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Opioid Prescribing to U.S. Children and Young Adults in 2019

Kao-Ping Chua, MD, PhD[a], **Chad M. Brummett, MD**[b,c], **Rena M. Conti, PhD**[d], **Amy S. Bohnert, PhD**[b,e]

[a]Department of Pediatrics, Susan B. Meister Child Health Evaluation and Research Center, University of Michigan, Ann Arbor, MI

[b]Division of Pain Medicine, Department of Anesthesiology, University of Michigan Medical School, Ann Arbor, MI

[c]Michigan Opioid Prescribing Engagement Network, Ann Arbor, MI

[d]Department of Markets, Public Policy, And Law, Institute for Health System Innovation and Policy, Questrom School of Business, Boston University, Boston, MA

[e]VA Center for Clinical Management Research, VA Ann Arbor Health System, Ann Arbor, MI

Abstract

BACKGROUND: Recent national data are lacking on the prevalence, safety, and prescribers of opioid prescriptions dispensed to children and young adults aged 0–21 years.

METHODS: We identified opioid prescriptions dispensed to children and young adults in 2019 in the IQVIA Longitudinal Prescription Database, which captures 92% of U.S. pharmacies. Using population denominators from the American Community Survey, we calculated the proportion of U.S. children and young adults with ≥1 dispensed opioid prescription in 2019. We calculated performance on 6 metrics of high-risk prescribing and the proportion of prescriptions written by each specialty. Of all prescriptions and those classified as high-risk by ≥1 metric, we calculated the proportion written by "high-volume" prescribers with prescription counts at the 95th percentile or above.

RESULTS: Analyses included 4,027,701 prescriptions. In 2019, 3.5% of U.S. children and young adults had ≥1 dispensed opioid prescription. Of prescriptions for opioid-naïve patients, 41.8% and 3.8% exceeded a 3-day and 7-day supply. Of prescriptions for young children, 8.4% and 7.7% were for codeine and tramadol. Of prescriptions for adolescents and young adults, 11.5% had daily dosages ≥50 morphine milligram equivalents; 4.6% had benzodiazepine overlap. Overall, 45.6%

Address correspondence to: Kao-Ping Chua, MD, PhD, 300 North Ingalls St, SPC 5456, Room 6E18, Ann Arbor, Michigan 48109. chuak@med.umich.edu. Phone: 734-615-8169.

CONTRIBUTORS' STATEMENT PAGE

Dr. Chua conceptualized and designed the study, collected the data, analyzed and interpreted the data, drafted the initial manuscript, and reviewed and revised the manuscript.

Dr. Brummett and Dr. Conti conceptualized and designed the study, analyzed and interpreted the data, and reviewed and revised the manuscript.

Dr. Bohnert conceptualized and designed the study, analyzed and interpreted the data, reviewed and revised the manuscript, and provided study supervision.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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of prescriptions were high-risk by ≥1 metric. Dentists and surgeons wrote 61.4% of prescriptions. High-volume prescribers wrote 53.3% of prescriptions and 53.1% of high-risk prescriptions.

CONCLUSIONS: Almost half of pediatric opioid prescriptions are high-risk. To reduce high-risk prescribing, initiatives targeting high-volume prescribers may be warranted. However, broad-based initiatives are also needed to address the large share of high-risk prescribing attributable to other prescribers.

Article Summary:

Of 4 million opioid prescriptions dispensed to children and young adults aged 0–21 years in 2019, 46% were high-risk.

INTRODUCTION

Ensuring the safety and appropriateness of pediatric opioid prescribing, defined as prescribing to children aged 0–17 years and young adults aged 18–21 years, is an important clinical and public health goal. In the short-term, prescription opioid exposure increases the risk of opioid-related adverse events, including overdose.[1–6] In the long-term, this exposure is associated with increased lifetime risk of substance use disorders in adolescents and young adults.[7–9] Pediatric opioid prescribing also has spillover effects, as opioids prescribed to children and young adults can be misused by relatives and friends.[10–12]

Recent national data are lacking on the prevalence of dispensed opioid prescriptions among U.S. children and young adults, the frequency of “high-risk” prescriptions that increase the risk of opioid-related adverse events, and the prescribers who account for the most pediatric opioid prescriptions and high-risk prescriptions. Studies have reported recent trends in opioid prescribing to children using commercial insurance claims and data from individual states,[13–15] but the generalizability of findings is unclear. Timely national data on pediatric opioid prescribing could inform the design of initiatives to improve this prescribing. For example, if a small group of prescribers accounts for most high-risk prescribing, initiatives targeting these prescribers may be warranted.

Using a national prescription dispensing database, we assessed the prevalence, safety, and prescribers of opioid prescriptions dispensed to U.S. children and young adults in 2019. To our knowledge, our study provides the most recent and complete data on U.S. pediatric opioid prescribing to date.

METHODS

Data source.

In January 2021, we conducted a cross-sectional analysis of the 2019 IQVIA Longitudinal Prescription Database. This database contains a record for every prescription dispensed in 2019 from 92% of U.S. retail pharmacies (e.g., chain pharmacies and food store pharmacies), 70% of mail-order pharmacies, and 70% of pharmacies in long-term care facilities. The database does not capture dispensing from pharmacies that only serve patients from specific hospitals or health systems (e.g., those affiliated with Kaiser Permanente). Data elements include drug name, dosing (e.g., days supplied), prescriber identifiers and

specialty, patient identifiers and characteristics, and method of payment (commercial, Medicaid or other non-Medicare public insurance (e.g., state public insurance programs), cash, and Medicare). Data on patient income, race, ethnicity, and prescription indication are not included. As needed, we used data from 2018 when a 90-day look-back period was required for prescriptions in early 2019.

