

# Associations between opioid prescribing patterns and opioid overdose among adolescents in the USA

Cornelius B Groenewald, MB,ChB, William C. Van Cleve MD MPH  
Seattle Children's Hospital Research Institute, and University of Washington School of Medicine

## Background

- Prescription opioid overdose is a serious public health concern affecting adolescents in the United States.
- Yet it is unknown whether individual differences in opioid prescribing, such as number of opioid tablets prescribed or type of opioid prescribed, are independent predictors of opioid overdose among adolescents.
- This is a major gap in knowledge that, if addressed, would provide important information on the risks and benefits associated with opioid prescribing to adolescents in the United States

## Aims and Hypotheses

**Aim 1:** Determined the rate of overdose among opioid-naïve adolescents who received opioid prescription during 2007-2014.

**Aim 2:** Determine whether patterns of opioid prescribing correlate with risk for opioid overdose. Specifically, we hypothesized that number of tablets of opioid at prescription would be correlated with probability of opioid overdose.

**Hypothesis:** Greater number of opioid tablets would be correlated with probability of opioid overdose.

## Methods: Sample and Procedures

**Database:** Truven Health MarketScan Commercial Clams and Encounters database for the years 2007-2014

**Participants:** Cohort included 1,2 million commercially insured adolescents, 10-17 years old, who received an opioid between 2007-2014.

## Methods: Measures

### Opioid users:

Opioids prescribed during outpatient visits, including oxycodone; hydrocodone, codeine, morphine, hydromorphone, meperidine, and tramadol.

Indicators of opioid prescriptions filled included number of tablets, number of days prescribed, and number of prescriptions.

### Opioid overdose:

The primary outcome variable was an opioid overdose event following an opioid prescription.

Similar to previous studies we define opioid overdose by the presence of one or more ICD-9 diagnostic codes for opioid poisoning (ICD9-CM codes 965.00, 965.02, 965.09, E850.1, and E850.2). We included all emergency department visits and observation admissions with these ICD-9 codes.

### Sociodemographic variables:

Data on sex, age, and region of the United States was collected for each participant.

## Methods: Data Analysis

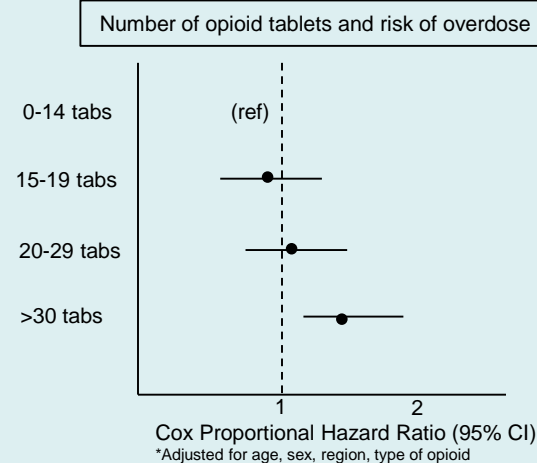
We developed multivariable Cox proportional hazards models to examine the relationship of opioid use measures and risk of opioid overdose adjusting for sociodemographic and opioid use characteristics.

## Results: Rate of overdose among opioid users

Of the 1,242,818 adolescents who received an opioid prescription, 472 had an opioid overdose event.

Thus, we estimated that the rate of opioid overdose events was 0.04% (0.4 per 1000) adolescent opioid users.

## Results: Risk of overdose



- Risk for opioid overdose events in adjusted Cox proportional hazards regression increased by 1.53 (95% CI: 1.18-1.99;  $p < 0.05$ ) fold if adolescents received >30 pills at their first prescription
- Male sex (HR=0.6; 95% CI: 0.5-0.8) and younger age (HR=0.9; 95% CI: 0.8-0.95) was associated with a decreased risk for overdose.

## Conclusions and Future Directions

- Greater amount of tablets associated with increased risk for overdose
- Future research should examine associations between opioid dose and frequency and overdose risk