Outpatient Opioid Prescriptions for Children and Opioid-Related Adverse Events

Cecilia P. Chung, MD, MPH, a S. Todd Callahan, MD, MPH, b William O. Cooper, MD, MPH, b,c William D. Dupont, PhD, d Katherine T. Murray, MD, a Andrew D. Franklin, MD, MBA, e Kathi Hall, BS, f Judith A. Dudley, BS, f C. Michael Stein, MD, a Wayne A. Ray, PhD f

BACKGROUND AND OBJECTIVES: Little is known about opioid prescribing for children without severe conditions. We studied the prevalence of and indications for outpatient opioid prescriptions and the incidence of opioid-related adverse events in this population.

METHODS: This retrospective cohort study between 1999 and 2014 included Tennessee Medicaid children and adolescents aged 2 to 17 without major chronic diseases, prolonged hospitalization, institutional residence, or evidence of a substance use disorder. We estimated the annual prevalence of outpatient opioid prescriptions and incidence of opioid-related adverse events, defined as an emergency department visit, hospitalization, or death related to an opioid adverse effect.

RESULTS: There were 1,362,503 outpatient opioid prescriptions; the annual mean prevalence of opioid prescriptions was 15.0%. The most common opioid indications were dental procedures (31.1% prescriptions), outpatient procedure and/or surgery (25.1%), trauma (18.1%), and infections (16.5%). There were 437 cases of opioid-related adverse events confirmed by medical record review; 88.6% were related to the child’s prescription and 71.2% had no recorded evidence of deviation from the prescribed regimen. The cumulative incidence of opioid-related adverse events was 38.3 of 100,000 prescriptions. Adverse events increased with age (incidence rate ratio = 2.22; 95% confidence interval, 1.67–2.96; 12–17 vs 2–5 years of age) and higher opioid doses (incidence rate ratio = 1.86 [1.45–2.39]; upper versus lower dose tertiles).

CONCLUSIONS: Children without severe conditions enrolled in Tennessee Medicaid frequently filled outpatient opioid prescriptions for acute, self-limited conditions. One of every 2,611 study opioid prescriptions was followed by an opioid-related adverse event (71.2% of which were related to therapeutic use of the prescribed opioid).

WHAT’S KNOWN ON THIS SUBJECT: The discussion of pediatric opioid prescribing has been focused on pain related to major chronic diseases, surgical procedures, or other severe conditions. Little is known about the prevalence and consequences of outpatient opioid prescribing for less serious, often self-limited conditions in children.

WHAT THIS STUDY ADDS: Outpatient opioid prescribing for children in the study was frequent; an estimated 15% received a prescription annually. One in every 2,611 prescriptions was followed by an opioid-related adverse event, most commonly related to therapeutic use of the prescribed opioid.
Although children and adolescents <18 years of age constitute one-quarter of the US population, the controversy regarding opioid analgesics1–3 has been largely restricted to adults. However, there is limited data on the extent to which the well-documented secular trend of increased opioid prescribing and toxicity has affected children. Some studies suggest that the marked increase in prescribing for adults has also occurred among children. In the United States, the number of office visits with an opioid prescription for patients 15 to 19 years of age nearly doubled between 1994 and 2007,4 the treatment of adolescents for opioid overdose has increased,5,6 and the number of pediatric hospitalizations attributed to opioid poisoning doubled from 1997 to 2012.7 Authors of other studies report that the prevalence of opioid use in children has remained constant8 or decreased slightly9,10 since 2010. Further information on the prevalence of opioid analgesic use in children and the reasons for which these medications are prescribed in this population is needed.

The discussion of opioid analgesics in pediatric practice has primarily been focused on pain related to serious chronic diseases, major surgical procedures, or other severe conditions.3,11,12 A recent statement from the Food and Drug Administration on refining guidelines for opioid use suggested that children prescribed these drugs had “severe conditions that include cancer, multisystem trauma and serious chronic diseases such as sickle cell anemia.”13 However, pediatric pain management reviews have considered opioids for less serious conditions,13,14 such as pain occurring after outpatient surgical or dental procedures15,16 and abdominal pain.17 If children frequently take opioids for relatively minor conditions for which there often are other therapeutic options, practitioners need better information on the harms of opioid therapy in children to make informed risk/benefit prescribing decisions. However, the available data are limited to case series of hospitalized children or to case reports.18–20 Furthermore, the pediatric literature has been focused on opioid toxicity related to inadvertent overdose,21 unsupervised use,22 or substance abuse.23 Hence, the incidence of adverse opioid effects for children during appropriate medical use for relatively minor conditions is unknown. Indeed, a recent Food and Drug Administration advisory committee meeting stressed the need for data on outcomes in pediatric patients and concurred that there should be “a balance in providing pain control for pediatric populations and making this population safe from the risks of misuse, abuse, addiction, overdose, and death.”24,25

