Available online at www.sciencedirect.com
SCIENCE DIRECT®
International Journal of Drug Policy 15 (2004) 1–16
THE INTERNATIONAL JOURNAL OF DRUG POLICY
www.elsevier.com/locate/drugpo

Review

HIV transmission and HIV prevention associated with injecting drug use in the Russian Federation

Tim Rhodes [a,*], Anya Sarang [b], Alexei Bobrik [c], Eugene Bobkov [b], Lucy Platt [a]

[a] *The Centre for Research on Drugs and Health Behaviour and Department for International Development Knowledge Programme in HIV/AIDS, Department of Social Science and Medicine, Imperial College, University of London, The Reynolds Building, St Dunstan's Road, London W6 8RP, UK*
[b] *AIDS Foundation East-West, Moscow, Russia*
[c] *Public Health Program, Open Society Institute-Russia, Central Research Institute of Organization of Health Care, Moscow, Russia*

Abstract

Aims: We review recent evidence of trends in HIV infection, risk behaviour and HIV prevention associated with injecting drug use in the Russian Federation. *Methods*: Findings draw on a review of English and Russian language research, published international conference abstracts, international agency and assessment reports, and centrally registered HIV surveillance data. *Findings*: We note the continued major importance of injecting drug use in mediating HIV transmission within Russia, noting recent evidence of HIV outbreaks associated with drug injecting. We note that high levels of risk behaviour associated with drug injecting may persist, but that evidence associates syringe distribution and exchange with reductions in risk behaviour. We summarise the development of 75 syringe distribution and exchange schemes and outreach interventions in the Federation, providing crude estimates of IDU population coverage and syringe distribution coverage. *Conclusions*: In the context of continuing levels of risk behaviour sufficient to sustain HIV transmission alongside evidence associating syringe distribution and exchange with risk reduction among IDUs, we note the critical importance of policy interventions to maximise syringe distribution coverage among IDU populations.
© 2003 Published by Elsevier B.V.

Keywords: Russia; Injecting drug use; HIV/AIDS; Risk behaviour; Syringe exchange; Coverage

Introduction

Injecting drug use is the predominant mode of HIV transmission in eastern Europe and central Asia. A decade after HIV transmission peaked in western Europe, and since 1995, epidemics of HIV have been reported among injecting drug users (IDUs) in a number of countries or territories in eastern Europe and central Asia, including most notably, Belarus, Kazakhstan, Moldova, Russia and Ukraine, and more recently, Estonia, Latvia, Lithuania and Kyrgyzstan (Rhodes, Platt, et al., 2002). The spread of HIV among IDUs in the region has been characterised by 'rapid' or 'explosive' outbreaks (Dehne, Khodakevich, Hamers, & Schwartlander, 1999; Rhodes et al., 1999; Rhodes, Lowndes, et al., 2002). In Russia, HIV outbreaks among IDUs have been observed in over 30 cities and in 82 of the 89 Regions or Territories of the Federation, including Kaliningrad (since January 1996), Krasnodar (since February 1996), Nizhny Novgorod (since March 1996), Tumen (since April 1996), Rostov (since June 1996); Tver (since 1997), Tula (since April 1997), Irkutsk (since 1998), Moscow (since 1999) and Saint Petersburg (since 2000). Russia accounts for over 70% of all HIV infections officially registered in central, eastern European and central Asian countries (Rhodes, Platt, et al., 2002), and is one of the fastest growing HIV epidemics in the world (UNAIDS, 2002). In this paper, we seek to review recent evidence, both of trends in HIV transmission and risk behaviour and trends in HIV prevention response among IDU's.

Methods and data sources

This review draws on published English and Russian language research literature, international conference abstracts, international agency and country assessment reports, and centrally registered HIV surveillance data. Electronic literature searches included the following databases: Medline (OVID) and the International Bibliography of the Social Sciences. Keywords employed included: Europe, eastern, in combination with: HIV; HIV and risk; injecting; drug;

* Corresponding author.
E-mail addresses: t.rhodes@imperial.ac.uk, t.rhodes@ic.ac.uk (T. Rhodes).

0955-3959/$ – see front matter © 2003 Published by Elsevier B.V.
doi:10.1016/j.drugpo.2003.09.001

prostitution; sex behaviours; sexually transmitted diseases; prevalence; and condoms. The electronic review was supplemented with searches via electronic HIV-related e-mail databases and networks, and manual searches of published conference abstracts (e.g. *International Conference of Drug-Related Harm*, 1999, 2000, 2001, 2002, 2003; *Russian Scientific-Practice Conference on HIV and Blood Borne Viruses*, 2001, 2002; *World AIDS Conference*, 1998, 2000, 2002) as well as relevant Russian language journals (e.g. *Journal of Microbiology and Epidemiology*, *Journal of Epidemiology and Infectious Diseases*, *Journal of Addiction*). The literature search concentrated on empirical papers and reports published between January 1995 and November 2002. The collation of national HIV surveillance data was undertaken using data collated by the Federal AIDS Center and by the European Centre for the Epidemiological Monitoring of AIDS (Hamers, 1997).

The epidemiology of HIV associated with IDU

Routine HIV surveillance

In the absence of targeted HIV prevalence studies among IDUs, the routine collation of HIV case reports remains the primary mode of HIV surveillance. In general, such case reports may be taken as approximate indicators of the geographic diffusion of HIV, though tend to underestimate the extent of HIV among vulnerable or hidden populations, such as IDUs (Dehne & Kobyshcha, 2000). Table 1 summarises notifications of new cases of HIV in Russia, including among IDUs. The total number of HIV infections registered to the end of 2001 in Russia (207,711) was four times greater than those reported in neighbouring Ukraine (47,988) and comprised 72% of the cumulative total of reported HIV infections in the eastern, central, south-eastern Europe and central Asian region (Rhodes, Platt, et al., 2002).

