rate, 29.0 per 100 000 person-years; 95% CI, 23.9-35.2 per 100 000 person-years), of which 14 were fatal (**Table 2**). Compared with no exposure to an opioid prescription in the past month, prescriptions to 1 or more family members and to index youth were associated with higher rates of overdose (family members, unadjusted incidence rate ratio, 2.7; 95% CI, 1.5-4.8; youth, unadjusted incidence rate ratio, 14.8; 95% CI, 7.8-26.2). While concurrent exposure to opioid prescriptions to both family members and youth in the past month was rare (848 of 355 280 person-years [0.2%]), it was associated with markedly higher rates of overdose compared with no exposure (unadjusted incidence rate ratio, 40.7; 95% CI, 15.8-88.8).

Opioid Prescriptions and Risk of Pharmaceutical Opioid Overdose Among Youth

In adjusted Cox proportional hazards models (**Table 3**), compared with no exposure to opioid prescriptions, prescriptions to 1 or more family members in the past month were independently associated with a 2-fold increase in the risk of overdose among index youth (aHR, 2.17; 95% CI, 1.24-3.79). Prescriptions to index youth in the past month were associated with a more than 6-fold increase in the risk of overdose (aHR, 6.62; 95% CI, 3.39-12.91). Concurrent prescriptions to both family members and youth in the past month were associated with a nearly 13-fold increase in overdose risk (aHR, 12.99; 95% CI, 5.08-33.25).

Table 2. Incidence Rates of Fatal and Nonfatal Prescription Opioid Overdose Among Adolescents and Young Adults

Opioid prescriptions in the past month	PY, No.	Overdoses, No.	Rate per 100 000 PY (95% CI)	Unadjusted incidence rate ratio (95% CI)
No prescription	320 519	65	20.3 (15.9-25.9)	1 [Reference]
Prescriptions to family members only	28 912	16	55.3 (33.9-90.3)	2.7 (1.5-4.8)
Prescriptions to youth only	5001	15	299.9 (180.8-497.5)	14.8 (7.8-26.2)
Prescriptions to both youth and family members	848	7	825.5 (393.7-1 732.3)	40.7 (15.8-88.8)
Overall	355 280	103	29.0 (23.9-35.2)	NA

Abbreviations: NA, not applicable; PY, person-years.

An analysis of dose response indicated that only the highest total dosage of opioids prescribed to family members in the past month was associated with risk of overdose (Table 3) (0 MME vs >0 to <200 MME: aHR, 1.39; 95% CI, 0.51-3.81; 0 MME vs 200 to <600 MME: aHR, 1.49; 95% CI, 0.59-3.77; 0 MME vs ≥600 MME: aHR, 2.93; 95% CI, 1.55-5.56). In the same model, the total dosage of opioids prescribed to youth similarly showed an apparent dose-response association (0 MME vs >0 to <120 MME: aHR 2.67; 95% CI, 0.63-11.28; 0 MME vs 120 to <225 MME: aHR 5.22; 95% CI, 1.87-14.60; 0 MME vs ≥225 MME: aHR 8.77; 95% CI, 4.05-18.99).

In secondary analysis (**Table 4**), 1 or more opioid prescriptions in the past 3 months to family members (aHR, 1.85; 95% CI, 1.11-3.11), youth (aHR, 5.86; 95% CI, 3.33-10.30), or both (aHR, 6.56; 95% CI, 2.87-14.99) were associated with lower risks compared with prescriptions in the past month. The overdose risk diminished for youth prescriptions in the past 6 months (aHR, 4.65; 95% CI, 2.69-8.04) and past 12 months (aHR, 3.93; 95% CI, 2.23-6.92), while it was variable for prescriptions to family members or both groups in the past 6 months (family members: aHR, 1.93; 95% CI, 1.19-3.13; both: aHR, 3.68; 95% CI, 1.71-7.89) and past 12 months (family members: aHR, 1.74; 95% CI, 1.02-2.98; both: aHR, 4.46; 95% CI, 2.36-8.43). While the risk of overdose persisted with exposure during the past 12 months, the month following an opioid prescription was associated with the most pronounced risk. In a sensitivity analysis (eTable in the Supplement), excluding 2518 youth with a diagnosed drug use disorder before their first opioid prescription did not alter the study conclusion that opioid prescriptions were associated with youth overdose.