Analyses assessed dispensing of opioid analgesics and benzodiazepines included in IQVIA's market definition of these drug classes (Appendix 1). The former excluded opioid cough-and-cold medications and buprenorphine formulations approved for opioid use disorder. Because data were de-identified, the Institutional Review Board of the University of Michigan Medical School exempted this study from review.

Sample.

Analyses were conducted at the prescription rather than patient level. We included opioid prescriptions dispensed in 2019 to children and young adults aged 0–21 years who lived in one of the 50 U.S. states or the District of Columbia. We chose this age range to capture the population seen by pediatric providers.[16] We did not include prescriptions from veterinarians. We excluded prescriptions for injectable opioid formulations and prescriptions with missing or potentially invalid dosing information, defined as days supplied ≤ 0, days supplied > 90, or quantity ≤ 0.

Prevalence of dispensed opioid prescriptions.

Based on dispensing totals and population denominators from the 2019 American Community Survey,[17] we calculated the proportion of U.S. children and young adults with ≥1 dispensed opioid prescription in 2019 (see Appendix 2 for details). We repeated analyses by age group, sex, and Census region of patient residence.

Frequency of high-risk prescribing.

We calculated performance on 6 metrics of high-risk prescribing:

- Metrics 1–2: Proportion of dispensed opioid prescriptions to opioid-naïve patients exceeding a 3-day or 7-day supply. The Centers for Disease Control and Prevention (CDC) opioid prescribing guidelines indicate a 3-day supply usually suffices for acute pain, while supplies exceeding 7 days are rarely necessary.[18] These thresholds were largely based on data from older adults, but may also be reasonable for children and young adults. For example, in prior studies, opioid consumption after common pediatric surgeries was typically 3 days or less.[11,19,20] Because data lacked information on indication, we used opioid-naïve status as a surrogate for acute pain. In support of this approach, 75.4% of prescriptions to opioid-naïve patients were written by dentists, surgeons, or emergency medicine physicians (Appendix 3). Following a National Quality Forum-endorsed quality measure, we defined opioid-naïve status as the absence of dispensed opioid prescriptions in the 90 days prior to dispensing.[21]
- Metrics 3–4: Proportion of opioid prescriptions dispensed to young children aged 0–11 years that were for codeine; proportion of these prescriptions that

were for tramadol. In 2017, the U.S. Food and Drug Administration (FDA) contraindicated codeine and tramadol use in young children, owing to reports of fatal overdose in this age group.[22]

- Metric 5: Proportion of opioid prescriptions dispensed to adolescents and young adults aged 12–21 years with daily dosages ≥50 morphine milligram equivalents (MME). MME are a standardized measure of opioid dosage; 50 MME corresponds to 10 pills containing 5 mg hydrocodone.[23] We calculated daily MME by multiplying strength, quantity, and published MME conversion factors,[23] then dividing by days supplied. The 50-MME threshold derives from the CDC guidelines.[18] Although this specific threshold has not been tested in adolescents and young adults, overdose risk in this population increases as daily opioid dosage rises.[3] We did not assess this metric for young children because we lacked information on weight, which affects risks associated with any given dosage level.[24] In contrast, most opioid prescriptions to adolescents and young adults use weight-invariant adult dosing. For example, mean weight of 14-year olds is approximately 50 kg.[25]
- Metric 6: Proportion of opioid prescriptions dispensed to adolescents and young adults that overlapped with a benzodiazepine prescription for ≥1 day. We included this metric because concurrent opioid and benzodiazepine exposure greatly increases overdose risk in adolescents and young adults.[3] To calculate the metric, we converted opioid and benzodiazepine prescriptions to periods of exposure that would occur if patients took medications as prescribed.[3] This period began on the dispensing date and ended on the dispensing date plus days supplied minus one. If the exposure period for an opioid prescription overlapped with that of a benzodiazepine prescription, the opioid prescription was included in the numerator.

We calculated the proportion of all prescriptions classified as high-risk by ≥1 metric. For each metric, we calculated performance by demographic characteristics. Using logistic regression with Huber-White robust standard errors clustered at the patient level, we assessed which characteristics were associated with performance. We calculated average marginal effects (AMEs), or the difference in the probability of outcomes if all patients were in a particular demographic category versus the baseline category.[26]

Prescribers of opioid prescriptions and high-risk prescriptions.

In prescriber analyses, we excluded prescriptions with missing prescriber identifiers. Of the remaining prescriptions, we calculated the proportion written by each specialty. To assess the degree to which pediatric opioid prescribing and high-risk prescribing is concentrated, we ranked prescribers by the number of opioid prescriptions dispensed to children and young adults in 2019, and identified those with prescription counts at the 95th percentile or above. We calculated the proportion of all prescriptions and high-risk prescriptions accounted for by these “high-volume” prescribers versus other prescribers. Among prescriptions from high-volume prescribers and other prescribers that were eligible for each metric of high-risk prescribing, we calculated the proportion classified as high-risk by the metric. We compared proportions using chi-squared tests.

We calculated performance on metrics by specialty and determined which specialties accounted for the most high-risk prescriptions. We present results in Appendix 4 for interested readers but do not discuss them owing to limited space.

Statistical analysis.

Analyses used SAS 9.4, Stata 15.1, and two-sided hypothesis tests with $\alpha = 0.05$.

RESULTS

Sample.

