Trends in Injection Drug Use Among High School Students, U.S., 1995–2013

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Introduction: Injection drug use is the most frequently reported risk behavior among new cases of hepatitis C virus infection, and recent reports of increases in infection are of great concern in many communities. This study assessed the prevalence and trends in injection drug use among U.S. high school students.

Methods: Data were from CDC's Youth Risk Behavior Surveillance System, which collects information on health risk behaviors at the national, state, and large urban school district levels. Analyses were conducted in 2014.

Results: In 2013, 1.7% of high school students nationwide had ever injected any illegal drug. Nationwide, ever injecting any illegal drug did not change significantly from 1995 to 2013, except among black non-Hispanic students. For this subgroup, both a significant linear increase from 1995 to 2013 and a significant quadratic trend were observed, with injection drug use increasing from 1995 to 2009 and decreasing from 2009 to 2013. Significant linear increases in injection drug use occurred in five states (Arkansas, Hawaii, Maine, Maryland, and New York) and six large urban school districts (Baltimore, Memphis, Miami–Dade County, New York City, Philadelphia, and Seattle). Significant linear decreases occurred in three states (Massachusetts, South Dakota, and West Virginia). Both a significant linear increase and quadratic trend were observed in Maine; quadratic trends were observed in Tennessee, Utah, and Palm Beach County, Florida.

Conclusions: In some geographic areas and population groups, an increasing or high frequency of injection drug use was found among high school students, who should be targeted for prevention.
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Introduction

In the U.S., injection drug use (IDU) is a significant public health problem with many health complications,[1–3] including an increased risk of infectious disease.[4] A major health concern is infection with hepatitis C virus (HCV), which is most efficiently transmitted through contaminated needles and other equipment used for injecting.[5] Moreover, IDU is a considerably more prevalent route of transmission for HCV than for other bloodborne pathogens such as hepatitis B virus[6] or HIV.[7] In the U.S., an estimated 2.7 million non-institutionalized people are living with HCV infection.[8] Injection drug users usually become infected with HCV soon after injection initiation; about 59% become infected with HCV after just 1 year of injecting.[9] Although HIV prevention programs in the U.S. have succeeded in decreasing new HIV infections,[10] similar declines have not been achieved in the prevention of HCV.[11]

IDU is also the most frequently reported risk behavior for cases of new HCV infection.[12] Reports of increases in HCV transmission related to drug injection have become a source of great concern and urgency in many communities.[13] Indeed, from 2007 to 2012, reports of new HCV infections increased 50% nationally.[12] Studies of clusters of reported HCV infections indicate that most cases occur among older adolescents and young adults, particularly in non-urban areas of the U.S. Northeast,[14] Midwest,[15] and Appalachian region.[16] A special study of newly diagnosed HCV infection found that 11% of cases were aged <20 years.[17] Studies also show that both IDU and non-IDU behaviors often begin

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during adolescence.[18,19] To broaden the understanding of IDU behavior among youth, a study was conducted to assess the prevalence and trends in IDU among U.S. high school students.

Methods

Study Sample

Data for this study were from CDC's Youth Risk Behavior Surveillance System (YRBSS),[20,21] which monitors health risk behaviors among youth and young adults in the U.S. The YRBSS includes a national school-based Youth Risk Behavior Survey (YRBS) conducted by CDC and state- and large urban school district school–based YRBSs conducted by state and local education and health agencies. For the current study, data were analyzed from the national and the state and large urban school district surveys for the years 1995–2013. Analyses were conducted in 2014.

The national YRBS is a cross-sectional survey that has been conducted biennially since 1991. In each survey year, a similar independent three-stage, cluster sample design was used to obtain a nationally representative sample of public and private school students in Grades 9–12 in the 50 states and District of Columbia.[21] School response rates during the years 1995–2013 ranged from 70% to 81%, student response rates ranged from 83% to 88%, and overall response rates (the product of the school and student response rates for each year) ranged from 60% to 71%. Sample sizes ranged from 10,904 to 16,410.

