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Research paper

# HIV infection and risk behaviour of primary fentanyl and amphetamine injectors in Tallinn, Estonia: Implications for intervention

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ABSTRACT

*Background:* Following a heroin shortage, fentanyl and 3-methylfentanyl, known as "China White" and "White Persian", have become the most widely used drugs, along with amphetamine, among injecting drug users (IDUs) in Tallinn, Estonia.
*Methods:* In order to assess the relationships between the injection of fentanyl and amphetamine, and levels of HIV prevalence and risk behaviour, 350 current IDUs were recruited using respondent-driven sampling for an interviewer-administered unlinked cross-sectional survey and HIV testing. IDUs were categorised into groups based on self-report of the main drug used within the last 28 days.
*Results:* 77% (256/331) of participants reported fentanyl and 23% (75/331) amphetamine as their main drug of injection. HIV prevalence was 27% (95% confidence interval [CI]: 18.45–35.51) and 62% (95% CI: 56.97–67.03) among amphetamine and fentanyl injectors, respectively. After adjustment, fentanyl injectors had three times the odds of being HIV positive (adjusted odds ratio [AOR] = 2.89; 95% CI: 1.55–5.39). They also had higher odds for injecting in the street with a previously used needle/syringe (AOR = 2.39; 95% CI: 1.14–5.04) and sharing a needle/syringe with somebody known to have HIV (AOR = 3.00, 95% CI: 1.33–6.79). Fentanyl injectors also had higher odds for lifetime overdose (AOR = 3.02, 95% CI: 1.65–5.54).
*Conclusion:* The injection of fentanyl is associated with elevated injecting risk behaviour derived from injection practice and situational risk factors, and needs urgently targeted interventions.


## Introduction

Major political, social and cultural changes along with economic changes in Eastern Europe have been associated with epidemics of HIV and sexually transmitted infections (STIs), declines in health and life expectancy as well as the growth of informal economies, including drugs and sex trade (Atlani, Caraël, Brunet, Frasca, & Chaika, 2000; Dehne, Khadokevich, Hamers, & Schwartländer, 1999; Hamers & Downs, 2003; Kelly & Amirkhanian, 2003; Rhodes, Singer, Bourgois, Friedman, & Strathedee, 2005). In 2006, the incidence of HIV in Eastern Europe was reported to be 211 per million, which is more than twice the average incidence rate in Western Europe (83 per million). In Eastern Europe, HIV is predominantly transmitted by injecting drug users (IDUs) (European Centre for the Epidemiological Monitoring of HIV and AIDS, 2007). The sharing of contaminated injecting equipment accounts for up to 80% of all HIV infections among IDUs in Eastern Europe and Central Asia (UNAIDS/WHO, 2006; UNODC, 2005). Estonia faces an HIV epidemic driven by injection drug use that has led to the highest increase in numbers of incident HIV infections in Europe (from 7.2 per million in 1998 to 504 in 2005) (European Centre for the Epidemiological Monitoring of HIV and AIDS, 2007). Local studies have revealed a high prevalence of HIV (40–90%) (Uusküla, Heimer, Dehovitz, Fischer, & McNutt, 2006; Uusküla, McNutt, Dehovitz, Fischer, & Heimer, 2007; Wilson, Sharma, Zilmer, Kalikova, & Uusküla, 2007), and a high incidence of HIV (>20/100 person years at risk) in the IDU population (Uusküla et al., 2008). The estimated prevalence of IDU is

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2.4% among 15–44-year olds in Estonia (Uusküla, Rajaleid, et al., 2007).

The type of drug primarily injected can influence the frequency and intensity of injection and therefore the risk of HIV transmission. For instance, epidemiological studies have associated the injection of cocaine and amphetamines with elevated risk of HIV and STIs compared to the injection of opioids among IDUs (Chaisson et al., 1989; Colfax & Shoptow, 2005), in part linked to increased levels of sexual risk behaviour (Colfax & Shoptow, 2005; Molitor, Truax, Ruiz, & Sun, 1998; Molitor et al., 1999). There is limited evidence available on how fentanyl injection might be associated with HIV infection and related risk behaviour (Cicero, Inciardi, & Muñoz, 2005; Rosenblum et al., 2007). Previous studies conducted in Estonia have examined HIV prevalence and risk behaviour among community and service user samples of IDUs (Platt et al., 2006; Uusküla et al., 2006; Uusküla, McNutt, et al., 2007; Uusküla et al., 2008; Wilson et al., 2007). Of these studies, Platt et al. (2006) reported fentanyl use as an independent risk factor for HIV serostatus in Tallinn, Estonia.