The database included 144,734,094 opioid prescriptions dispensed in 2019; 4,030,834 (2.8%) were for patients aged 0–21 years. Of these prescriptions, 3,133 (0.08%) were excluded. Of the remaining 4,027,701 prescriptions in the sample, 3,487,263 (86.6%) were for adolescents and young adults; 3,250,443 (80.7%) were for opioid-naïve patients. Method of payment was commercial insurance for 2,447,863 (60.8%) prescriptions, followed by Medicaid/other public insurance (1,106,206; 27.5%), cash (330,225; 8.2%), and Medicare (143,407; 3.6%). Hydrocodone accounted for 2,120,784 (52.7%) prescriptions, followed by oxycodone (857,641; 21.3%), codeine (556,463; 13.8%), and tramadol (395,829; 9.8%); 51,046 (1.3%) prescriptions were for extended-release/long-acting opioids. Median days supplied was 3 days (25^{th}-75^{th} percentile: 3–5). The 4,027,701 prescriptions were for 3,131,759 patients; 449,310 (14.3%) patients had multiple prescriptions.

Prevalence of dispensed opioid prescriptions.

Table 1 displays prevalence estimates overall and by demographic subgroup. Of all U.S. children and young adults, 3.5% had ≥1 dispensed opioid prescription in 2019. For young children aged 0–11 years and adolescents and young adults aged 12–21 years, this proportion was 0.9% and 6.3%, respectively. The proportion of children and young adults with ≥1 dispensed opioid prescription in 2019 was highest in the South (4.1%).

Frequency of high-risk prescribing.

Tables 2–3 display performance on the 6 metrics of high-risk prescribing. Among 3,250,443 prescriptions for opioid-naïve patients, 1,359,082 (41.8%) and 124,874 (3.8%) exceeded a 3-day and 7-day supply (Figure 1). Among 540,438 prescriptions for young children, 45,494 (8.4%) and 41,619 (7.7%) were for codeine and tramadol. Among 3,487,263 prescriptions for adolescents and young adults, 402,430 (11.5%) had daily MME ≥50; 159,269 (4.6%) had benzodiazepine overlap. Among all 4,207,701 prescriptions, 1,834,776 (45.6%) were classified as high-risk by ≥1 metric.

For each metric, the AMEs of demographic characteristics on performance are displayed in Appendix 5. Prescriptions for opioid-naïve patients were less likely to exceed a 3-day supply if they were for adolescents and young adults rather than young children (unadjusted difference: −13.6 percentage points, AME: −12.2, 95% CI: −12.4, −12.1). The same pattern occurred for prescriptions exceeding a 7-day supply. Prescriptions to young children were less likely to be for codeine if method of payment was Medicaid/other public insurance rather than commercial insurance (unadjusted difference: −3.4 percentage

points; AME: −3.6, 95% CI: −3.7, −3.4). The same pattern occurred for tramadol. For metrics assessing prescriptions to adolescents and young adults with daily MME ≥50 and opioid-benzodiazepine overlap, performance differences between demographic subgroups were generally modest.

Prescribers of opioid prescriptions and high-risk prescriptions.

Of 4,027,701 prescriptions in the sample, 84,470 (2.1%) were excluded in prescriber analyses owing to missing prescriber identifiers. Of the remaining 3,943,231 prescriptions, dentists accounted for 1,504,370 (38.2%); surgeons accounted for 918,154 (23.3%). These prescribers collectively accounted for 2,422,524 prescriptions (61.4%) (Table 4). Surgical subspecialties accounting for the most prescriptions were orthopedics (7.6% of the 3,943,231 prescriptions) and otolaryngology (6.3%) (Appendix 6). Surgeons (47.1%) accounted for a higher proportion of prescriptions for young children than dentists (11.8%). In contrast, dentists (42.1%) accounted for a higher proportion of prescriptions for adolescents and young adults than surgeons (19.7%) (Appendix 7). General pediatricians accounted for 1.7% of the 3,943,231 prescriptions.

The 3,943,231 prescriptions were written by 404,102 prescribers. The median prescriber accounted for 3 prescriptions (25^{th}-75^{th} percentile: 1–7). The 95^{th} percentile was 31. Among 20,848 (5.2%) “high-volume” prescribers with prescription counts ≥31, 7,431 (35.6%) and 6,684 (32.1%) were dentists and surgeons; 10,579 (50.7%) practiced in the South. Of the other 383,254 prescribers, 56,371 (14.7%) and 64,997 (17.0%) were dentists and surgeons; 154,852 (40.4%) practiced in the South. High-volume prescribers accounted for 2,100,283 prescriptions (53.3% of 3,943,231 prescriptions) and 950,137 high-risk prescriptions (53.1% of 1,787,721 high-risk prescriptions). Other prescribers accounted for 46.7% and 46.9% of prescriptions and high-risk prescriptions (Figure 2). Appendix 8 reports results when defining high-volume prescribers as those with prescription counts at the 99^{th} percentile or above.

For each metric, Figure 3 displays the proportion of eligible prescriptions from high-volume prescribers and other prescribers that were classified as high-risk. This proportion was consistently higher among prescriptions from other prescribers (median difference: 2.9 percentage points; $p<0.001$ for all differences).

DISCUSSION

In 2019, almost half of the 4 million opioid prescriptions dispensed to U.S. children and young adults were classified as high-risk by at least one of six metrics. Dentists and surgeons collectively accounted for 6 in 10 prescriptions. Approximately 20,000 high-volume prescribers – those with prescription counts at the 95^{th} percentile or above – accounted for 53% of all prescriptions and high-risk prescriptions.

This study provides national data on the prevalence and demographic correlates of high-risk pediatric opioid prescribing. In 2019, 41.8% and 3.8% of opioid prescriptions dispensed to opioid-naïve children and young adults exceeded a 3-day and 7-day supply, even though many of these prescriptions likely were for dental and surgical procedures that do not

require long durations of opioid therapy.[11,19,20,27] Investigators have substantially reduced opioid quantities in perioperative prescriptions for adult patients by developing procedure-specific prescribing guidelines based on data on patient-reported post-operative opioid consumption.[28,29] Similar efforts have begun in some pediatric institutions[30], but should be more widespread. Our findings highlight the importance of including young children in such efforts. In 2019, prescriptions for opioid-naïve patients were more likely to exceed a 3-day supply if they were for young children rather than adolescents and young adults, potentially because the latter were more likely to receive dental opioid prescriptions, which are typically of short duration.[31]

Approximately 1 in 6 opioid prescriptions dispensed to young children were for codeine or tramadol, both contraindicated in this age group.[22] The persistent use of codeine is consistent with a study demonstrating incomplete reductions in codeine prescribing to children undergoing tonsillectomy following a 2013 FDA contraindication.[32,33] To reduce codeine and tramadol prescribing to young children, electronic health record systems and pharmacists could prompt clinicians to consider alternatives when this prescribing is attempted. Additionally, insurers could refuse to cover codeine or tramadol prescriptions for young children.