Approximately 52% of the total cumulative HIV cases reported to the Russian Ministry of Health to date—119,496 to the end of December 2002—are registered as diagnoses among IDUs. The proportion of HIV cases associated with IDU in Russia, however, is known to be greater, and is estimated to be nearer 90% (Federal AIDS Centre, 2003). Independent research studies also note the pivotal role of IDU in the spread of HIV at the city level, showing, for example, at least 90% of HIV infections associated with IDU in Kazan (Kartchevski & Badrieva, 2002), Rostov (Saukhat, Tormozova, Dosyagaeva, et al., 2002), Togliatti and Samara (Bykov, Hudyakova, & Lazareva, 2000; Rhodes, Lowndes, et al., 2002), Volgograd (Shelkovnikova, 2002a), Mirny (Filatov & Suharsky, 2002) and over 70% of infections associated with IDU in Belgorod (Tarakanova, Perutsky, & Zhmurovskaya, 2002), Tver (having declined from 95% in 1997; Ivanov, 2002) and Saint Petersburg (Bogoyavlensky et al., 2000; Rakhmanova et al., 2000).

Table 1
Registered new HIV infections in Russia, 1997–2002

	1997	1998	1999	2000	2001	2002	Total to date
New cases	4366	4058	19953	59257	88422	50378	229049
New IDU	2537	1816	10830	37151	46837	17914	119496

Source. Federal AIDS Centre (2003) (December 31, 2002).

Importantly, the HIV epidemic among IDUs in Russia remains dynamic, and trends in case reports appear sensitive enough to reflect this. While case reports may underestimate the true number of hidden IDU populations, evidence suggests that case reporting is sensitive enough to detect rapid or explosive spread. Additionally, shifts in testing policy—such as the introduction of voluntary testing—have not altered the reliability of case reports in providing indicators of geographical diffusion (Savtchenko, Lladnaya, Bochkova, Pokrovsky, & Buravstova, 1998). In Saint Petersburg, for example, analyses of all notifications between 1987 and 2000 showed that the number of new notifications increased four to five times in 2000 compared to the previous year, with independent estimates of HIV prevalence among IDUs increasing from 4.5 to 10% in the same time period (Rakhmanova et al., 2000). In Moscow, registered cases increased dramatically from a cumulative total of 128 in 1997 to 5356 in 1999, with 89% associated with IDU (Seltsovsky et al., 2002). In Irkutsk, whereas only two HIV infections were detected in January 1990, by March there were 24 cases, and by April, 70 cases. With only a doubling of the screening effort in early 2000, over 500 cases per month were being detected (R. Heimer, personal communication, 2002; Zaznobova & Ivanova, 2000), and by 2001, 13,000 cases were identified, over 90% among IDU (Bobkov et al., 2001).

There is emerging evidence in some cities of stabilisation and decline in the proportion of new HIV infections attributed to drug injecting alongside case reports of increased sexual transmission. The proportion of new HIV infections registered in Russia attributed to heterosexual transmission has increased from 4.3% in 2001, to 12.1% in 2002 to 17.5 in the first six months of 2003, while the proportion attributed to IDU has decreased from 93.7% in 2001 to 75.9% in 2003 to 66% in the first six months of 2003. In Kaliningrad, for example the number of HIV case notifications among IDU has decreased since 1997, from 403 in 1996, to 707 in 1997, to approximately 150 per year between 1998 and 2001, with slight increases also emerging in the number of heterosexually transmitted cases. In 1997, 5% of cases were associated with sexual transmission, whereas by 2001, this proportion had increased to 29% (Pokrovsky, Ladnaya, & Sokolova, 2002). In Moscow, the proportion of cases associated with sexual transmission increased near three times between 1999 and 2001, from 9 to 26% (Mashkilleyson & Leinikki, 1999; Pokrovsky et al., 2002; Seltsovsky et al., 2002). In Vladivostok, 86% of HIV cases were associated with IDU in 2000, and by 2001, this proportion had declined to 61% (Zavadskaya, Kolesnikova, & Berezkin, 2002). In Mirny, the share of transmission as-

sociated with IDU decreased from 93% in 2000 to 60% in 2001 (Filatov & Suharsky, 2002). In neighbouring Ukraine also, the proportion of new HIV cases among IDUs appears to have decreased in parallel with an increasing proportion of new HIV cases associated with unprotected sex (Kolesov, 2002; Shapoval, 2000; Shcherbinska, Kruglov, Antonenko, Lyulchuk, & Kravchenko, 2001, 2002).

HIV prevalence

Estimates of HIV prevalence derived from community studies among populations at risk arguably provide more accurate measures of the extent of HIV infection in a population than estimates derived from routine case reports. There are examples of such HIV prevalence studies in a number of eastern European cities, including Odessa, Nykolayev and Kharkiv in Ukraine (Balakireva & Varban, 2002; Khodakevich, Kobyshcha, & Shcherbinskaya, 1997), and Svetlogorsk and Minsk in Belarus (Bezruchenko-Novachuk & Romantsov, 1998; Vickerman & Watts, 2002). In Russia, HIV prevalence studies among IDUs have been undertaken in Ekaterinburg, Irkutsk, Kaliningrad, Novosibirsk, Nizhny Novgorod, Rostov-Na-Donu, Pskov, Samara City, Saint Petersburg, Togliatti City and Tver (Abdala et al., 2003; Loktev et al., 2001; Mashkilleyson & Leinikki, 1999; Moshkovich, 2000; Rhodes, Lowndes, et al., 2002; Saukhat, 2001; Sivatcheva, Trofimov, Gonchar, Gorodetskaya, & Lukicheva 2002; Smolskaya et al., 2002a, 2002b). Table 2 summarises these results.

