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Research paper

A decline in the prevalence of injecting drug users in Estonia, 2005–2009

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ABSTRACT

Aims: Here we report a study aimed at estimating trends in the prevalence of injection drug use between 2005 and 2009 in Estonia.
Background: Descriptions of behavioural epidemics have received little attention compared with infectious disease epidemics in Eastern Europe.
Methods: The number of injection drug users (IDUs) aged 15–44 each year between 2005 and 2009 was estimated using capture–recapture methodology based on 4 data sources (2 treatment data bases: drug use and non-fatal overdose treatment; criminal justice (drug related offences) and mortality (injection drug use related deaths) data). Poisson log-linear regression models were applied to the matched data, with interactions between data sources fitted to replicate the dependencies between the data sources. Linear regression was used to estimate average change over time.
Results: There were 24305, 12,292, 238, 545 records and 8100, 1655, 155, 545 individual IDUs identified in the four capture sources (police, drug treatment, overdose, and death registry, accordingly) over the period 2005–2009. The estimated prevalence of IDUs among the population aged 15–44 declined from 2.7% (1.8–7.9%) in 2005 to 2.0% (1.4–5.0%) in 2008, and 0.9% (0.7–1.7%) in 2009. Regression analysis indicated an average reduction of about 1600 injectors per year.
Conclusion: While the capture–recapture method has known limitations, the results are consistent with other data from Estonia. Identifying the drivers of change in the prevalence of injection drug use warrants further research.

Introduction

There is evidence that both risk behaviours (high risk sexual behaviour, illicit drug use) and related infectious diseases (sexually transmitted and blood borne infections) are constantly evolving in the interplay between social-environmental factors, pathogens and their hosts (Bello, Simwaka, Ndhlovu, Salaniponi, & Hallett, 2011). In an epidemic outbreak of an infectious disease the prevalence in a particular population does not grow indefinitely, but saturates at some level. Following the initial spread there is generally a fall in the incidence followed by a reduction in prevalence. The same is likely to apply to behavioral epidemics. There are similarities between the spread of drug use, in particular the spread of the use addictive drugs (such as heroin), and that of infectious diseases. The use of drugs is communicated, not as an organic agent, but as a kind of "innovative" social practice or custom, and not to everyone but only to those who, for whatever reason, are not immune (i.e., susceptible individuals) (Rossi, 2002).

Behavioural epidemics have received little attention compared with infectious disease epidemics in Eastern Europe.

Estonia is a small country in the northern–eastern part of Europe with a population of about 1,340,000 (Statistics Estonia, 2012). According to a global review of injection drug use and HIV epidemiology, Estonia has one of the highest prevalences of injection drug users (IDUs) among people aged 15–64 years (1.51% in 2007) coupled with a high HIV prevalence among IDUs (Mathers et al., 2008; Uusküla et al., 2008). We have previously estimated the prevalence of IDU among ages 15–44 in Estonia to be 2.4% in 2004 (Uusküla et al., 2007).

Capture–recapture (CRC) is an indirect method that estimates population size from the degree of overlap between two or more separate samples from a population (Hook & Regal, 1995). The method calculates the extent to which the same individuals appear in datasets from different sources, and extrapolates from this to estimate the number of individuals who do not appear in any of the sources. Several assumptions are made when using CRC: the population is closed; overlaps between datasets can accurately be

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identified; the samples are independent or multiple sources are used to account for dependencies; all members of the population have an equal probability of occurring in any of the sources; representative samples of the population can be obtained (Millar, Domingo-Salvany, Eastwood, & Hay, 2008). As injection drug use encompasses criminal and health problems, CRC studies should obtain data from both criminal justice and healthcare sources to target the population (Hickman, Seaman, & de Angelis, 2001).

We have used CRC methodology to estimate the number of IDUs in the 15–44 year age range in Estonia for each year between 2005 and 2009and to examine the trend in prevalence of injection drug users during this period.

Methods

Data sources and definitions

Our target population was men and women aged 15–44 who were residents in Estonia and injecting drugs at some time between 2005 and 2009. Series of cross-sectional studies conducted in several location and across the period of 2004–2011 have documented that overwhelming majority (~95%) of IDUs in Estonia are of age 15–44 (Talu et al., 2010; Uusküla, Abel-Ollo, Markina, McNutt, & Heimer, 2012). We used four data sources: (1) police data on drug-related offences, (2) data on drug treatment from the Estonian Health Insurance Fund (EHIF), (3) data on drug overdoses from EHIF, and (4) data about injection drug use related deaths from the Estonian Causes of Death Registry (ECDR). Each data source is described below and the main characteristics are summarized in Table 1.