Among opioid prescriptions dispensed to adolescents and young adults, 11.5% had daily opioid dosages of 50 MME or higher. In the rare instances in which such elevated dosages are required for children and young adults (e.g., cancer pain), interventions to mitigate overdose risk should be considered, such as co-prescribing naloxone.[34] Moreover, 4.6% of opioid prescriptions dispensed to adolescents and young adults overlapped with a benzodiazepine prescription. In this population, benzodiazepines have limited evidence of efficacy for anxiety, the most common indication for these medications.[35] Reducing low-value benzodiazepine prescribing may therefore be a feasible method to reduce concurrent opioid and benzodiazepine exposure.

The outsized role of dentists and surgeons in pediatric opioid prescribing suggests that reductions in prescribing by these clinicians could substantially lower prescription opioid exposure in children and young adults. Evidence suggests such reductions could be achieved without compromising pain control. For example, almost 80% of dental opioid prescriptions for adolescents and young adults are for tooth extraction,[31] a procedure for which ibuprofen provides effective analgesia.[36] As another example, randomized trials suggest opioids and ibuprofen provide equivalent analgesia for tonsillectomy, a common pediatric surgery.[37,38] Despite this, 6 in 10 privately insured children undergoing tonsillectomy have dispensed perioperative opioid prescriptions.[39] Avoiding opioid prescribing for surgical and dental procedures not only decreases the risk of misuse and overdose, but also decreases the risk of side effects, such as vomiting and constipation.[40] Consequently, when non-opioids provide effective analgesia, first-line use of these medications could improve safety and patient experience.

Approximately 20,000 high-volume prescribers accounted for 53% of pediatric opioid prescriptions. The concentrated nature of pediatric opioid prescribing is consistent with a prior study of opioid prescribing to privately insured Americans, most of whom were

adults.[41] Notably, high-volume prescribers may not necessarily have high rates of opioid prescribing. For example, surgeons whose patient volume is higher than average may be high-volume prescribers even if their prescribing rates are similar to other surgeons. Nonetheless, the outsized role of high-volume prescribers in pediatric opioid prescribing suggests that their prescribing rates may warrant particular attention.

High-volume prescribers also accounted for 53% of high-risk prescriptions. This finding suggests that initiatives to improve the safety of pediatric opioid prescribing may be most efficient if they target high-volume prescribers. Importantly, however, other prescribers collectively accounted for 47% of high-risk prescriptions and had slightly worse performance on metrics of high-risk prescribing compared with high-volume prescribers. Consequently, broad-based initiatives inclusive of all prescribers should also be considered.

We estimate that 6.3% of U.S. adolescents and young adults had dispensed opioid prescriptions in 2019. This estimate is markedly lower than the prevalence of past-year opioid use reported by adolescents and young adults participating in the National Survey on Drug Use and Health (NSDUH). In the 2015–2016 NSDUH, 17.2% and 24.4% of respondents aged 12–17 years and 18–25 years reported past-year use of opioids prescribed to them but no past-year misuse of their opioids or of opioids prescribed to others.[42] A caveat is that U.S. opioid prescribing has declined since 2015, partly owing to heightened awareness of the opioid epidemic.[43] Moreover, past-year opioid use could include use of leftover opioids from prescriptions written more than a year ago. Additional research is needed to reconcile our estimates with the NSDUH.

Study strengths include its use of timely national data. However, limitations exist. First, analyses underestimate the prevalence of dispensed opioid prescriptions among U.S. children and young adults, as data do not include all pharmacies. Second, dispensing from hospital-specific pharmacies was not observed. Some hospitals with such pharmacies may be affiliated with academic medical centers, which may have prescribing practices that differ from other settings. Third, analyses underestimate the role of surgical care in pediatric opioid prescribing, as physician assistants and nurse practitioners account for one-fifth of perioperative opioid prescriptions.[44] Fourth, because data lacked clinical details, the denominator for estimates of the prevalence of dispensed opioid prescriptions could not be restricted to patients with potential indications for opioids (e.g., injuries). Finally, the outbreak of coronavirus disease 2019 delayed many dental and surgical procedures,[45–47] the primary indications for pediatric opioid prescribing. Consequently, the rate of this prescribing during the pandemic is likely lower than in 2019. However, findings will still inform quality improvement initiatives unless the pandemic permanently alters practice.

CONCLUSION

Reducing opioid prescribing by dentists and surgeons could substantially lower prescription opioid exposure in children and young adults. To improve the safety of pediatric opioid prescribing, initiatives targeting high-volume prescribers may be warranted. However, broad-based initiatives are also needed to address the large share of high-risk prescribing attributable to other prescribers.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Abbreviations:

NSDUH	National Survey on Drug Use and Heath
MME	morphine milligram equivalents
AME	average marginal effect

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What's known on this subject:

Recent national data are lacking on the prevalence of dispensed opioid prescriptions among U.S. children and young adults; the frequency of "high-risk" prescriptions that increase risk of adverse events, including overdose; and the prescribers who account for the most prescriptions.