In Togliatti City, Samara Oblast, there were virtually no registered reports of HIV among IDUs until 2000, and yet by September 2001, 56% of 426 community-recruited IDUs were found to be HIV positive (Rhodes, Lowndes, et al., 2002). This survey also found that 41% of IDUs who reported a negative antibody test result in 2000 and 2001 tested antibody positive by the time of the survey, suggesting high rates of incidence as well as recent explosive spread. In Saint Petersburg, where HIV prevalence had remained low and stable until 1999, HIV prevalence among IDU rose from 4% in 1998 to 12% in 1999, 19% in 2000 and 36% in 2001 (Abdala et al., 2003; Smolskaya, Khodakevich, et al., 2000; Smolskaya, Pimenov, et al., 2000; Smolskaya et al., 2002a, 2002b), suggesting rapid spread of HIV between 1999 and 2001 (Smolskaya et al., 2002a). Higher estimates of HIV prevalence—in Saint Petersburg at 65% and in Togliatti at 62%—have been found among samples of female IDUs with a regular involvement in sex work (Dehne & Kobyshcha, 2000; Lowndes et al., 2002).

A recent multi-site study in Russia compared estimates of HIV prevalence among IDUs attending syringe-exchange projects (based on the testing of returned syringes) against estimates of prevalence derived from routine surveillance or in-treatment blood samples (Smolskaya et al., 2002a, 2002b). In Irkutsk, 64.5% of street IDUs ($n = 152$) were estimated to be HIV positive (90% of whom were aged under 20 years), in Tver 55% ($n = 137$), in Samara 29% ($n = 150$) and in Rostov-Na-Donu 18% ($n = 200$). In Ekaterinburg, a third of IDUs (34%; $n = 82$) were HIV positive, and among IDUs aged 15–19.5 years 57% ($n = 14$). In Irkutsk and Tver, these estimates were three times higher than those derived from routine surveillance, and 14 times higher in Rostov-On-Don.

Other estimates of HIV prevalence among Russian IDUs have suggested rates of over 50% in Kaliningrad (Dehne & Kobyshcha, 2000; Mashkilleyson & Leinikki, 1999), and over 30% in Rostov-Na-Donu, (Saukhat, 2001), although a more recent study in Rostov-Na-Donu, based on tested returned syringes among 350 clients of two syringe exchanges found 11% to be HIV positive (Saukhat, Tormozova, Dosyagaeva, et al., 2002). A study among 986 individuals reporting occasional drug injecting sampled from hospital admissions in Sverdlovsk Oblast estimated 18% HIV

Table 2
HIV prevalence among IDUs in Russian cities, 2000–2002

Location	Year	Author	Sample characteristics	Sample	% HIV
Kaliningrad	1997	Dehne and Kobyshcha (2000)	Arrested IDUs in sex work	300	65.0
Saint Petersburg	1999	Smolskaya, Khodakevich, et al., 2000; Smolskaya, Pimenov, et al., 2000	Returned syringes to exchange	300	12.0
Saint Petersburg	2000	Abdala et al. (2003)	Returned syringes to exchange	101	10.9
Saint Petersburg	2001	Smolskaya et al. (2002a, 2002b)	Returned syringes to exchange	250–300	35.7
Saint Petersburg	1999	Morozov and Fridman (2000)	Survey of prison inmates	9727	46.0
Novosibirsk	2000	Loktev et al. (2001)	Needles in narcology treatment	239	5.9
Rostov-Don	2001	Saukhat (2001)	Needle-syringe exchange	255	33.3
Pskov	2000	Sivatcheva (2000)	Needle-syringe exchange	543	0.0
Togliatti	2001	Rhodes, Lowndes, et al., 2002	Street and community-recruited	426	56.0
Irkutsk	2001	Smolskaya et al. (2002a, 2002b)	Returned syringes to exchange	152	64.5
Tver	2001	Smolskaya et al. (2002a, 2002b)	Returned syringes to exchange	137	54.6
Samara	2001	Smolskaya et al. (2002a, 2002b)	Returned syringes to exchange	150	28.7
Rostov	2001	Smolskaya et al. (2002a, 2002b)	Returned syringes to exchange	200	18.0
Rostov	2002	Saukhat, Tormozova, Dosyagaeva, et al., 2002; Saukhat, Tormozova, Poplavskaya, & Kravchenko, 2002	Returned syringes to exchange	350	10.9

prevalence (Struin, 2002). In Novosibirsk, Siberia, where at the time of the study only 61 HIV cases were registered, a study of 239 needles used for routine phlebotomy among IDUs found 6% to be HIV positive (Loktev et al., 2001). A study of 741 clients of a harm reduction project in Pskov found under 1% to be HIV positive (Sivatcheva et al., 2002). Similarly, of 338 IDUs contacted by syringe exchange and outreach and tested for HIV antibody in Nizhny Novgorod, under 1% (three persons) were found to be HIV positive (Moshkovich et al., 2000a, 2000b). This latter study associates estimates of low HIV prevalence with the introduction of harm reduction. Additional estimates of HIV prevalence among IDUs include a finding of 46% prevalence among a sample of 9727 IDU prison inmates in Saint Petersburg, 58% of whom had injected in the last 12 months (Morozov & Fridman, 2000). Studies tend to suggest highest HIV prevalence among IDUs (>30%) in cities where there are high concentrations of IDUs (Dehne & Kobyshcha, 2000). It is important to note that once HIV prevalence among a high-risk population reaches 10–20%, HIV epidemics can maintain a self-perpetuating effect, with even modest levels of risk behaviour leading to substantial rates of infection (Des Jarlais et al., 2000).

