

# HIV testing and counselling in Estonian prisons, 2012 to 2013: aims, processes and impacts

K Kivimets (kristel.kivimets@just.ee)<sup>1</sup>, A Uusküla<sup>2</sup>

1. The Estonian Ministry of Justice, Prison Department, Rehabilitation Division, Jõhvi, Estonia

2. Department of Public Health, University of Tartu, Tartu, Estonia

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We present data from an observational cohort study on human immunodeficiency virus (HIV) prevention and control measures in prisons in Estonia to assess the potential for HIV transmission in this setting. HIV testing and retesting data from the Estonian prison health department were used to estimate HIV prevalence and incidence in prison. Since 2002, voluntary HIV counselling and testing has routinely been offered to all prisoners and has been part of the new prisoners health check. At the end of 2012, there were 3,289 prisoners in Estonia, including 170 women: 28.5% were drug users and 15.6% were infected with HIV. Of the HIV-positive inmates, 8.3% were newly diagnosed on prison entry. In 2012, 4,387 HIV tests (including retests) were performed in Estonian prisons. Among 1,756 initially HIV-negative prisoners who were in prison for more than one year and therefore tested for HIV twice within 12 months (at entry and annual testing), one new HIV infection was detected, an incidence of 0.067 per 100 person-years (95% confidence interval (CI): 0.025–5.572). This analysis indicates low risk of HIV transmission in Estonian prisons. Implementation of HIV management interventions could impact positively on the health of prisoners and the communities to which they return.

## Introduction

In most countries, the rates of human immunodeficiency virus (HIV) infection, tuberculosis (TB) and hepatitis B and C among prisoners are higher than those in the general population [1] owing to risk behaviour before and during incarceration. These risks include injection drug use [2,3], exchange of sex for money or drugs [4], multiple sex partners [5], and low socio-economic status (homeless people). [6–8] Many people who inject drugs (PWID) engage in low-level criminal activity to support their drug use and many experience incarceration at least once in their lifetime [9]. Research has shown that HIV-infected people are frequently incarcerated during the course of their disease, with an estimated 17% of people living with HIV/AIDS in the United States (US) and incarcerated at some point in a given year [10]. In addition, female prisoners

who have been involved with sex work, which is frequently associated with injection drug use and contact with HIV-infected sexual partners, are at additional risk of HIV being infected when entering prison. [11] The high prevalence of HIV infection and drug dependence among prisoners, combined with the sharing of injecting drug equipment, make prisons a high-risk environment for the transmission of HIV. Therefore, the World Health Organization (WHO) has recommended that HIV testing in prison settings should be prioritised [12].

A review by Dolan et al. suggests that prisons are a particular focus of the HIV epidemic in several countries in Europe, and that HIV infection rates are substantially higher among prisoners than among the general population in some countries in eastern Europe, e.g. above 10% nationally in Estonia, Romania, and Slovakia, and in a single prison or region in Lithuania and Ukraine [13]. Less is known about the implementation and effectiveness of HIV prevention and harm reduction programmes introduced in prisons in these countries.

This article assesses the prevalence of HIV infection among prisoners, and describes prison policies and practices on voluntary HIV testing and counselling (VCT) and retesting in Estonian prisons between January 2012 and March 2013.

## Situation in Estonia

Estonia is a small country in north-eastern Europe with a population of ca 1.3 million [14]. In 2009, the estimated HIV prevalence among 15–49 years-olds in Estonia was 1.2% compared with 1.0% in Russia and 1.1% in Ukraine. In 2011, Estonia had the third highest rates of HIV diagnosis in Europe (27.3/100,000), after Russia (44.1/100,000 in 2010) and Ukraine (38.0/100,000) [15]. Estonia has one of the highest prevalences of PWID among people aged 15–64 years (1.5% in 2007) coupled with a 40–90% HIV prevalence among PWID [16,17].

There are four prisons in Estonia: Tartu, Tallinn, Viru, and Harku and Murru. Data from the Estonian Ministry

of Justice show that the prison population was ca 3,300 in January 2013 [18], translating into an imprisonment rate of 246 per 100,000 population. According to the Health Services Organisation Act, healthcare in prisons is part of the national healthcare system [19]. Prisoners' treatment costs are covered through the Ministry of Justice from the state budget [20].