Thus, we conducted a retrospective cohort study of the outpatient prescribing of opioids in a large population of children and adolescents 2 to 17 years of age. Because our objective was to study opioid use for children without severe conditions, the cohort consisted of children without major chronic diseases (cancer or sickle cell disease) or other severe conditions. Our objectives were to (1) describe the prevalence of outpatient prescriptions for opioid analgesics, (2) characterize the children prescribed these medications (including the prescription indication), and (3) estimate the incidence of opioid-related adverse events and to determine the proportion of these adverse events associated with appropriate therapeutic use.

METHODS

Study Children

Study data came from the Tennessee state Medicaid program, which provides both medical and dental care for qualifying children.26–28 Medicaid files record enrollment, medical encounters, filled prescriptions, inpatient admissions, outpatient visits, and other types of care and are linked to computerized death certificates29 and an “all payers” hospital discharge database.30 These data provided an efficient way to define a large population of children and identify both prescriptions for opioids and potential adverse effects.

The study population consisted of children and adolescents 2 to 17 years of age enrolled in Medicaid between January 1, 1999, and December 31, 2014. To ensure adequate information for study variables, the children selected had to be enrolled for at least 1 year and have recorded medical encounters (including prescriptions) during that year (Supplemental Table 4). They had no previous encounters with diagnoses from the International Classification of Diseases, Ninth Revision, Clinical Modification, procedures from the Current Procedural Terminology, Fourth Edition or medication prescriptions indicating severe underlying conditions (cancer, sickle cell anemia, congenital anomalies, hospitalization for a total of >30 days in the preceding year, or history of an organ transplant), institutional residence, or evidence of a substance use disorder (Supplemental Table 4).

Study Prescriptions for Opioid Analgesics

The study included outpatient prescriptions filled during the study period for children who satisfied the cohort eligibility criteria on the date of the prescription fill (Supplemental Table 4). The study opioids (Supplemental Table 5) excluded parenteral opioids (infrequently prescribed for outpatients), buprenorphine (primarily used as treatment of opioid addiction), and
preparations specifically formulated for cough or diarrhea.

We estimated the dose (milligrams per kilograms per day) for each opioid prescription. We first converted the dispensed dose to morphine equivalents (Supplemental Table 5) and calculated the milligrams per day from the prescription days of supply. Because the Medicaid data do not include weight, we used the age- and sex-specific growth charts from the Centers for Disease Control and Prevention (https://www.cdc.gov/growthcharts/html_charts/wtage.htm#males) to estimate each child’s weight as the median weight for the child’s age (in months) on the day the prescription was filled. The primary analysis included weight-adjusted doses based on tertiles; the respective cutoff points (expressed in morphine equivalents per kilogram per day) were low tertile (\( \leq 0.38 \) mg/kg per day), intermediate tertile (0.38–0.66 mg/kg per day), and high tertile (\( >0.66 \) mg/kg per day). We also performed sensitivity analyses with weight estimates based on the upper and lower quartiles of the Centers for Disease Control and Prevention growth charts.

Each prescription’s indication was assigned with an algorithm that gave priority to temporal proximity to the prescription fill date and the type of medical care (Supplemental Section 3; Supplemental Table 6). When multiple potential indications were noted, we assigned the primary indication in the following order: outpatient procedure and/or surgery, trauma, dental procedure, back pain, other musculoskeletal pain, abdominal pain, headache or other neurologic condition, and infection.