What this study adds:

Of 4 million opioid prescriptions dispensed to children and young adults aged 0–21 years in 2019, 46% were high-risk. Dentists and surgeons accounted for 61% of prescriptions. Prescribers with prescription counts at the 95th percentile or above accounted for 53%.

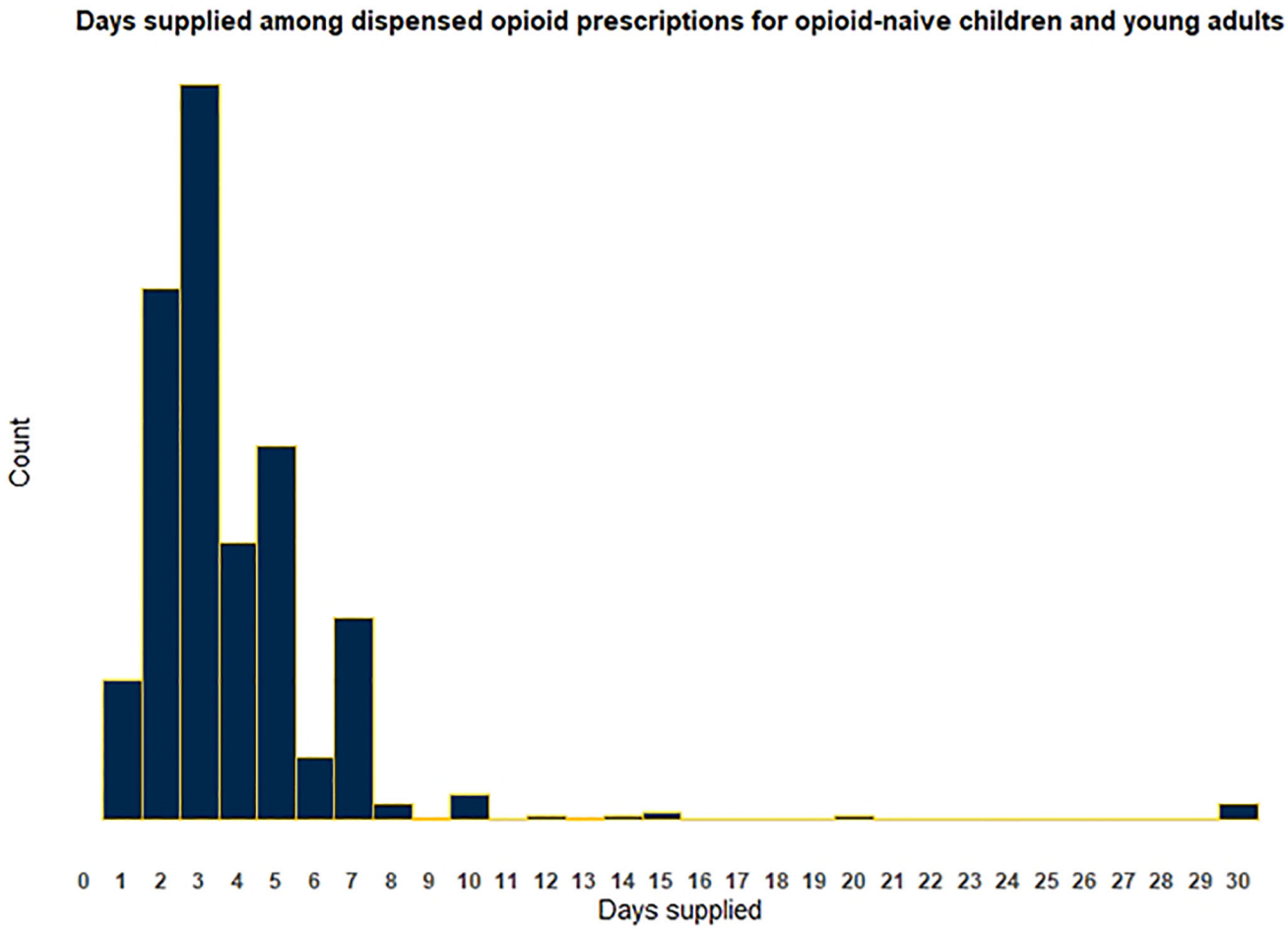

Figure 1.
Distribution of days supplied among dispensed opioid prescriptions for opioid-naïve children and young adults. A total of 3,250,443 opioid prescriptions were dispensed to such patients in 2019. Of these 1,234,208 (38.0%) had days supplied between 4–7 days. Additionally, 2,508 had days supplied exceeding 30 days; these prescriptions are not depicted in this graph owing to their small numbers.

