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# Original Reports

## Assessing Controlled Substance Prescribing Errors in a Pediatric Teaching Hospital: An Analysis of the Safety of Analgesic Prescription Practice in the Transition From the Hospital to Home

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**Abstract:** **Iatrogenic errors producing serious and often preventable injury occur frequently in hospitalized patients, particularly in children. Little is known about the epidemiology of analgesic medication errors in patients being discharged from the hospital. The goal of this study was to describe the epidemiology of controlled substance prescription errors by physicians-in-training for children being discharged from the hospital. We conducted a prospective, observational study of the analgesic prescriptions and discharge forms of 241 pediatric patients discharged from a Children's Center of a major urban teaching hospital from November 2003 to April 2004. All patients who were actively followed by the Pediatric Pain Service at the time of their discharge and were discharged with an analgesic prescription were included in the study. Primary outcome variables were the percentage of prescriptions that contained at least 1 medication error or potential adverse drug event. Errors were defined using the Institute for Safe Medication Practices' (ISMP) List of Error-Prone Abbreviations, Symbols, and Dose Designations, literature review, expert panel consensus, and the Johns Hopkins Department of Pharmacy hospital formulary. Two hundred forty-one patients who received 314 prescriptions were included in this study. Prescription errors were common; 257 of 314 (82%) of the prescriptions examined contained 1 or more errors. The most common errors were missing or wrong patient weight (n = 127, 77%), incomplete dispensing information (n = 167, 53%), and no or wrong date on prescription (n = 19, 6%). Nine prescriptions (2.9%) had the potential for significant medical injury and were considered potential adverse drug events. Discharge prescription errors for children requiring potent, opioid analgesic drugs in the management of pain are common, and nearly 3% could cause significant harm. The high rate of prescribing errors highlights the importance of developing, testing and implementing effective error-prevention strategies, especially in high-risk medications such as narcotics.**

***Perspective:*** ***Narcotic prescriptions written by trainees at discharge from a pediatric hospital are error prone and nearly 3% have the potential to cause significant harm. With a low therapeutic profile, the hospital may consider a review/verification process to reduce the risk of patient harm.***



***Key words:*** *Patient safety, narcotics, medical error, prescribing, children.*

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Iatrogenic errors producing serious and often preventable injury occur frequently in hospitalized patients.[3] The landmark 1999 report by the Institute of Medicine "To Err is Human," estimated that iatrogenic injury results in 44,000 to 98,000 preventable deaths in the United States each year.[9] Although there has been some controversy about the accuracy of these estimates, many studies have found that hospitalized patients commonly have adverse events related to medical therapy and that many of these injuries are preventable.[1-3,12] Medication errors are the most common type of iatrogenic errors.[12] Children have a 3-fold greater risk of having a potentially harmful medication error than adults and are more likely to be harmed.[7] In children, drug doses are usually calculated individually on the basis of age, weight, and clinical condition, and the difference between therapeutic and toxic drug levels is smaller than for adults. Additionally, young children, and newborn infants in particular, often have less reserves than most adults to buffer errors, and young children have less developed communication skills with which to recognize or communicate potential mistakes or to describe signs of adverse effects.[7,16,28]

Medication errors can occur during drug ordering, transcribing, dispensing, administering, and monitoring. Some studies estimate that most adverse drug events (ADEs) occur at the stage of prescription writing or drug ordering (68% to 75%).[23,27] These mistakes involve incorrect dosing or dose calculation, incorrect medication, failure to use "best prescription writing practice" (eg, decimal points, units, and abbreviations), handwriting legibility, and dosage forms.[6,27] Errors involving opioid analgesics are among the most pernicious. However, little is known about the epidemiology of analgesic medication errors in patients being discharged from the hospital. In a recent study of the prevalence of potential outpatient medication dosing errors in children from 3 health maintenance organizations, analgesic medications were the most likely to involve prescription overdosage errors.[18] The specific aim of this study was to describe the epidemiology of controlled substance prescription errors and deviation from hospital "best practice" guidelines by physicians-in-training (who write all the outpatient prescriptions in our institution) for children being discharged from the hospital.

## Methods

### Study Design and Patient Population

This prospective study was conducted by the Pediatric Pain Service at the Children's Medical and Surgical Center of the Johns Hopkins Hospital, a major urban teaching hospital with a socioeconomically diverse patient population. The Johns Hopkins Hospital treats both adult and pediatric patients but has a geographically and administratively distinct children's hospital within the hospital. This study was approved by the institutional review board and a waiver of informed consent was provided. Patients who were admitted to the Children's Medical and Surgical Center of the Johns Hopkins Hospital and who received a consultation by the Pediatric Pain Service were studied on discharge from the hospital if they received a narcotic prescription written by their primary service. Narcotic prescriptions were defined as United States Drug Enforcement Agency Class 2-5 drugs and included opioids and benzodiazepines.

### Outcome Variables

Our primary outcome variables were the percentage of prescriptions that contained at least 1 prescribing medication error or potential adverse drug event. Prescribing medication errors and "best practice" guidelines were defined a priori, based on the Institute for Safe Medication Practices' (ISMP) List of Error-Prone Abbreviations, Symbols, and Dose Designations, a combination of literature review and expert panel consensus, and the Johns Hopkins Medicine Department of Pharmacy hospital formulary.[6,22] Deviations from "best practice" guidelines were categorized as missing/omitted information, dosing errors, incomplete information, and patient identification errors (Table 1). The prescriptions were also reviewed to determine the severity of the deviations from the a priori consensus-based guidelines (Table 2).[17,25] The severity of the deviations was rated by the researchers (BHL) on a scale from 1 to 5 (with 1 = insignificant to 5 = severe), based on previously published guidelines, which were slightly modified for analysis of prescriptions. Prescriptions containing multiple deviations were assigned a single severity score, determined by the most significant deviation present. Prescriptions with severity scores of 3 or greater were considered prescribing errors. Potential ADEs were defined as prescription orders that have the potential to result in significant medical injury if the prescription were filled and the drug administered as ordered by the health care provider.

A prescription that met "best practice" or safe prescription writing guidelines contained no prescribing medication errors and no error-prone abbreviations, symbols, or dose designations as defined by the Institute

**Table 1. Type of Prescription Errors**

| |
|---|
| Wrong formulation is written. |
| Wrong dose of medication is written. |
| No weight or age (or birth date) recorded on the prescription (or incorrect weight) in patients weighing <40 kg. |
| No information on dose/kg body weight (ie, mg of drug/kg of body weight) for patients weighing <40 kg. |
| Frequency of the medication is significantly out of the range commonly accepted without overdosing or underdosing (potential lack of efficacy). |
| No date listed on the prescription. |
| Medication is prescribed when there is likely the potential for an allergic reaction. |
| Illegible prescription. |
| Illegible signature or printed name. |
| Medication is prescribed to the wrong person or is in the wrong chart. |
| Wrong instructions are given for a medication (eg, crush OxyContin tablet). |
| Wrong medication is written. |