**Opioid-Related Adverse Events**

An opioid-related adverse event was defined as an emergency department (ED) visit, hospital admission, or death related to an opioid adverse effect. Potential cases during follow-up were identified from deaths or medical encounters possibly indicating opioid adverse effects (Supplemental Section 5; Supplemental Fig 3). The medical encounters had to have either a coded diagnosis explicitly indicating an adverse medication effect (opioid or an unspecified medication) or symptoms consistent with an opioid overdose. Medical records were sought for all of these encounters as well as for all deaths (including autopsies when available) during follow-up. Deidentified records were independently adjudicated by 2 study physicians (S.T.C. and C.P.C.), with disagreements resolved by all the investigators.

A confirmed case of an opioid-related adverse event required evidence in the medical record of an adverse effect that could be reasonably attributed to an opioid (Supplemental Section 5; Supplemental Fig 4). The following were the 3 categories of confirmed cases (Supplemental Section 5): (1) probable with symptoms (opioid adverse effect signs or symptoms that could not be reasonably attributed to another cause); (2) probable with intervention (signs or symptoms not recorded in the chart, but there was direct intervention or escalation of care appropriate to manage a potential opioid adverse effect); and (3) possible (opioid adverse effect signs or symptoms, but another potential cause was documented).

Case severity was assessed by determining if the medical record documented an opioid-related intervention or escalation of care (Supplemental Section 5) or if there was hospitalization or death. Medical records were used to identify the source of the opioid implicated in the adverse reaction (the patient’s prescription or other source) and characterize the circumstances of the opioid use as (1) therapeutic use (no documentation indicating deviation from the prescribed regimen, overdose, or substance use disorder), (2) unintentional overdose, or (3) substance use disorder and/or self-harm.

The analysis of opioid-related adverse events was restricted to prescriptions filled between 1999 and 2011. This cutoff date of 2011 was due to the long lead time required to identify medical care providers, seek permission to review records (with human subjects committee submissions), obtain the records by an on-site visit if necessary, and perform deidentified case adjudication.

**Analysis: Opioid Prescription Prevalence**

For each study year, we calculated the annual opioid prescription prevalence. The numerator was the number of children with 1 or more qualifying study opioid prescriptions filled during a given year. The denominator was the study population size during that same year, calculated as the number of children enrolled in TennCare on July 1 who on that date met the study eligibility criteria (Supplemental Table 4).

**Analysis: Opioid-Related Adverse Events**

The prescription exposure period (follow-up for opioid-related adverse events) extended from the prescription fill date through 14 days after the end of the prescribed days of supply (Supplemental Section 4). The exposure period was further classified as current use (filling of the prescription through the end of days of supply) and recent use (additional 14 days after the end of days of supply). Although the greatest risk for adverse effects should be during current use, the exposure period included recent use to account for pro re nata prescriptions. It was suggested in a pilot study that more than one-third of cases of opioid-related adverse
events occurred during the recent use period. We also classified the exposure period according to days since the prescription fill (1–3, 4–7, ≥8) because some adverse effects are more likely to occur early in therapy. We estimated the cumulative incidence of opioid-related adverse events during the prescription exposure period with the product-limit method. To test for differences in incidence according to current versus recent use and dose, we modeled the incidence rate ratio (IRR) with Poisson regression. In this analysis, both the person-days of each prescription exposure period and the study cases were allocated to the appropriate covariate categories. The multivariate model included sex, age category, calendar year, days since the prescription fill, current versus recent use, and dose. The primary analysis included multiple instances of adverse events for the same child (0.5% of cases); an analysis in which we excluded these had essentially identical results. All analyses were done by using Stata/MP 13.1 (Stata Corp, College Station, TX).

**Human Research Protection**

The study was approved by the Bureau of TennCare and the Institutional Review Boards of Vanderbilt University School of Medicine and the Tennessee Department of Health, which waived informed consent.