Table 3. Adjusted Association of Opioid Prescriptions With Pharmaceutical Opioid Overdose Among Adolescents and Young Adults

	aHR (95% CI)	
Exposure	Model 1[a,b]	Model 2[a,c]
Opioid prescription in the past month		
No prescription	1 [Reference]	NA
Prescriptions to family members	2.17 (1.24-3.79)	NA
Prescriptions to youth	6.62 (3.39-12.91)	NA
Prescriptions to youth and family members	12.99 (5.08-33.25)	NA
Total MME to family members in the past month		
0	NA	1 [Reference]
>0 to <200	NA	1.39 (0.51-3.81)
200 to <600	NA	1.49 (0.59-3.77)
≥600	NA	2.93 (1.55-5.56)
Total MME to youth in the past month		
0	NA	1 [Reference]
>0 to <120	NA	2.67 (0.63-11.28)
120 to <225	NA	5.22 (1.87-14.60)
≥225	NA	8.77 (4.05-18.99)

Abbreviations: aHR, adjusted hazard ratio; MME, morphine milligram equivalents.

[a] Covariates in adjusted models include 1 or more conditions in the Quan-Deyo Modified Charlson Comorbidity Index; drug use disorder; alcohol use disorder; tobacco use; major depressive disorder; anxiety disorder; mood disorder; pain diagnosis; prescriptions for benzodiazepines, stimulants, or antidepressants; gender; race; ethnicity; age; subscriber unit size; and tract-level median family income.

[b] Model 1 specifies exposure to opioid prescriptions in the past month as a 4-level time-varying measure.

[c] Model 2 includes total opioid dosage in MMEs in the past month for family members and youth as time-varying measures grouped in categories of approximately equal size.

Table 4. Association of Opioid Prescriptions With Pharmaceutical Opioid Overdose During Past 3 Months, 6 Months, and 12 Months

	aHR (95% CI)[a]		
Opioid prescriptions	Past 3 mo	Past 6 mo	Past 12 mo
No prescription	1 [Reference]	1 [Reference]	1 [Reference]
Prescriptions to family members	1.85 (1.11-3.11)	1.93 (1.19-3.13)	1.74 (1.02-2.98)
Prescriptions to youth	5.86 (3.33-10.30)	4.65 (2.69-8.04)	3.93 (2.23-6.92)
Prescriptions to youth and family members	6.56 (2.87-14.99)	3.68 (1.71-7.89)	4.46 (2.36-8.43)

Abbreviation: aHR, adjusted hazard ratio.

[a] Covariates in adjusted models include 1 or more conditions in the Quan-Deyo Modified Charlson Comorbidity Index; drug use disorder; alcohol use disorder; tobacco use; major depressive disorder; anxiety disorder; mood disorder; pain diagnosis; prescriptions for benzodiazepines, stimulants, or antidepressants; gender; race; ethnicity; age; subscriber unit size; and tract-level median family income.

Discussion

Exposure to family members with opioid prescriptions in the past month was associated with increased risk of pharmaceutical opioid overdose, independent of youth being prescribed opioids. In addition, concurrent opioid prescriptions among youth and family members in the past month, time immediately following prescriptions, and high dose were all associated with increased risks. These findings suggest that exposure to prescribed opioids in the family poses serious risk of pharmaceutical opioid overdose among youth.

Several potential mechanisms could explain the association of prescribed opioids from family members with overdose among youth. First, and most directly, opioid prescriptions to family members may provide ready access to opioids. Unsecured and leftover medications may be misused, and medications may also be shared among family members.[18] Second, family exposure may reflect parents and siblings who model behaviors, attitudes, and norms regarding medical and nonmedical use of opioids.[14] This can influence youth preferences and contribute to initiation of opioid use, misuse, and opioid-related complications. Third, family exposure may also be a marker of problems related to parents' opioid use, such as aberrant pain medication seeking behaviors, intermittent oversedation, and the development of opioid use disorders (OUD), that may impair parenting ability, diminish the quality of parent-child relationships, and induce stress and instability in the home.[25] Poor parental discipline skills, neglect, and mistreatment have been shown to be associated with risk of adolescent substance use problems.[26] Finally, there may be shared risk factors that link patterns of opioid use among youth and their family members, including genetic predisposition, common health conditions, social stressors (eg, housing instability, financial insecurity, and marital dissolution), and local availability of opioids.[16,27-30]