To differentiate injection drug users from non-injection drug users among case files we limited the data abstraction to health events (overdose, drug treatment, and death) related to the opiates use. This evidence is supported by the data from the Estonian drug treatment database. According to the data from 2010 only 5.6% of persons receiving drug treatment and admitting opiates use (heroin, fentanyl, poppy liquid, and other opiates) have never injected drugs (Dr. Kaire Vals, administrator, Estonian drug treatment database, personal communication). Further, attribution of non-fatal overdoses and deaths related to the opiates use being associated with injection drug use is confirmed in the discussions with the health care/prevention services providers and Estonian Forensic Science Institute researchers (Denissov, 2012; Dr. Marika Väli, Deputy Director of Estonian Forensic Science Institute, personal communication).

For police data – preparatory key informants (drug users, police officials) interviews documented that 90% of the drug users arrested/detained at the Ida-Virumaa county and close to 80% in Tallinn area (Harjumaa county) are injection drug users (personal communication, Ave Talu, Estonian Drug Monitoring Center).

Police: drug-related offences

Data on drug-related offences detected and registered by the police was abstracted from the POLIS database which is a national database comprising data on all registered crimes. According to police information, the POLIS database is relatively complete due to the mandatory character of reporting, technical control and regular auditing. However, POLIS is an administrative database and does not record details on routes of drug administration (i.e., injected or other). We defined IDUs as people registered in the database for the unlawful acquisition, storage, or use of small quantities of narcotic drugs or psychotropic substances without a doctor's prescription.

Estonian Health Insurance Fund (EHIF): drug treatment and overdoses

Healthcare in Estonia is funded through a compulsory scheme under which employers are obliged to fund health insurance for their employees. In addition, certain groups (i.e., pregnant women, persons under 19 years of age, persons receiving an Estonian state pension) do not pay but are covered by the insurance. As of 31 December 2010, EHIF had 1,256,240 members representing 93.7% of the Estonian population (Estonian Health Insurance Fund, 2010). Emergency care (i.e., in the case of drug overdose) is free and covered for everyone in need irrespective of the health insurance status. It is important to note, however, that studies conducted in Estonia among IDUs found less than 50% health insurance coverage in this group (Vorobjov et al., 2012). The EHIF database was used to construct a data source of people who received treatment related to the use of opioids (*International Classification of Diseases*, tenth edition (ICD-10) codes F11.0–F11.9) and a separate data source of people who had an opioid overdose requiring emergency care (ICD-10 T40.0, T40.1, T40.2) from 2005 to 2009.

Estonian Causes of Death Registry (ECDR) (E): Injection drug use related deaths

ECDR is developed in collaboration between Statistics Estonia and the National Institute for Health Development, containing individual data from 1983 and onwards. Our study considered all deaths deemed after autopsy to be due to an acute reaction to an opiate and confirmed by the pathologist's report on the basis of organic samples (blood and/or tissue), including ICD-10 codes T40.2, T40.3, T40.4, and T43.6 if heroin, morphine, methadone, or fentanyl/3-methyl-fentanyl had been detected.

Matching

In all data sets an identification (ID) variable consisting of initials of first name and surname, full date of birth (day/month/year) and gender was constructed. Additionally, from the police and EHIF database an encoded identification code (which does not permit personal identification or linking to other registries) was obtained. This code could not be used for matching purposes, but allowed us to identify different records belonging to the same individuals within the respective data sets, and thus assess the quality of the constructed ID variable. The persons' identity remained unknown to us at all times.

The data sets from police and EHIF were originally composed of episodes and not individuals. Unique individuals were identified by the ID variable and one record per person was kept for each year. Records belonging to individuals under 15 or over 44 were removed. The ID variable was then used for cross-matching between the data sources. Individuals cannot appear in any other data source after death and this therefore violates the requirement for defining a closed population. Therefore, when estimating the number of IDUs in a given year, deaths from the following year were used (e.g., for the 2007 estimation, we used deaths from 2008).

Analyses

We evaluated the dependence among sources using the Poisson log-linear model for complete data. Data from each year of observation were arranged in the 2^4 incomplete multiway contingency table with one missing cell corresponding to absence in all sources. Log-linear models were fitted to this contingency table to estimate the number of missing cases, taking into account the pattern of association between sources. The table has 15 observations (corresponding to the presence in one, two, three or four sources). Any model may contain up to 14 terms: four independence terms (each corresponding to the main effect of a source), six first-order interaction terms (each corresponding to the interaction effect between two sources) and four second-order interaction terms (corresponding to the interaction effect between three of the considered sources). Interaction terms represent different aspects