**RESULTS**

**Opioid Prescription Prevalence**

During the study period, the population included an annual mean of 401,972 children enrolled in TennCare without severe conditions or diagnosed substance abuse disorders. These children had 1,362,503 filled outpatient prescriptions for opioid analgesics, of which 269,602 (19.8%) were for children 2 to 5 years of age, 377,823 (27.7%) were for children 6 to 11, and 715,078 (52.5%) were for children and adolescents 12 to 17. Of these children, a mean of 15.0% (annual range: 10.2%–17.2%) had 1 or more filled opioid prescriptions each year (Fig 1A). Children and adolescents 12 to 17 years of age were the most likely to be prescribed opioids (Fig 1B); for these children, the mean annual opioid prescription prevalence was 22.4% (15.8%–26.0%). The mean annual opioid prescription prevalence was lower for younger children (Fig 1C).
For children 2 to 5 years and 6 to 11 years of age, the respective mean annual opioid prescription prevalences were 11.2% (range: 7.6%–13.1%) and 12.1% (range: 7.9%–14.1%).

For each age group, the annual prescription prevalence declined after 2009. By 2014, the annual opioid prescription prevalences were 10.2% for all children and 7.6%, 7.9%, and 15.8%, respectively, for those 2 to 5, 6 to 11, and 12 to 17 years of age.

Characteristics of Children With Opioid Prescriptions

Of the study prescriptions, 52.0% were for female patients (Table 1). There were 6.5% of prescriptions for children with disability-related enrollment and 11.5% for children hospitalized in the previous year.

For study opioid prescriptions with an identified indication (85.1%; Table 1), the most common indications were dental procedures (31.1%), outpatient surgical or medical procedures (25.1%), trauma (18.1%), and minor infections (16.5%), most frequently ear, nose, throat, and/or upper respiratory infections. For children 2 to 5 years of age, 23.7% of prescriptions had an infection indication.

The median prescription exposure period included 3 days of current use and 14 days of recent use, for a total study exposure of 17 days. The median opioid dose was between 0.5 and 0.6 mg/kg per day (morphine equivalents). The most commonly prescribed individual opioids (Table 1) were hydrocodone (42.1% of prescriptions), codeine (40.2%), meperidine (5.2%), oxycodone (4.6%), and tramadol (2.9%). Meperidine was prescribed more frequently for children 2 to 5 years of age (10.8% of prescriptions), whereas oxycodone and tramadol were prescribed more frequently for children and adolescents 12 to 17 years of age (8.2% and 5.3% of prescriptions, respectively).

Opioid-Related Adverse Events

We identified 1179 potential opioid-related ED visits, hospitalizations, or deaths between 1999 and 2011. Medical records with sufficient information for adjudication were retrieved for 917 (77.8%) potential cases (Supplemental Fig 3), of which 437 were confirmed cases that met the criteria for an opioid-related adverse event (Supplemental Fig 4). Of these cases, 272 (62.2%) were adjudicated as probable with...
In 337 patients, symptoms associated with opioid toxicity were determined to be the main reason for the ED visit. In 15 patients, there was another reason for the visit, but opioid toxicity was part of the encounter. Each of the 3 deaths had an autopsy, the underlying cause of death was an adverse medication effect, and there was evidence that the death was related to the prescribed opioid. The most frequent opioid-related symptoms were gastrointestinal (30.7%), neuropsychiatric (27.5%), dermatologic (23.3%), and central nervous system (CNS) depression (22.2%). For 88.6% of cases, the opioid prescribed for the child was implicated in the adverse event. For 71.2% of cases, there was no recorded evidence of deviation from the prescribed regimen.

The characteristics of opioid-related adverse events during current use were greater than that observed during recent use (Table 3; reference group of children 2–5 years of age) was 2.22 (95% CI, 1.67–2.96).

The adjusted incidence of opioid-related adverse events increased with increasing dose; the adjusted IRRs for the high and intermediate dose tertiles were 1.86 (95% CI, 1.45–2.39) and 1.59 (95% CI, 1.23–2.04), respectively. Sensitivity analyses used to restrict the cases to those adjudicated as probable with symptoms of opioid adverse effects had essentially identical findings (Supplemental Table 10).

## DISCUSSION

Outpatient use of prescribed opioids in this large cohort of children without severe conditions was common. During the study period, 15% of children in the qualifying Medicaid population had a filled
outpatient opioid prescription annually, including >10% of children 2 to 5 years of age. The primary indications for these prescriptions were acute and, in most cases, self-limited conditions (dental procedures, outpatient surgical or medical procedures, trauma, and minor infections).