HIV/AIDS prevention in prisons is based on the national HIV/AIDS Strategy 2006–2015. The main objective is to block HIV transmission inside prison. Antiretroviral therapy (ART) is available in all prisons and is administered according to the national guidelines, which require that ART should be initiated at a CD4 T cell count < 350 cells/mm<sup>3</sup>. Condoms are distributed free of charge in long-term visiting rooms. Drug prevention in the prison system was commenced in 1998. Until 2003 the focus was primarily on reducing the supply by inspection, but recently more attention has been paid to reducing the demand by treatment and rehabilitation of drug addicts [21]. Two types of drug dependency treatment are offered in Estonian prisons. Abstinence-based treatment is the most common and is available in all prisons. The only form of opiate substitution is methadone maintenance treatment and coverage is increasing every year. No prisons in Estonia offer needle exchange programmes.

On entry, all detained persons undergo an initial health check and VCT is a component of every new prisoner health check [20]. VCT is carried out by medical personnel and performed with the informed consent of the prisoner. Retesting for those who were HIV-negative at previous/initial testing is offered once a year or more often if necessary, i.e. if a prisoner can identify a specific incident of HIV exposure. Exposure incidents are tattooing, fighting, self-harm with dirty razors, unprotected sexual intercourse or injecting.

All HIV tests are performed in regional HIV screening laboratories (in Jõhvi, Tartu and Tallinn) using fourth-generation HIV screening tests (i.e. Vironostika HIV Uniform II Ag/Ab, BioMerieux method). Confirmatory HIV testing (for those testing positive in a screening test) is done at the national HIV/AIDS reference laboratory in Tallinn (using the INNO LIA HIV I/II Score Western blot algorithm) [22]. According to the Communicable Diseases Prevention and Control Act [23] new cases of HIV are reported to the Estonian Health Board, an institution responsible for infectious disease surveillance in Estonia.

## Methods

This work was based on the analysis of administrative data. The term 'prisoner' is used for all those, including adults and juveniles, detained during the investigation of a crime, while awaiting trial, after conviction, before sentencing, and after sentencing.

## Data and data sources

### Prison health reports

Data on the occurrence of drug dependence among inmates were obtained from the quarterly health reports from prisons summarised in the Estonian Ministry of Justice Drug Monitoring Report 2012 [24] which compiles all prison data on drug use, treatment and other preventive activities for the period from 1 January to 31 December 2012. Defining drug addiction status was based on ICD 10 diagnosis codes F11–F16 and F18–F19 [25].

These data were used to describe the prison population in Estonia in 2012, including HIV prevalence and ART coverage among those with HIV.

### Prison goals database

The prison goals database is an electronic database containing aggregated information about HIV infection, HIV testing and retesting. Since the introduction of mandatory reporting of HIV testing in 2011, the database has been updated monthly by all prison medical departments. Data on HIV testing between 1 January and 31 December 2012 was extracted from the prison goals database. These data were used to describe HIV testing and retesting conducted in prisons in 2012.

### Prison electronic patient database

The prison electronic patient database is an information system containing information from the electronic health records designed for prison healthcare. Individualised HIV testing and retesting results for the period from 1 January to 31 March 2013 were collected from the electronic prison patient database. Analysis was limited to prisoners who had been in prison for more than one year and had previously had a negative HIV test, i.e. those who were eligible for retesting. This information was used to explore the occurrence of newly acquired HIV infections (HIV incidence) among the prison population.

The data sources used for this study cover all the prisons in Estonia. Data on HIV/hepatitis C virus (HCV) testing and results, history of injection drug use, and condom use during conjugal visits (from the case management interview held following HIV diagnosis) on inmate newly infected in prison were also collected from the prison electronic patient database.

### Statistical analysis

Descriptive statistics (proportions with 95% confidence intervals (CIs)) were calculated using Microsoft Excel 2010. HIV incidence and 95% CIs were calculated using Poisson distribution.