Our study contributes to an emerging literature on the risks of opioid exposures in the family and opioid initiation,[16] long-term opioid use,[15] and overdose.[31] We tested and quantified the risk associated with prescribed opioids in the family, while adjusting for opioids prescribed to youth. Since youth may be widely exposed to family members with prescription opioids, the associated overdose risk for youth, even if modest compared with the risk associated with youth's own prescriptions, may be significant at the population level. These findings also highlight the need for greater attention to the magnified overdose risk associated with concurrent opioid use among youth and their family members. Greater combined opioid dosage from concurrent exposure may contribute to such risk.

Our findings suggest that clinicians prescribing opioids in adult medicine should consider counseling patients about the risks of opioids to youth in their families. Reducing opioid prescriptions to adults has been a focus of recent prevention efforts and can contribute to decreasing opioid exposure in the home. The Centers for Disease Control and Prevention established guidelines recommending prescribing limits in the treatment of chronic pain with regard to opioid initiation, dosage, and duration to curb unnecessary exposure and excess supply.[6] However, limiting access to opioids should be balanced against the risks of complications induced by volatile dosing and undertreatment of pain.[32,33]

In response to concerns that prescribed opioids in the home may be misused among youth, federal agencies have supported common-sense educational campaigns to encourage safe storage and proper disposal of medications.[34,35] However, the evidence base to support such interventions is not currently robust.[13,18] While home safety interventions may serve as an effective primary prevention for youth who have not yet initiated opioid use, such interventions may have unintended consequences. For example, a change in access to opioids in the home may push youth who are already misusing into the illicit drug market, where the unknown quality and potency of heroin and fentanyl could magnify overdose risk.[36] Thus, further research on best practices and potential adverse effects of well-intended interventions are needed.

Interventions that focus on restricting and controlling access to prescription opioids alone are among several efforts needed to curb the current epidemic that is increasingly centered on illicit

opioids.[36,37] Undiagnosed and untreated OUD may contribute to prescription misuse and high overdose risk. Efforts should include increased screening and treatment paired with interventions to address social and economic determinants of OUD more broadly.[29,38,39] Given the prevalence of nonmedical use of prescription opioids and rates of overdoses,[9,40] harm reduction strategies are also needed, including increased access to overdose reversal medication through standing orders and codispensing.

In the current crisis, addressing early exposures to opioids among youth, including those from opioids prescribed to family members, may be important in preventing OUD and the use of illicit opioids.[41] Adolescence and young adulthood are periods in the life course when drug use is usually initiated,[42] and nonmedical use of opioids in this population is associated subsequent heroin use and OUD.[43-46]

Limitations and Strengths

This study has limitations. We were unable to distinguish whether prescription opioids from family members, youth, or elsewhere directly contributed to overdoses. The study did not capture all potential sources of prescription opioids, including prescriptions that were paid by cash or another health plan or were obtained from peers, family members not enrolled in the same health plan, or informal drug markets, which together may underestimate the extent of exposure to prescription opioids. On the other hand, we were unable to verify whether health plan subscriber members resided in the same household, implying that access to prescription opioids may be overstated. The study also did not account for shared genetic, social, and environmental risk factors that may put individuals in the same family at risk of overdose and could confound the association between exposure to opioids among household members and risk of overdose. Finally, because the study was conducted in a single health system in Colorado, findings should be replicated in other settings.

Our study also has several strengths. We leveraged electronic health records to link a large cohort of youth to their family members to assess exposure in the family. Use of pharmacy dispensing data allowed us to determine the degree and timing of opioid exposures with precision.

Conclusions

In this cohort study of adolescents and young adults, exposure to prescription opioids in families was common. Opioids prescribed to family members were associated with increased risk of pharmaceutical opioid overdose, independent of opioids prescribed to youth. Further intervention efforts targeting youth and families are needed, including counseling patients about risks of opioids to youth in their families.

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SUPPLEMENT.

eTable. Sensitivity Analysis for Exclusion of 2518 Youth With Drug Use Disorders Before First Opioid Prescription