The prevalence of sexually transmitted infections

There are few studies of STI prevalence among drug injecting populations. Studies in Saint Petersburg have suggested that over 33% of IDUs have untreated STIs (Kalichman et al., 2000), and based on analyses of returned syringes from 101 IDUs, that the prevalence of syphilis is around 7% (Abdala et al., 2003). Slightly higher estimates of syphilis prevalence—at 12 and 11%—resulted from a study among 910 IDUs attending the city's main HIV prevention project and a study among 1770 clients of the city needle-exchange bus (Karapetyan et al., 2002; Volkova et al., 1999).

Outside Saint Petersburg, a study of a sample of 176 IDUs, most of whom were resident in Tver, found that the prevalence of syphilis was 16% among HIV positive IDUs and 12% among HIV negative IDUs (Bobkova et al., 1998). In Pskov, around 7% of 543 IDUs in contact with outreach were found to have syphilis (Sivatcheva, 2000), while in Rostov-Na-Donu syphilis prevalence was estimated at under 1% in a study of returned syringes among 350 IDUs (Saukhat, Tormozova, Dosyagaeva, et al., 2002; Saukhat, Tormozova, Poplavskaya, & Kravchenko, 2002). Over half (58% of 200) of surveyed IDUs in Stavropol (Filonenko, Isaev, & Petrov, 2002), and 32% of 41 male IDU patients of an infectious disease hospital and 60% of 32 IDU patients of a narcology clinic in Moscow, reported having an STI in the past (Kozhevnikova, Alikeeva, Shamov, & Yushuk, 1998).

The prevalence of hepatitis B and C

There are a number of estimates of hepatitis C and B prevalence generated from studies among IDUs in Saint Petersburg. Two of these based on the analysis of blood contained in returned syringes to an HIV prevention project show HCV prevalence at 78.2 and 92% and HBV prevalence at 15.5 and 33%, respectively (Abdala et al., 2003; Smolksaya et al., 2002). A third study in Saint Petersburg found 79% of 910 IDUs to be HCV positive and 48% to be HBV negative (Karapetyan et al., 2002), and a fourth, among 1700 clients of a needle-exchange bus, found that 81% were HCV positive and 64% HBV positive (Volkova et al., 1999). In Pskov, 54% of 543 IDUs in contact with outreach HIV prevention were confirmed HCV positive (Sivatcheva, 2000), while in Nizhny Novgorod, 65% (218) of 335 IDUs contacted by syringe exchange and outreach were found to be HCV positive and 32% (98/305) HBV positive, although HIV prevalence was estimated at under 1% (Moshkovich et al., 2000a, 2000b). A study of returned syringes to two syringe exchanges in Rostov-Na-Donu estimated HCV prevalence at 33.5% and HBV prevalence at 23% (Saukhat, Tormozova, Dosyagaeva, et al., 2002; Saukhat, Tormozova, Poplavskaya, et al., 2002). In Novosibirsk, Siberia, a study of 239 needles used for routine phlebotomy among IDUs found 57% to be HCV positive and 6% HVB positive (Loktev et al., 2001), while in Sverdlovsk, 15% of individuals admitted to hospitals and reporting occasional drug injecting were found to be HCV positive and 27% HBV positive (Struin, 2000).

The diffusion of injecting drug use

Prior to the rapid diffusion of powdered heroin in eastern Europe since about 1997, the most commonly injected opiates in Russia were kitchen-based home-produced derivatives of poppy, including 'chornaya' ('black'), 'khimiya' ('chemistry'), 'mak' or 'hanka'. Prior to 1998, between 70 and 95% of Russian IDUs were estimated to be regularly injecting these drugs (Dehne et al., 1999). In addition, home-produced derivatives of ephedrine and ephedrine-based medicines include a liquid methamphetamine usually known as 'Vint' ('screw'), as well as jeff and moulka (Sergeyev et al., 1999). Some studies associate IDUs with a history of injecting home-produced Vint with a higher likelihood of needle and syringe sharing and HIV positivity (Rhodes, Lowndes, et al., 2002; Rhodes, Platt, et al., 2002).

The current trend is for the majority of Russian IDUs to be primarily injectors of heroin. Aside from recent interruptions in the local availability of heroin—reported anecdotally in a number of Russian cities around late 2001 (Ruzhnikov, 2002), and possibly related to shifts in supply as a consequence of the conflict in Afghanistan (Hankins, Friedman, Zafar, & Strathdee, 2002)—heroin is generally reported to be locally available in most large cities in the region (Bogdanov, Khalidova, Dontsov, & Degtyar, 2002; Golubeva & Bogonis, 2002). Yet, city differences pertain. For example, a study of syringe-exchange participants in five cities indicated geographical variations, showing that at the time of the survey

(2001) the majority of IDUs in Saint Petersburg (96%) and Volgograd (90%) injected heroin, whereas in Nizhny Novgorod (83%) and Rostov-Na-Donu (84%) the majority injected home-produced opiates (Des Jarlais et al., 2002). This study also found that the injecting of amphetamines was more common than opiates in Pskov. Ephedrine users also predominate in Vladivostok (Zavadskaya et al., 2002).