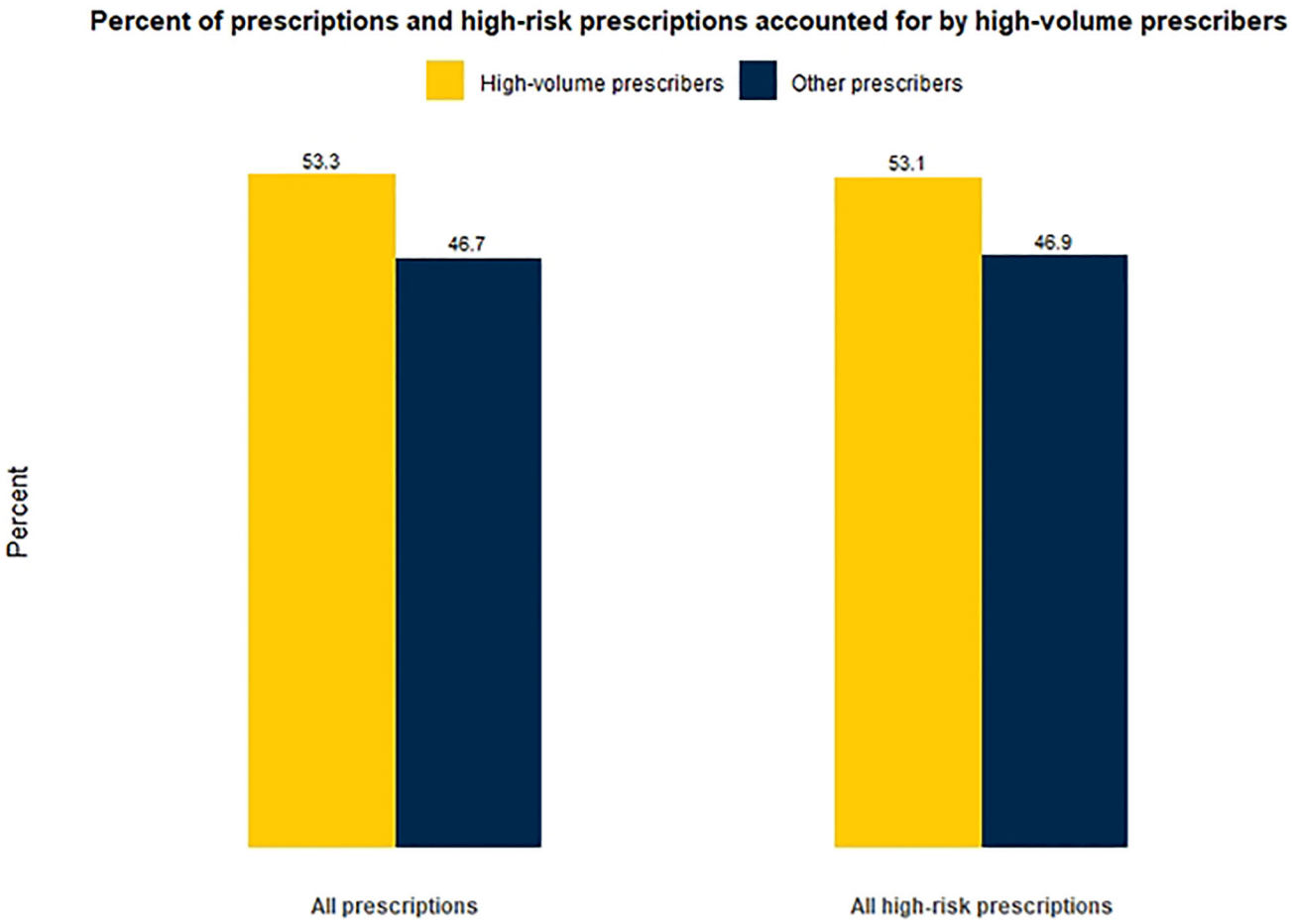

Figure 2.

Percent of pediatric opioid prescriptions and high-risk prescriptions accounted for by high-volume prescribers and other prescribers.

"High-volume prescribers" were the 20,848 prescribers with prescription counts at the 95th percentile or above among all clinicians who accounted for ≥1 dispensed opioid prescription to children and young adults in 2019. "Other prescribers" were the 383,254 prescribers with prescriptions below the 95th percentile. Data source: 2019 IQVIA Longitudinal Prescription Database.