The study complied with local data protection regulations. Data characteristics of the prison population, HIV testing and retesting in the year 2012 contained only non-identifiable (aggregated) data. The analysis of HIV testing and retesting results for the period 1 January

**TABLE 1**

Selected characteristics of prisoners in Estonia, 1 January–31 December 2012 (n=3,289)

	Viru	Tartu	Tallinn	Harku /Murru	All
Number of prisoners on 31 December 2012	950	920	1,157	262	3,289
Number of female prisoners	9 (0.9%)	5 (0.5%)	46 (4.0%)	110 (42.0)	170 (5.2)
HIV-infected prisoners (n, % of all)	162 (17.1%)	78 (8.5%)	236 (20.4%)	43 (16.4%)	519 (15.8%)
Number of female HIV-infected prisoners	3 (33.3%)	1 (20.0%)	19 (41.3%)	42 (38.2%)	65 (38.2%)
Prisoners on ART (n, % of those infected)	86 (53.1%)	57 (73%)	112 (47.5%)	26 (60.4%)	281 (54.1%)

ART: antiretroviral therapy; HIV: human immunodeficiency virus.

to 31 March 2013 was based on identifiable individual human data, analysed by authorised personnel (author KK), and considered eligible for exemption by the ethics review board as the research was conducted by the head of a governmental agency (author KK is the Prison Department medical adviser) authorised to evaluate public programmes.

## Results

The prison population in Estonia consisted of 3,289 people at the end of 2012. Of these, 5% were women, 32% were 30–39 years-old, 1.2% were juveniles (under 18 years) and 1% were over 60 years-old [21].

At the end of 2012, 15.6% of the 3,289 prisoners were infected with HIV (Table 1). The HIV prevalence was 38.2% among female and 14.5% among male prisoners in Estonian prisons. One third (28.5%; n=906) of the total prison population were diagnosed with drug addiction (diagnosis codes F11-16, F18-19) [25]: 50% of them were opiate users, 25% users of multiple drugs, 19% stimulant users, 4% cannabis users and 2% other (solvent).

A total of 4,387 HIV tests (including retests) were performed across Estonian prisons in 2012 (Table 2). Of those, 2,425 were tests of people when entering prison, a testing uptake rate of 97.3%. Of the tests on admission, 1.8% (43/2,425 resulted in a new HIV diagnosis. These 43 individuals diagnosed on prison entry correspond to 8.3% of the total of 519 HIV-positive inmates in 2012. In addition, 23 prisoners self-reported being

HIV-negative (or not sure of their HIV status) but were found to have had a previous HIV-positive test result recorded at the national HIV/AIDS reference laboratory. Two prisoners who self-reported being HIV-positive, had negative results when tested.

To estimate the HIV incidence in prison, data on HIV retesting conducted from 1 January 2013 to 31 March 2013 were used. The following analysis is limited to the 1,756 prisoners who had been in prison more than one year and who therefore had an opportunity for HIV retesting during the indicated period (the total prison population in Estonia (including persons under pre-trial) was 3,294 as of 31 March 2013 [9]).

On admission to prison, 220 prisoners (12.5% of the 1,756; 95% CI: 11.5–13.6%) were already infected with HIV (Table 3). Of those who were HIV-negative at prison entry: 97% (1,489/1,536; 95% CI: 96.4–97.6%) were retested and found to be negative at the retest a year later. One prisoner was HIV-positive at the retest (translating into an HIV incidence of 0.067 per 100 person years; 95% CI: 0.025–5.572), while 3% (46/1,536; 95% CI: 2.4–3.6%) did not agree to repeat testing.

Data from prison health medical records (previous HIV/HCV testing and results, history of injection drug use and case management interview held following HIV diagnosis) on the newly infected inmate indicated that this prisoner may have become infected during conjugal visits from an HIV-positive partner. The inmate has been in prison for more than five years and their

**TABLE 2**

HIV testing and retesting in Estonian prisons, 1 January–31 December 2012 (n=4,387)

	Viru	Tartu	Tallinn	Harku /Murru	All
Total number of HIV tests done	992	1,172	1,987	236	4,387
Number of retests done	596	693	437	236	1,962
Number of those tested on admission to prison	396	479	1,550	0	2,425
Number of previously undiagnosed infections among those tested on admission to prison (new infections detected)	16	2	25	0	43
Number of HIV-positive prisoners	162	78	236	43	519

HIV: human immunodeficiency virus.