Extent of injecting drug use

Evidence points to a marked growth in the extent of drug injecting in eastern Europe since 1990 (Dehne et al., 1999; Koshkina, 2000; Max Planck Institute, 2000). Current registered drug users in Russia, known to be an underestimate, are approximately 450,000 (Koshkina, 2000). Estimates of the true extent of the population suggest between 1.5 and 3 million IDUs in a total population of 150 million; perhaps 1–2% of the population (Max Planck Institute, 2000; UNAIDS, 2000; USAID & CDC, 1998). Epidemiologists in the region estimate between 7 and 10 unknown drug users for each drug user officially registered (Barabanshikov & Konrad, 1999; Koshkina, 2000).

Rapid assessment estimates suggests that in some Russian cities the prevalence of IDU can be under 1% (Belgorod and Pskov), although in the majority of locations is between 1 and 2% (Kaliningrad, Kazan, Novorossiysk, Rostov and Volgograd). Estimates in Ekaterinburg, Chapayevsk, Irkutsk, Novosibirsk, Penza and Togliatti are as high as 3 and 5% (Dehne & Kobyshcha, 2000; Koshkina, Koryakin, & Tsarev, 2002; Platt, Hickman, et al., 2003). For example, a recent prevalence estimation study using capture–recapture methods in Togliatti city estimated a population of 15,039 male IDUs (C1 12,696–18,515) suggesting that the true prevalence of IDU is at least three times greater than the registered male IDU population (Platt, Hickman, et al., 2003). An additional capture–recapture study in Chapayevsk, a smaller city of Samara Oblast with a population of 83,000, gave an estimate of 2625 drug users in the city (CI 2328–2987), 97% of whom were estimated to be IDUs. This estimate, three times higher than the number of officially registered cases of drug users, suggests that the IDU population is approximately 3% of the total city population (Koshkina et al., 2002).

Demographic profile

Rapid diffusions in drug use coincided with decreasing trends in age at first injection. Most studies estimate that the average age at first injection is between 18 and 20 years (Abdala et al., 2003; Bogdanov, Khalidova, Dontsova, & Degtyar, 2002; Des Jarlais et al., 2002; Moshkovich et al., 2000a; Trofimov, Lukitcheva, Gorodezkaya, & Sokolov, 2000), though some suggest that the average age at first injection may be falling (Filatov & Suharsky, 2002; Gabbasov, Dayanova, & Ruchev, 1998; Rumyanteseva, Novitskaya, Mastakova, Jalabajeva, & Kulakov, 2001). The estimated average age of IDUs varies between cities, but most studies suggest that at least half of Russian IDUs are aged under 25 years with average injecting careers of around 3–4 years (Bogdanov et al., 2002; Des Jarlais et al., 2002; Filatov & Suharsky, 2002; Rhodes, Lowndes, et al., 2002; Sivolap & Savchenkov, 2002; Tadvhiev, 2001). Importantly, some studies show that a sizeable minority of Russian IDUs injected the first time they used drugs (other than cannabis) (Filatov & Suharsky, 2002; Rhodes, Lowndes, et al., 2002) and that the majority injected within their first year of drug use (Filatov & Suharsky, 2002).

In general, most IDUs are indigenous, unemployed males, living in the major cities, although there is evidence pointing towards the increased diffusion of injecting drug use from city to rural areas (Vinogradova, Karpets, Novikova, Filippov, & Tsaritsentseva, 2001; Volova, Bazilevskaya, & Orlova, 1999), as well as among young women (Bogdanov et al., 2002; Saukhat, 2001; Trofimov, 2000). The ratio of male to female IDUs in Russia as a whole is estimated to have decreased from 7:1 in 1991 to 5:1 in 2001 (Koshkina, 2002).

While there is a large cohort of IDUs in many Russian cities, recent anecdotal evidence suggests decreases in the numbers of young people becoming initiated into drug injecting. This is suggested by reductions in the number of new IDUs seeking help from narcology clinics and by the fact that the overwhelming majority of IDUs currently in contact with harm reduction projects have injecting histories of more than 2 years.

Risk behaviour

Receptive needle and syringe sharing

Most studies indicate that the majority of IDUs have had experience of injecting with borrowed and previously used needles and syringes. Studies in Ekaterinburg and Togliatti, for example, indicate that 82 and 84% of IDUs, respectively, have ever injected with previously used needles and syringes (Bogdanov et al., 2002; Rhodes, Lowndes, et al., 2002). As shown in Table 3, survey estimates of the proportions of IDUs reporting recent or current receptive needle and syringe sharing range from 36 to 82% (Bogdanov et al., 2002; Des Jarlais et al., 2002; Golubkova, Dubrovina, & Kadyrova, et al., 2000; Moshkovich et al., 2000a; Rhodes, Lowndes, et al., 2002), with surveys of prison IDU populations suggesting a range between 22 and 65% (Frost, Bijl, & Tchertkov, 2001; Morozov & Fridman, 2000). A synthesis of 63 rapid assessment studies in Russia conducted between 1998 and 2000 suggested that the proportion of IDUs reporting regular receptive sharing of needles and syringes ranged between 9 and 95%, with the majority of cities clustering between 40 and 70% (Frost, Burrows, & Murdo, 2000).