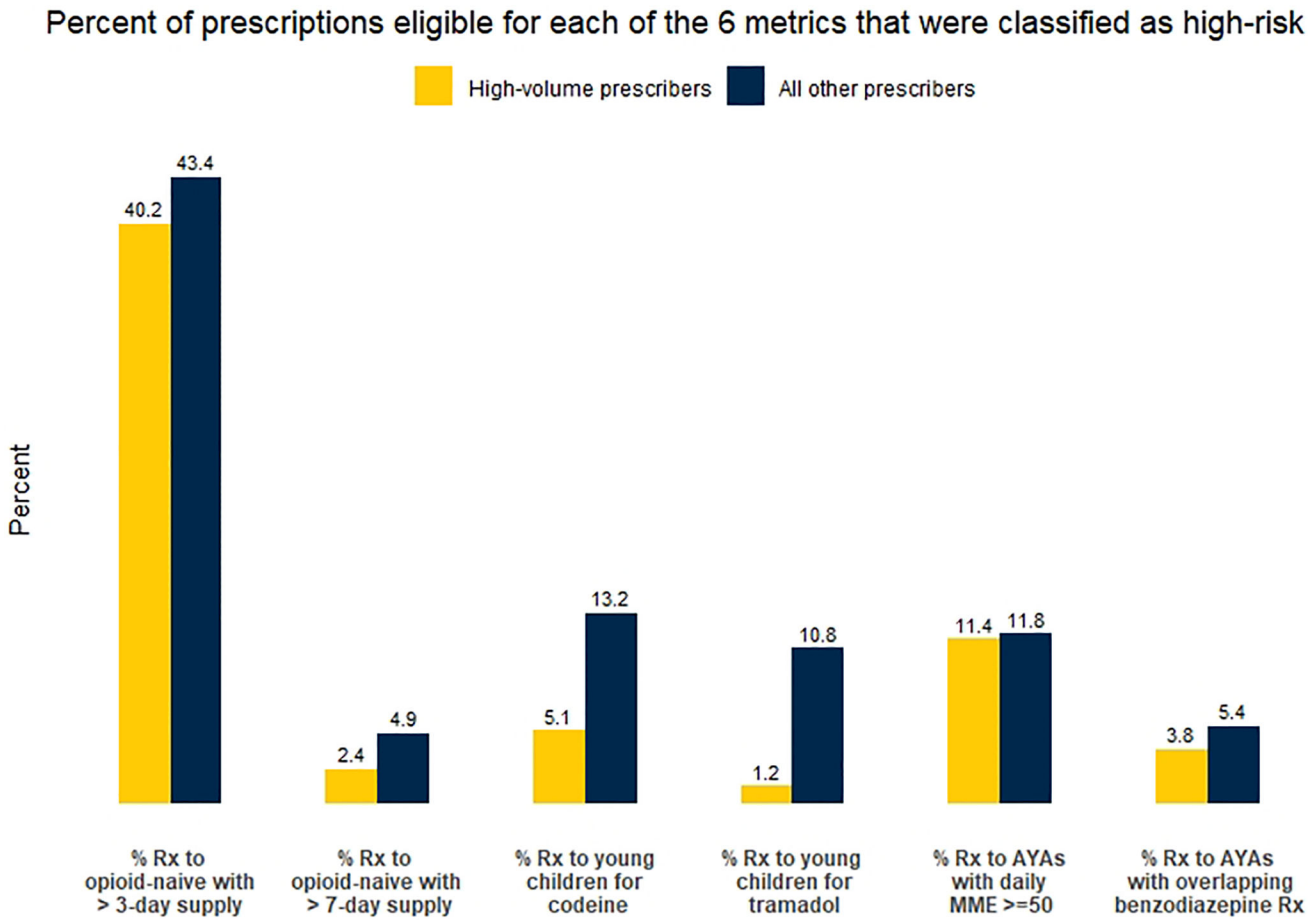

Figure 3.

Percent of eligible opioid prescriptions from high-volume prescribers and other prescribers that were classified as high-risk by 6 metrics

"High-volume prescribers" were the 20,848 prescribers with prescription counts at the 95th percentile or above among all clinicians who accounted for ≥1 dispensed opioid prescription to children and young adults in 2019. "Other prescribers" were the 383,254 prescribers with prescriptions below the 95th percentile. Data source: 2019 IQVIA Longitudinal Prescription Database. AYA – adolescent and young adult; MME – morphine milligram equivalents.

Table 1.

Prevalence of dispensed opioid prescriptions among U.S. children and young adults aged 0–21 years in 2019

	Number of prescriptions (% of total)	Number of patients in database with ≥1 dispensed opioid prescription in 2019	U.S. population denominator from 2019 American Community Survey[a]	Rate of dispensed opioid prescriptions per 100 U.S. children and young adults	Proportion of U.S. children and young adults with ≥1 dispensed opioid prescription in 2019
Overall	4,027,701 (100.0%)	3,131,759	90,657,309	4.4	3.5
Age group					
0–11 years	540,438 (13.4%)	427,241	47,552,304	1.1	0.9
12–21 years	3,487,263 (86.6%)	2,704,518	43,105,005	8.1	6.3
Sex					
Male	1,818,708 (45.2%)	1,430,441	46,439,447	3.9	3.1
Female	2,203,232 (54.7%)	1,696,980	44,217,862	5.0	3.8
Unknown	5,761 (0.1%)	4,338	N/A[b]	N/A[b]	N/A[b]
Census Region					
Northeast	452,473 (11.2%)	364,360	14,426,616	3.1	2.5
Midwest	854,430 (21.0%)	663,939	19,050,769	4.5	3.5
South	1,906,296 (47.3%)	1,446,345	35,350,669	5.4	4.1
West	824,502 (20.5%)	660,969	21,829,255	3.8	3.0

N/A – not applicable

[a] See Appendix 2 for details on obtaining population denominators.

[b] Population denominators for patients of unknown sex could not be calculated. Prevalence estimates for males and females would be slightly higher if patient sex were known for these 5,761 prescriptions.

Table 2.

Performance on two metrics assessing days supplied in opioid prescriptions for opioid-naïve children and young adults[a]

	Proportion of Rx for opioid-naïve patients with days supplied > 3		Proportion of Rx for opioid-naïve patients with days supplied > 7[b]	
	# Rx eligible for metric	# Rx in numerator (%)	# Rx eligible for metric	# Rx in numerator (%)
Overall	3,250,443	1,359,082 (41.8%)	3,250,443	124,874 (3.8%)
Age group				
0–11 years	437,914	234,551 (53.6%)	437,914	40,770 (9.3%)
12–21 years	2,812,529	1,124,531 (40.0%)	2,812,529	84,104 (3.0%)
Sex				
Male	1,478,677	619,295 (41.9%)	1,478,677	60,193 (4.1%)
Female	1,767,313	737,723 (41.7%)	1,767,313	64,127 (3.6%)
Unknown	4,453	2,064 (46.4%)	4,453	554 (12.4%)
Census Region				
Northeast	374,372	121,781 (32.5%)	374,372	9,648 (2.6%)
Midwest	687,665	283,918 (41.3%)	687,665	23,110 (3.4%)
South	1,504,480	656,505 (43.6%)	1,504,480	64,119 (4.3%)
West	683,926	296,878 (43.4%)	683,926	27,997 (4.1%)
Method of payment				
Commercial	2,034,441	797,592 (39.2%)	2,034,441	66,649 (3.3%)
Medicaid or other public insurance	912,743	412,178 (45.2%)	912,743	26,297 (2.9%)
Cash	271,669	129,039 (47.5%)	271,669	25,834 (9.5%)
Medicare[c]	31,590	20,273 (64.2%)	31,590	6,094 (19.3%)

[a]Opioid-naïve patients were those without any dispensed opioid prescriptions during the 90 days to 1 day prior to the dispensing date of the index prescription.

[b]By definition, all prescriptions for opioid-naïve patients with days supplied > 7 days were included among prescriptions for opioid-naïve patients with days supplied > 3 days

[c]Medicare covers children and young adults with end-stage renal disease and some children and young adults with disabilities.

Table 3.