The prevalence of opioid prescriptions for children in the study peaked in 2009 and subsequently decreased through 2014, which is consistent with other recent data from pediatric populations and secular trends in adults. This decrease may be related to several factors, including greater awareness of the potential harms of widespread opioid use and a prescription drug monitoring program started in Tennessee in 2012. Nevertheless, the prevalence of opioid prescriptions for children in the study remained >10% by 2014. The frequent prescribing of opioids in this population, including codeine, which now is considered a suboptimal analgesic choice for children, underscores the need for education regarding multimodal opioid-sparing regimens.

One of every 2611 opioid prescriptions for the children in the study was followed by an opioid-related ED visit, hospitalization, or death. The incidence of opioid-related adverse events increased for children and adolescents 12 to 17 years of age, during current opioid use, and with higher opioid doses. Because we sought to minimize false-positive study events, our findings

FIGURE 2
Cumulative incidence of opioid-related adverse events. A, Cumulative incidence of opioid-related adverse events, all ages. B, Cumulative incidence of opioid-related adverse events, by age category. Indicates the median follow-up of 17 days.

TABLE 3 Incidence of Opioid-Related Adverse Events According to Age Category, Timing of Use, Days Since Prescription Filled, and Dose Tertile

<table>
<thead>
<tr>
<th>Prescription Exposure Period, d</th>
<th>N Cases</th>
<th>Incidence per 100000 d</th>
<th>IRR (^{a}) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age category, y</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12–17</td>
<td>9380221</td>
<td>310</td>
<td>3.3</td>
</tr>
<tr>
<td>6–11</td>
<td>5303297</td>
<td>71</td>
<td>1.3</td>
</tr>
<tr>
<td>2–5</td>
<td>3997444</td>
<td>56</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Timing of use</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>5048647</td>
<td>263</td>
<td>5.2</td>
</tr>
<tr>
<td>Recent</td>
<td>13632315</td>
<td>174</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Days since prescription filled, d</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–3</td>
<td>3339652</td>
<td>229</td>
<td>6.9</td>
</tr>
<tr>
<td>4–7</td>
<td>4203528</td>
<td>87</td>
<td>2.1</td>
</tr>
<tr>
<td>≥8</td>
<td>11137784</td>
<td>121</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Dose (mg/kg per d) tertile</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6075031</td>
<td>177</td>
<td>2.9</td>
</tr>
<tr>
<td>Intermediate</td>
<td>6426759</td>
<td>160</td>
<td>2.5</td>
</tr>
<tr>
<td>Low</td>
<td>6175172</td>
<td>100</td>
<td>1.6</td>
</tr>
</tbody>
</table>

—, not applicable.

\(^{a}\) The Poisson regression model for adjusted IRRs includes age (2–5, 6–11, and 12–17 years), sex, current versus recent use, days since the prescription fill (1–3, 4–7, and ≥8), dose tertile by age, and calendar year (1999–2003, 2004–2007, and 2008–2011). Current use was defined as the time between the filling of the prescription and the end of the days of supply. Recent use was defined as the additional 14 days after the end of the days of supply.
are likely to underestimate the incidence of opioid-related adverse events in children. First, unlike other definitions, opioid-related adverse events managed with a physician visit or not resulting in medical care encounters were not considered. Second, records with diagnoses of less serious symptoms (gastrointestinal or dermatologic) were not sought unless a coded diagnosis indicated an adverse drug effect and did not attribute the effect to a different drug. Finally, the medical records required for case confirmation were unavailable for 22.2% of potential cases. Thus, our study provides a conservative estimate of the clinical impact of adverse opioid effects in children. In 89% of the opioid-related adverse events, the implicated opioid came from the child’s prescription, and, in two-thirds of the cases, there was no recorded evidence of deviation from the prescribed regimen. In contrast, in many pediatric case reports, opioid adverse effects are attributed to errors in administration, unsupervised use, use of leftover medications, or ingestion of opioids from another person’s prescription. Our finding that nontherapeutic opioid use did not account for the majority of opioid-related adverse events in patients who received outpatient opioid prescriptions suggests that efforts to improve opioid safety in children must go beyond the reduction of administration errors or inappropriate use.