Two of the largest studies investigating syringe sharing comprise the five-city study of 1076 syringe-exchange participants undertaken in Nizhny Novgorod, Saint Petersburg,

Table 3
Estimates of receptive needle/syringe sharing among IDUs

Location	Author	Sample characteristics	Sample	% Needle/syringe sharing
Russia	Des Jarlais et al. (2002); Grund et al. (2001)	IDUs attending syringe exchanges in Nizhniy Novgorod, Pskov, Rostov-Na-Donu, St. Petersburg, and Volgograd in 2000	1076	Average 38% IDUs reported receptive sharing in 30 days prior to attending syringe-exchange projects. Average 11% IDUs reported receptive sharing in last 30 days since participating in syringe-exchange project
Sverdlovsk	Power and Nozhkina (2002)	IDUs attending syringe-exchange projects in three sites in the Oblast in 2001	663	68% injected with another's syringe and 60% with another's needle in the 4 weeks before attending the syringe exchange. 22% of IDUs injected with another's syringe and 25% with another's needle in last 4 weeks during participation with the syringe exchange
Togliatti	Rhodes, Lowndes, et al., 2002	Community-recruited survey sample of IDUs	426	36% injected with needles and syringes previously used by someone else in last 4 weeks. 66% injected with same needle and syringe more than once, a median of three times
Ekaterinburg	Fedotova, Balueva, Romanova, Dubrovina, & Kravchenko, 2002; Fedotova, Zemerov, & Yefimova, 2002	IDUs attending AIDS City Centre	394	78% reported receptive needle/syringe sharing in last year
Nizhny Novgorod	Moshkovich (2000)	IDUs contacted through outreach and syringe-exchange services	4036	47% reported regular receptive needle/syringe sharing in last year
Ekaterinburg	Golubkova et al. (2000)	IDUs attending AIDS, narcological and medical services	82	82% reported regular receptive needle/syringe sharing in last year
Russia	Frost et al. (2000)	Synthesis of 63 rapid assessments conducted since 1998	Varied	Cities reported between 9 and 95% of IDUs who shared needles and syringes. Majority of cities reported between 40 and 70% of IDUs who shared
Russia	Frost et al. (2000)	Inmates in 11 Russian prisons in four regions, in 2000	1100	26% had injected in the last 3 weeks and 65% had used or passed on used injecting equipment
Saint Petersburg	Morozov and Fridman (2000)	IDU inmates, January and December 1999	9727	22% reported injecting with a used shared syringe in the last 12 months

Pskov, Rostov-Na-Donu and Volgograd (Des Jarlais et al., 2002), and a survey undertaken among 426 IDUs, all of whom were recruited outside of treatment or syringe-exchange settings, in Togliatti City, Samara Oblast (Rhodes, Lowndes, et al., 2002). The five-city study found 38% of IDUs to report receptive syringe sharing in the 30 days prior to their first attendance at a syringe exchange, with sharing rates highest in Saint Petersburg (48% of $n = 221$) and Nizhny Novgorod (41% of $n = 236$) (Des Jarlais et al., 2002). The Togliatti study found that 36% of IDUs reported injecting with needles and syringes previously used by someone else in the last 4 weeks, of whom 61% shared with a close friend, 24% shared with a regular sex partner, and 21% shared with an unknown person (Rhodes, Lowndes, et al., 2002). A sizeable minority (7%) of IDUs in Togliatti also said they had injected with needles and syringes previously used by someone they knew had HIV infection. Additionally, two-thirds (66%) had injected with the same needle or syringe a median of three times in the last 4 weeks, with the median number of days since the last sharing event being five. IDUs arrested or detained by police in the past, and who on the last occasion had been arrested or detained for drugs, had over four times the odds of needle and syringe sharing in the last 4 weeks (Rhodes, Judd, et al., 2003).

Drug distribution

There are two main methods of drug distribution in the region associated with an increased risk of transmitting blood-borne infections. These are: the distribution of drug solutions in ready filled syringes (consumers purchase the ready filled syringe); and the distribution of solutions via 'front-loading' (where the drug solution is squirted from a donor syringe into the front of another syringe with needle removed) or less commonly, 'back-loading' (where the drug solution is squirted from a donor syringe into the back of another syringe with plunger removed) (Dehne & Kobyshcha, 2000; Dehne et al., 1999; Rhodes et al., 1999). North American research associates front-loading and back-loading with HIV and HCV transmission (Jose, Friedman, Neaigus, Curtis, et al., 1993; Stark et al., 1996). It has also been posited that the HIV transmission potential of

front-loading and back-loading may be increased within the Russian context given the preference among Russian IDUs for injecting with larger volume (2 ml) syringes (Abdala, Stephens, Griffith, & Heimer, 1999).

Among IDUs recruited into the five-city study in Russia (Des Jarlais et al., 2002), 19% in Rostov-Na-Donu, 14% in Saint Petersburg and 13% in Volgograd reported having purchased ready filled syringes in the month prior to first attending a syringe exchange, while fewer IDUs—4 and 9%—reported doing this in Nizhny Novgorod and Pskov. In Sverdlovsk, 17% of IDUs reported purchasing ready filled syringes in the month prior to first attending a syringe exchange (Power & Nozhkina, 2002), while in Mirny, 15% of surveyed IDUs reported doing so (Filatov & Suharsky, 2002). In Togliatti, 7% of IDUs reported doing this in the last 4 weeks (Rhodes, Lowndes, et al., 2002), and qualitative data point to this practice being more likely among injectors of Vint than heroin or opiates (Rhodes, Mikhailova, et al., 2003).