State and large urban school district data were used only if the site's overall response rate was ≥60% in any given year. Further, only sites measuring the prevalence of having ever injected any illegal drug in 2013 were included in this study. Of the 47 states and 22 large urban school districts that conducted a YRBS in 2013, 29 state and 16 large urban school districts met these criteria and were included in this analysis. State and large urban school district surveys also were conducted biennially and used a two-stage, cluster sample design to produce a representative sample of students in Grades 9–12 in each jurisdiction. Most sites included all regular public schools in their sampling frames, but Ohio and North Dakota also included private schools.

Survey Administration

Data collection protocols are similar for national, state, and large urban school district surveys. Local procedures for obtaining parental permission are followed before administering the YRBS in any school. Student participation in the YRBS is anonymous and voluntary. Survey participants complete a self-administered questionnaire during a regular class period and record their responses on a computer-scannable questionnaire booklet or answer sheet. CDC's IRB approved the protocol for the national YRBS. State and large urban school districts followed local IRB policies and procedures.

The YRBS instrument measures six categories of health-risk behaviors:

1. behaviors that contribute to unintentional injuries and violence;
2. tobacco use;
3. alcohol and other drug use;
4. sexual behaviors that contribute to unintended pregnancy and sexually transmitted infections, including HIV infection;
5. unhealthy dietary behaviors; and
6. physical inactivity.[20,21]

Beginning in 1995, the following question was included on the YRBS: *During your life, how many times have you used a needle to inject any illegal drug into your body?* Response options were dichotomized into zero times and one or more times. Additional information about the YRBSS is available at www.cdc.gov/yrbs.

Statistical Analysis

To account for the complex sample design of the survey, all analyses were conducted using SUDAAN, version 11.0.1. In the national surveys, a weight based on student sex, race/ethnicity, and grade was applied to each record to adjust for school and student nonresponse and oversampling of black and Hispanic students. For the state and large urban school districts, a weight was applied to each student record to adjust for student nonresponse and the distribution of students by grade, sex, and race/ethnicity in each jurisdiction. Missing data were not imputed.

For the 2013 national YRBS data, *t*-tests were used to determine pairwise differences in IDU by sex, race/ethnicity, and grade. Logistic regression models were used to identify temporal changes in IDU based on prevalence estimates from the earliest year of data collection (1995 in most sites) to 2013. Logistic regression models controlled for sex, grade, and race/ethnicity, assessing linear time effects when there were ≥2 years of data and quadratic time effects when there were ≥6 years of data.[22] A quadratic time effect indicates a significant but nonlinear trend over time. A temporal change that includes a significant linear and quadratic time effect demonstrates nonlinear variation (e.g., leveling off or change in direction) in addition to an overall increase or decrease over time. Linear and quadratic time variables were treated as continuous and were coded using orthogonal coefficients calculated with PROC IML in SAS, version 9.3. Proc IML allows for customization of the number of survey years available for analysis in each survey site and identification of both linear and quadratic orthogonal coefficients simultaneously. When a significant quadratic trend was detected, Joinpoint, version 4.1.1 (surveillance.cancer.gov/joinpoint/) was used to identify the year or "joinpoint" where the quadratic trend leveled off or changed in direction. Then two logistic regression models were used to assess linear trends in the segments before and after the joinpoint so that each segment could be described as having increased, decreased, or leveled off. For all analyses, a p-value <0.05 was considered statistically significant.

Results

In 2013, 1.7% of high school students nationwide reported ever IDU (Table 1). The prevalence of ever IDU was higher among male (2.2%) than among female (1.3%) students ($p<0.001$), but did not differ significantly by race/ethnicity or grade (data available on request). Nationwide, IDU did not change from 1995 to 2013 except among non-Hispanic black students (Table 1). For this subgroup, a significant linear increase