Performance on four age-specific metrics of high-risk prescribing

	Proportion of Rx to young children for codeine		Proportion of Rx to young children for tramadol		Proportion of Rx to adolescents and young adults with daily MME ≥ 50		Proportion of Rx to adolescents and young adults with benzodiazepine overlap	
	# Rx eligible for metric	# Rx in numerator (%)	# Rx eligible for metric	# Rx in numerator (%)	# Rx eligible for metric	# Rx in numerator (%)	# Rx eligible for metric	# Rx in numerator (%)
Age group								
0–11 years	540,438	45,494 (8.4%)	540,438	41,619 (7.7%)	N/A	N/A	N/A	N/A
12–21 years	N/A	N/A	N/A	N/A	3,487,263	402,430 (11.5%)	3,487,263	159,269 (4.6%)
Sex								
Male	298,003	24,340 (8.2%)	298,003	21,146 (7.1%)	1,520,705	187,403 (12.3%)	1,520,705	65,001 (4.3%)
Female	241,208	21,031 (8.7%)	241,208	19,953 (8.3%)	1,962,024	214,469 (10.9%)	1,962,024	94,075 (4.8%)
Unknown	1,227	123 (10.0%)	1,227	520 (42.4%)	4,534	558 (12.3%)	4,534	193 (4.3%)
Census Region								
Northeast	44,250	3,012 (6.8%)	44,250	3,744 (8.5%)	408,223	48,281 (11.8%)	408,223	19,858 (4.9%)
Midwest	115,571	7,477 (6.5%)	115,571	8,703 (7.5%)	729,859	81,814 (11.2%)	729,859	27,899 (3.8%)
South	286,899	28,354 (9.9%)	286,899	23,672 (8.3%)	1,618,397	184,779 (11.4%)	1,618,397	80,367 (5.0%)
West	93,718	6,651 (7.1%)	93,718	5,500 (5.9%)	730,784	87,556 (12.0%)	730,784	31,145 (4.3%)
Method of payment								
Commercial	268,783	22,721 (8.5%)	268,783	22,774 (8.5%)	2,179,080	267,919 (12.3%)	2,179,080	93,839 (4.3%)
Medicaid or other public insurance	184,193	9,252 (5.0%)	184,193	2,304 (1.3%)	922,013	79,380 (8.6%)	922,013	30,315 (3.3%)
Cash	55,311	11,320 (20.5%)	55,311	8,986 (16.2%)	274,914	29,402 (10.7%)	274,914	10,504 (3.8%)
Medicare	32,151	2,201 (6.8%)	32,151	7,555 (23.5%)	111,256	25,729 (23.1%)	111,256	24,611 (22.1%)

MME – morphine milligram equivalents

Young children were those aged 0–11 years; adolescents and young adults were those aged 12–21 years

Table 4.

Opioid prescriptions dispensed to children and young adults in 2019, by prescriber specialty

Specialty	Number of prescriptions	% of all prescriptions
Dentist[a]	1,504,370	38.2
Surgery[b]	918,154	23.3
Physician assistant	282,194	7.2
Emergency medicine[c]	279,478	7.1
Nurse practitioner	218,143	5.5
Family medicine[d]	194,316	4.9
Obstetrics/gynecology[e]	138,889	3.5
Internal medicine[f]	85,539	2.2
General pediatrics	66,376	1.7
Podiatry	59,830	1.5
Pain medicine and anesthesiology[g]	43,359	1.1
Hematology/oncology[h]	37,655	1.0
Physical medicine and rehabilitation[i]	21,059	0.5
Hospice/palliative care	2,599	0.1
All other prescribers[j]	81,434	2.1
Unknown	9,836	0.2
Total[k]	3,943,231	100.0[l]

[a]Includes general dentists, dental subspecialists (anesthesiology, endodontics, orthodontics, pedodontists, periodontics, orthodontics), and oral and maxillofacial surgeons

[b]Includes cardiothoracic, colorectal, general, hand, neurosurgery, ophthalmology, orthopedic surgery, otolaryngology, pediatric, plastic, thoracic, transplant, urology, and vascular surgery

[c]Includes pediatric emergency medicine physicians and emergency medicine physicians in clinical informatics, medical toxicology, sports medicine, and underseas medicine

[d]Includes family medicine physicians in clinical informatics, geriatric medicine, sports medicine, and those dually boarded in family medicine/psychiatry

[e]Includes general obstetrics/gynecology, gynecological oncology, maternal and fetal medicine, reproductive endocrinology and infertility, and female pelvic medicine/reconstructive surgery

[f]Includes internists in sports medicine and geriatrics, and physicians dually boarded in internal medicine and anesthesiology, family medicine, pediatrics, and preventive medicine

[g]Includes non-pain medicine anesthesiology and pain medicine physicians from anesthesiology, neurology, physical medicine/rehabilitation, and psychiatry

[h]Includes pediatric and non-pediatric hematology/oncology

[i]Includes pediatric and non-pediatric physical medicine and rehabilitation. Physical medicine and rehabilitation physicians in pain medicine were classified as pain medicine physicians.

[j] Addiction, aerospace, allergy/immunology, anesthesiology, cardiology, chiropractic, critical care, dermatology, endocrinology, gastroenterology, general practice, genetics, gastroenterology/hepatology, hospitalists, hygienist, infectious disease, legal medicine, microbiology, midwife, military, naturopath, neonatology, nephrology, neurology, neuromuscular medicine, nuclear medicine, nurse, nurse anesthetist, occupational medicine, optometrist, osteopathy, pathology, pharmaceutical medicine, pharmacist, preventive medicine, psychiatry, pulmonology, radiation oncology, radiology, rheumatology, sleep medicine, and toxicology. Also includes pediatricians in the following specialties: adolescent medicine, child abuse, clinical informatics, developmental/behavioral, neurodevelopmental, medical toxicology, sports medicine. These pediatricians accounted for just 673 pediatric opioid prescriptions.

[k] Sample for this analysis includes 3,943,231 prescriptions with non-missing prescriber identifiers

[l] Values in the rows above do not add to 100% owing to rounding error