Anecdotal reports suggest that 'front-loading' is common, especially when drugs are prepared, divided and injected in group situations. Among Russian IDUs, an average of 58% of IDUs across five cities reported 'syringe-mediated drug sharing' (front- or back-loading) and 91% reported injecting in a group situation in the 30 days prior to attending a syringe exchange (Des Jarlais et al., 2002; Grund et al., 2001). In Togliatti, approximately 40% reported dividing or sharing drugs by front- or back-loading in the last 4 weeks, while 63% reported using a previously used filter (Rhodes, Lowndes, et al., 2002). Findings from 63 rapid assessment studies point to a wide variation in the proportion of IDUs reporting that they share containers or spoons from 10 to 100%, with most cities estimating that this occurs among 30–80% of IDUs (Frost et al., 2001). The five-city syringe-exchange survey points to between 75 and 93% of IDUs having shared cookers, filters and rinse water in the last 30 days (Des Jarlais et al., 2002).

Importantly, it has been noted that injecting in groups is an almost ubiquitous feature of drug use in Russia wherein the collective use of containers and injecting equipment is common (Gabbasov et al., 1998; Grund et al., 2001). A study among 4036 IDUs participating in a harm reduction project in Nizhny Novgorod found that 85% of IDUs reported injecting in a communal setting. Similarly, in Ekaterinburg, 90% of IDUs reported injecting in group situations, and 95% reported using common containers for drug preparation (Bogdanov et al., 2002; Moshkovich et al., 2000a). Injecting within groups is a normative pattern associated with a tradition of home production of hanka/chornaya and Vint as well as with the structure of local dealing networks and economic factors (Kozhevnikova & Pokrovsky, 1999).

Drug production

It has been posited that the methods employed in the home production of liquid drugs (both hanka or chornaya and Vint) may have a direct link with HIV transmission. First, it has been posited that HIV may enter the production process via containers and mixers used to collect up, decant and mix the solution ingredients during and between heating, and via injecting equipment used to test the liquid directly from mixing containers; and second, some reports suggested that in some cases human blood may be added to the drug solution as a cleansing agent (Bolekham & Zmushko, 1998; Burrows, Rhodes, Trautmann, et al., 1998). More recent studies suggest that the use of blood in home drug production is neither common nor current. Cultures and patterns of home production also vary considerably across cities in the region. Multi-site studies in Russia have shown that 8% of IDUs ($n = 1976$) report using blood when home-producing drugs in the 30 days prior to first attending a syringe exchange (Grund et al., 2001), although between 25 and 33% of IDUs in Sverdlovsk are said to report using blood in drug production (Power & Nozhkina, 2002). Only 3% of IDUs in Togliatti reported doing so in a similar time period (Rhodes, Lowndes, et al., 2002). Evidence, including that derived from laboratory-based simulations, suggests that even if HIV-contaminated blood were to be used, the heating and boiling during the production process would almost definitely inactivate HIV (Dehne et al., 1999).

Sexual behaviour and condom use

Available evidence highlights that the majority of IDUs are sexually active. A survey among IDUs attending syringe exchange in Saint Petersburg found that 86% (of $n = 110$) were sexually active, of whom 51% had one regular sexual partner and 36% had more than one sexual partner (Abdala et al., 2003). A recent survey among 408 IDUs in Tver showed that 87.5% were sexually active in the last 3 months, of whom 63% had sex with non-injecting sexual partners and 27% with multiple partners (Ivanov, 2002). A comparison among 41 male and 80 female heroin users in Moscow showed that 70% of female users had male partners who were also IDU, and that 76% reported that they were initiated into heroin by their sexual partners (Mokhnatchev, 2002). Another study in Moscow among IDUs attending a narcology clinic indicated that over 40% had non-IDU sexual partners (Kozhevnikova, Alikeeva, Shamov, & Yushuk, 1998). The survey of street-recruited IDUs in Togliatti found that 43% (140/325) reported penetrative sex in the last 6 months, with 33% (99/303) reporting one sexual partner and 9% reporting more than two sexual partners during this period (Rhodes, Lowndes, et al., 2002). In Ekaterinburg, one study found that 86% of IDUs reported sexual contacts in the last 3 months (Bogdanov et al., 2002), and another, that 32% of IDUs reported two sexual partners and 28% of female IDUs reported an involvement in sex work in the last year (Fedotova, Balueva, Romanova, Dubrovina, & Kravchenko, 2002; Fedotova, Zemerov, & Yefimova, 2002). Of 109 IDUs in Astrahan, over 80% reported sexual relations with sex

workers and occasional sexual partners in the previous year (Tadzhiev, 2001).

The consensus among studies is that the majority of IDUs do not use condoms consistently. The proportions of IDUs using condoms consistently or 'always' in the last 4 weeks was estimated at 13% in Sverdlovsk Oblast (Power & Nozhkina, 2002), 17% among male IDUs in Togliatti (Lowndes et al., 2002), 17% among IDUs in Nizhny Novgorod (Moshkovich et al., 2000a), 24% in Volgograd (Shelkovnikova, 2002a, 2002b), and 28% among IDUs in Ekaterinburg (Fedotova, Balueva, et al., 2002; Fedotova, Zemerov, et al., 2002). Higher rates of consistent condom use—40% of those sexually active—were reported among IDUs ($n = 357$) surveyed in Tver (Ivanov, 2002). In a study of 9727 prisoners in Saint Petersburg, 58% of whom were IDUs, 40% reported multiple sexual partners in the last 12 months and 61% reported never using a condom (Morozov & Fridman, 2000). In Mirny, 23% of IDUs reported that they never use condoms and 50% reported seldom use of condoms (Filatov & Suharsky, 2002). Almost half (44%) of IDUs in Ekaterinburg who engage in unprotected sex also have IDUs as sexual partners, and that 12% of reported cases of unprotected sex are with sex workers (Bogdanov et al., 2002).