Based on data from surveys conducted among IDUs in Estonia (Lõhmus & Trummal, 2007; Platt et al., 2006; Uusküla et al., 2006; Uusküla, McNutt, et al., 2007; Uusküla et al., 2008; Wilson et al., 2007), a shift in use from heroin and home-made opiates to fentanyl analogues and amphetamine has occurred in recent years. This finding is supported by evidence from drug seizures analysed by the Forensic Service Centre. Illicit fentanyl produced in illegal clandestine laboratories, known by the street name of *China White* and 3-methylfentanyl known as a *White Persian* were introduced to the drug market in Estonia in 2002 following a heroin shortage in 2001 (Politseiamet, 2005; Talu et al., 2003). In 2003–2006, 3-metylfentanyl accounted for the majority of confiscated opiate seizures (Abel, Talu, Ahven, Neuman, & Laastik, 2004; Abel et al., 2005; Abel-Ollo et al., 2007; Oole et al., 2006; Politseiamet, 2005; Talu et al., 2003). Seizures of fentanyl analogues have also been reported in neighbouring countries, including Lithuania, Finland and Sweden (European Monitoring Centre for Drugs and Drug Addiction, 2004, 2006). The synthetic opioid fentanyl is used widely as an analgesic or anaesthetic in surgical procedures. Fentanyl's extremely rapid onset, potency and relatively short duration of action have lead to its misuse (Berens, Voets, & Demedts, 1996; Cicero et al., 2005). Evidence relating to the injection of fentanyl is scarce in Estonia as well as worldwide. Fentanyl-related deaths among IDUs have been recorded in several countries including the USA (Denton, Donaghue, McReynolds, & Kalelkar, 2008; Henderson, 1991; Hull, Juhascok, Mazur, Flomenbaum, & Behonick, 2007; Wong, Curtis, & Wingert, 2008), Sweden (Jönsson, Holmgren, Druid, & Ahlner, 2007; Kronstrand, Druid, Holmgern, & Rajs, 1997), Finland (Ojanperä et al., 2006) and in Estonia (Ojanperä, Gergov, Liiv, Riikoja, & Vuori, 2008) related to the injection of illegally produced 3-methylfentanyl. In 2005–2006, there were 117 deaths among IDUs (with an average age of 26 years) due to 3-methylfentanyl injections in Estonia (Ojanperä et al., 2008).

A growing body of evidence (Lõhmus & Trummal, 2007; Uusküla, McNutt, et al., 2007; Wilson et al., 2007) also points to the spread of amphetamine injection among IDUs in Estonia. A study conducted in 2006 at syringe exchanges found that 53% of IDUs were current amphetamine and 9.8% fentanyl users (Lõhmus & Trummal, 2007). Data on drug seizures of the Forensic Service Centre shows that amphetamine-type stimulants continued to be the most commonly confiscated illegal drugs (Abel-Ollo et al., 2007). In a setting of high HIV incidence and prevalence among IDUs, the emergence of a new IDU sub-population due to drug market changes, and evidence of deaths related to fentanyl use, there is a need to explore health risks linked to amphetamine and fentanyl injection. We therefore compared primary fentanyl and amphetamine injectors in order to assess whether HIV and related risk behaviour among IDUs in Tallinn, Estonia differ according to the type of drug primarily injected.

## Methods

### *Settings, study population, data collection and laboratory testing*

An unlinked, anonymous cross-sectional study of risk behaviour and HIV status among IDUs was conducted in Tallinn, the capital of Estonia, in 2005. A total of 350 current IDUs were recruited for an interviewer-administered risk behaviour survey and biological sample collection for HIV testing (dry blood spot) using respondent-driven sampling (RDS) (Heckathorn, 1997, 2002). We started the RDS procedure with the recruitment of six initial 'seeds' who all were current IDUs and represented different categories (e.g. ethnic Russian, Estonian, female and sex-worker IDUs, and amphetamine or fentanyl injecting IDUs) and were recruited through key informants. Eligible seeds were interviewed and provided with numbered coupons distributed to the next eligible recruits known as 'first wave' who, after completing the interview, were given numbered coupons to distribute to recruits within their IDU networks for recruitment of a 'second wave'. Recruitment was achieved using the coupon system and continued until the desired sample size was reached. A dual incentive was used: one for study participation and another for peer recruitment. Eligible participants had to report injecting drugs within the past 28 days and be at least 18 years old. Face-to-face interviews were conducted using a structured questionnaire developed from previous questionnaires used extensively in a variety of multi-centre studies in resource-constrained and developed countries, including the Russian Federation (Rhodes et al., 2002).

We collected data on: socioeconomic characteristics, history of drug use, recent and current (last 28 days) injecting drug use, HIV risk practices associated with injecting drugs, contacts with police/imprisonment, sexual behaviour, previous HIV testing, reported HIV antibody status, drug treatment history, and contacts with services for HIV prevention and harm reduction. Dried blood spot specimens were collected and tested for HIV antibodies using GACELISA, reactive specimens were confirmed using anti-HIV GACPAT immunoassay, with confirmatory testing conducted on discordant results using the HIV Blot 2.2 Western Blot assay (AbbotMurex) (Connell, Parry, Mortimer, & Duncan, 1993; Parry et al., 1995). The testing was undertaken at the UK Health Protection Agency.

### *Statistical analysis*

IDUs were categorised into two groups based on their self-reported main drug injected within the last 28 days. Among those defined by us as primarily amphetamine or fentanyl users, 63% and 43%, respectively injected only their main drug. Multi-drug injection was reported by 53% across the whole sample. Risk behaviours and characteristics were compared between the two groups of IDUs. Odds ratios (OR) and 95% confidence intervals (95% CI) together with *p*-values were used to compare characteristics and risk factors for HIV for fentanyl and amphetamine injectors. Multivariate analysis based on a conceptual hierarchical framework (Victora, Huttly, Fuchs, & Olinto, 1997) was conducted to explore risk factors associated with using fentanyl. Adjusted odds ratios (AORs) were calculated using nationality, education, employment status, frequency of injection (daily vs. less than daily) and duration of injection (0–1, 2–5, ≥6 years) in the logistic regression models. The data were analysed using the 'tabodds' and 'logistic' commands in the statistical package Intercooled Stata for Windows 9.0 (STATA Corporation). The potential recruitment biases were explored using an RDS analysis tool (RDSAT 5.6) to adjust for differences in net-