**TABLE 3**

HIV retesting in prisons, Estonia, 1 January–31 March 2013 (n=1,756)

	Viru	Tartu	Tallinn	Harku /Murru	All
In prison for more than one year	569	581	412	194	<b>1,756</b>
Prisoners HIV-positive on entry to prison	67	58	57	38	<b>220</b>
Prisoners HIV-negative at annual retest	490	513	341	154	<b>1,489</b>
Prisoners HIV-positive at annual retest	0	0	0	1	<b>1</b>
Prisoners refusing annual HIV retesting	12	10	24	0	<b>46</b>

previous HIV tests were negative. Moreover, the inmate also tested negative for HCV in 2012, an indication that the inmate probably did not inject drugs in prison as the HCV prevalence in PWID in Estonia has been documented very high (>90%) [26]. There was no information in the medical records that would suggest a history of drug injection of the newly infected prisoner. During the year 2012, the inmate had several conjugal visits from their partner. The inmate indicated that they did not use condoms. Therefore, the infection was probably acquired sexually during a one of those visits.

## Discussion

To our knowledge, this is the first article providing data on HIV in prisons from one of the European countries witnessing HIV epidemics related to injection drugs since the early 2000s. Our results document an HIV prevalence of 15.6% in prisons in Estonia. Based on the high prevalence of drug addiction among inmates and of drug-related crimes as a reason for imprisonment, we suggest that the high HIV prevalence observed among prisoners is probably related to injection drug use. Prisoners should not leave prison in a worse health condition than when they entered [27]. HIV transmission does occur in custody; however, many experts conclude from the available data that most HIV-infected inmates are probably infected before entering prison [10,28]. Nevertheless, collecting data on risk behaviours in prison is important because the absence of such data can be used to justify inaction [29].

In a systematic review on HIV prevalence in prisons in low and middle income countries in 2003-2004, information was presented for 75 countries. The HIV prevalence in prisons was more than 10% in 20 countries [13]. In 2001, Rotily et al. published results of a multicentre pilot study estimating the HIV prevalence in prisons in several European countries (including 4.1% in France, 3.1% in the Netherlands, 2.7% in Sweden, 1.2% in Italy, 0.9% in Germany, 0.7% in Scotland) [30]. However, it has recently been reported that the HIV prevalence was significantly higher among prisoners in those European countries that witnessed HIV epidemics driven mainly by injection drug use, e.g. 6.0% in Portugal [31], 10% among female prisoners in Portugal [32], 10.8% in Spain [33], and 19.8% in individuals released from prison within the last six months in Ukraine [34]. In most industrialised countries in western Europe and

North America, many prison entrants have a history of injecting drug use and thus already have a high HIV prevalence, higher than those in the respective general populations. Furthermore, the lack of or insufficient supply in most prisons of preventive measures such as clean needles and syringes or condoms, combined with stressful social conditions, create further opportunities for HIV transmission [35]. Several studies, including from Estonia, report that drug injecting occurs among prisoners [36]. However, few studies have documented the epidemic spread of HIV within prisons [37].

According to our data, the risk of HIV transmission was low in Estonian prisons in 2012 and 2013 (0.067 per 100 person-years). Low levels of transmission have previously been identified in prison, with an incidence of zero to four per 1,000 person-years [28]. A systematic review conducted on the basis of studies from the US reporting HIV incidence in the prison population provides a pooled HIV incidence of 0.08 per 100 person-years (95% CI: 0.0–0.24) among continuously incarcerated populations with a similar incidence estimation method to that used in our report [38].

Our results have several implications: they show (i) a need to provide comprehensive HIV prevention within prisons and (ii) a need to provide comprehensive HIV care to those infected, including substance abuse management.