More than 20% of the children and adolescents 12 to 17 years of age in the study were prescribed an opioid annually. Although the opioids implicated in the adverse events for these children predominantly were those prescribed, more than one-fourth of the adolescent cases were attributed to substance use disorder or attempted self-harm. These findings indicate that extra precautions may be needed when prescribing opioids to adolescents for acute, self-limited conditions, given the increased likelihood of risk-taking during this developmental period. The opioid-related adverse events identified from ED visits included less serious reactions, such as nausea, constipation, pruritus, and rash. Although not life-threatening, these symptoms did lead to additional medical care encounters, which entail both inconvenience and additional costs. These findings underscore the need to develop more comprehensive pediatric guidelines for the treatment of acute, self-limited conditions, which should balance both the unnecessary exposure of children to increased risk of adverse opioid effects and the potential for undertreatment of painful short-term conditions.

The generalizability of the study findings may be limited because of the characteristics of the study cohort. To better identify indication, we required that cohort inclusion be dependent on active use of medical care in the past year, which could underrepresent the healthiest children. The cohort came from Medicaid enrollees from a single state in a region with known elevated prevalence of opioid use for adults. Furthermore, ED use differs according to Medicaid status, with greater use of services for less severe conditions. However, children enrolled in Medicaid constitute an important population per se, because an estimated 38% of US children have health insurance coverage by Medicaid. The study relied upon a large computerized database used to identify both the cohort and potential opioid-related adverse events. Thus, it lacked important clinical detail. For example, because the Medicaid files did not include weight, the analysis of dose was based on national growth charts and was subject to misclassification. However, the large database did permit characterization of opioid prescribing and related adverse events in a large, well-defined pediatric population.

Our study had several other limitations. We relied on medical records that may be incomplete to adjudicate potential cases and to identify the circumstances of the opioid-related adverse effects, including the source of the implicated opioid. Because all children in the study had a recent opioid prescription, adjudicators could not be blinded to opioid exposure status; however, the adjudication process used a structured protocol and required agreement by 2 independent reviewers, with disagreements resolved by all investigators.

CONCLUSIONS

In this cohort of children enrolled in Medicaid without severe conditions, 15% of children filled outpatient opioid analgesic prescriptions annually for acute, self-limited conditions. One of every 2611 study opioid prescriptions was followed by an opioid-related ED visit, hospitalization, or death; more than two-thirds of these were related to therapeutic use of the prescribed opioid.

ACKNOWLEDGMENTS

We acknowledge the Bureau of TennCare and the Tennessee Department of Health, which provided study data.

ABBREVIATIONS

CI: confidence interval  
CNS: central nervous system  
ED: emergency department  
IRR: incidence rate ratio
REFERENCES


21. Gunn VL, Taha SH, Liebelt EL, Serwint JR. Toxicity of over-the-counter cough


34. Tobias JD, Green TP, Coté CJ; Section on Anesthesiology and Pain Medicine; Committee on Drugs. Codeine: time to say “no”. *Pediatrics.* 2016;138(4):e20162396


44. Kaiser Family Foundation. Health insurance coverage of children 0-18. Available at: https://www.kff.org/other/state-indicator/children-0-18/?currentTimeframe=0&sortModel=1("colid":"Location","sort":"asc"). Accessed May 24, 2018
Outpatient Opioid Prescriptions for Children and Opioid-Related Adverse Events


Pediatrics 2018;142;
DOI: 10.1542/peds.2017-2156 originally published online July 16, 2018;

Updated Information & Services
including high resolution figures, can be found at:
http://pediatrics.aappublications.org/content/142/2/e20172156

References
This article cites 38 articles, 7 of which you can access for free at:
http://pediatrics.aappublications.org/content/142/2/e20172156#BIBL

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
Pharmacology
http://www.aappublications.org/cgi/collection/pharmacology_sub

Permissions & Licensing
Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
http://www.aappublications.org/site/misc/Permissions.xhtml

Reprints
Information about ordering reprints can be found online:
http://www.aappublications.org/site/misc/reprints.xhtml
Outpatient Opioid Prescriptions for Children and Opioid-Related Adverse Events


Pediatrics 2018;142;
DOI: 10.1542/peds.2017-2156 originally published online July 16, 2018;

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://pediatrics.aappublications.org/content/142/2/e20172156

Data Supplement at:
http://pediatrics.aappublications.org/content/suppl/2018/07/13/peds.2017-2156.DCSupplemental