In Estonia, 10–28% of all new HIV infections during the period from 2000 to 2009 were diagnosed in prisons [39]. Our findings also indicate that, close to one 10th (8.3%) of HIV infected inmates were newly diagnosed on prison entry. We argue that there is a strong case for routine testing on entry into the Estonian prison system as newly diagnosed cases are identified and previously known cases can be referred for treatment. Early diagnosis of HIV infection provides an opportunity to improve patient health outcomes and will also improve public health. At the end of 2012, 54% of HIV-seropositive prisoners in Estonia were receiving ART in prison [24], compared with ca 40% coverage of PWID in the community (data not shown).

Our analysis indicated a low risk of HIV transmission in Estonian prisons. However, it is important to retest those who tested negative but are at ongoing risk for

acquiring HIV through high-risk behaviours and those who may be in the early stages of infection but have not yet developed a sufficient antibody level to be detected by serological testing, i.e. during the 'window period' [40].

Our finding that the HIV prevalence in female inmates is substantially higher than in male inmates is in agreement with other published reports [41-45].

Our study has several limitations. It is possible that we have underestimated the risk of HIV transmission in the prison setting if the small proportion of inmates who refused retesting had a different risk profile (higher HIV incidence) from those who were retested. In the unlikely scenario of all of those declining retesting ( $n=46$ ) being infected with HIV within those 12 months, our HIV incidence estimate would have been higher (3.06 per 100 person-years). Furthermore, the HIV risk could be different among those in prison for periods shorter than 12 months. However, we believe that our results are representative of the prison population in Estonia given that the databases used cover all prisons in Estonia and are considered to be complete.

The state is responsible for adequately securing a prisoner's health by providing the required medical assistance [46]. Prisons continue to be effective targets for public health interventions [10]. HIV testing and linkage to care, both within prisons and in the community, comprise an important component of the 'seek and treat' strategy to prevent further HIV infections. Prison-based screening of infectious diseases, especially but not limited to HIV, in conjunction with treatment and linkage to community care is an important component of HIV prevention among high-risk communities. Significantly, for drug users at high risk of parenteral as well as sexual transmission, combined prevention strategies to reduce both transmission paths should not be overlooked.

## Conclusions

Estonia is one of the European countries witnessing injection drug-related HIV epidemics since the early 2000s. Data on HIV prevalence of prison populations in the region of central and eastern Europe is very limited. The study was launched in 2013 and, at the time, no data on HIV transmission in Estonian prisons had been published. To our knowledge, this is one of few detailed descriptions and analyses of HIV testing designed to assess in-prison transmission of HIV infection in a country with high HIV prevalence in both the general population and the prison population. The aim of this article was to describe the HIV prevention and control measures used in Estonian prisons and to assess the potential for HIV transmission in this setting. Further we provide an estimate of HIV incidence inside prison (based on HIV testing and retesting results). This analysis indicates a low risk of HIV transmission in Estonian prisons. Outbreaks of HIV infection have occurred in prisons in several countries,

demonstrating how rapidly HIV can spread in such settings. Retesting can ensure that if an outbreak occurs, control measures can effectively be implemented in the event of an outbreak [47]. HIV testing and counselling in prisons should not be limited to promoting prisoners' access to HIV testing and counselling, but must at the same time aim to mitigate the stigma and discrimination related to HIV [48].

Prison staff, in partnership with public health officials, should assess the adequacy of existing programmes and services for incarcerated populations and develop strategies to reduce HIV infection, both in prisons and in the community [49,50]. Implementation of the HIV management interventions described in this article could have public health benefits including a positive impact on the health of prisoners and the communities to which they return. These findings provide a basis for prison and public health authorities to consider whether HIV testing, counselling and other preventive measures should be part of an HIV prevention package in prisons. The implementation of routine testing policies in prison offers opportunities to reach high risk individuals and engage them in HIV prevention and treatment.

## Conflict of interest

KK is employed by the Estonian Ministry of Justice. The Estonian Ministry of Justice did not provide any financial support or place any restrictions on this research or publication.

## Authors' contributions

All authors were involved in the design of the study. KK did the database research and was responsible for data management. All authors contributed to the writing of the paper and approved the final version.

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