Involvement in sex work

Across Russian cities, studies estimate that between 15 and 50% of female IDUs are involved in sex work (Platt, Sarang, Khachatrian, Montgomery, & Rhodes, 2003). Two recent studies in Volgograd, for example, estimated that 28 and 31% of IDUs attending the city syringe exchange were involved in sex work (Shelkovnikova, 2002a; Ryabenko, 2001). One Russian study estimated that four in every five HIV positive women were involved in both drug use and sex work (Smolskaya, Khodakevich, et al., 2000; Smolskaya, Pimenov, et al., 2000). In Togliatti, 50% of female IDUs (77 of 155) had ever exchanged sex for goods or money, and 86% of these were involved in sex work at the time of the survey (Lowndes et al., 2002). Of these, 86% reported consistent condom use with paying partners, and all reported penetrative sex with clients in the last 4 weeks. Female IDUs involved in sex work were found to inject drugs more frequently than female IDUs not involved in sex work (86% compared with 55% inject at least once a day, $P < 0.0001$), and higher proportions of IDUs involved in sex work reported sharing needles with people they know to be HIV positive (17% compared with 4%, $P < 0.01$) (Lowndes et al., 2002).

Studies of female sex workers also show an overlap with injecting drug use, with estimates showing at least 30% of sex workers to also inject drugs (Atlani, Caraël, Brunet, Frasca, & Chaika, 2000; Lakhulamani, 1997; Platt, Hickman, et al., 2003; Platt, Sarang, et al., 2003; Nashkhoev, 2002). In Ekaterinburg, 86% of 44 sex workers reported injecting drug use (Bogdanov et al., 2002), while in Astrahan and Stavropol, 80 and 88% of sex workers, respectively, reported injecting drug use (Filonenko, Isaev, & Petrov, 2002; Tadzhiev, 2001). In Saratov, 64% of 385 sex workers surveyed reported using drugs during the 6 months before the survey, and of these 84% reported injecting heroin and 15% hanka (O & K Marketing, 2000). The same study showed that 22% of IDU sex workers reported sharing needles or syringes occasionally and 8% always. The majority (86%) reported receiving drugs in exchange for sex.

Risk reduction

International studies indicate reductions in the level and frequency of needle and syringe sharing among syringe-exchange participants, and associate the legal accessibility and availability of syringe distribution with reductions in HIV transmission (Bastos & Strathdee, 2000; Des Jarlais et al., 1996; Gibson, Flynn, & Perales, 2001; Hurley, Jolley, & Kaldor, 1997). In Russia, there is a growing evidence base of evaluative and other research exploring risk reduction among IDUs. Of recent note are studies by Des Jarlais et al. (2002) and Grund et al. (2001), and a study monitoring syringe-exchange use in three sites in Sverdlovsk Oblast (Power & Nozhkina, 2002).

Comparing risk behaviour in the 30 days before first attendance at a syringe exchange against the last 30 days among 1076 syringe-exchange participants in five cities, Des Jarlais et al. (2002) suggest reductions in receptive needle and syringe sharing from 38 to 11%. Reductions in the proportions of IDUs sharing syringes following participation in a syringe-exchange project occurred across each of the five cities in the study: Nizhny Novgorod (from 41% before to 9% after); Pskov (26–4%); Rostov-Na-Donu (39–9%); Saint Petersburg (48–29%); and Volgograd (37–3%). The Power and Nozhkina study showed that the proportions only using their own syringe increased from 32% (of $n = 663$) at Time 1, 1 month before attending a syringe exchange, to 72% (of $n = 241$) at Time 2, after 6 months attendance at a syringe exchange. The same study compared syringe-exchange attenders at Time 2 to non-attenders and found that attenders were at least twice as likely to only use their own needle and syringe as well as their own filter and drug solution (Power & Nozhkina, 2002).

In the Togliatti survey of 426 IDUs, a multivariate model showed that IDUs who reported syringe exchanges or outreach workers as their main source of new needles and syringes in the last 4 weeks had 0.3 times the odds of sharing compared to those obtaining them from a pharmacy or shop, whereas those whose main source was buying needles and syringes on the streets or obtaining from friends, sexual partners or other drug users had 12 times the odds of receptive needle and syringe sharing in the last 4 weeks (Rhodes, Judd, et al., 2003).

Additional evidence in support of risk reduction is provided by internal monitoring of syringe-exchange projects. In Belgorod, for example, the proportion of syringe-exchange participants reporting needle and syringe sharing decreased from 50% in 1999 to 22% in 2001 (Tarakanova et al., 2002). In Rostov-Na-Donu, evaluation of syringe exchange showed reductions in needle and syringe sharing among exchange participants, from 74% in early 1999 to 21% by November 1999, as well as reductions in the re-use of filters (Saukhat, Tormozova, Poplavskaya, et al., 2002).

Other projects associate low and stable HIV incidence with the early introduction and presence of syringe exchange and outreach (Moshkovich et al., 2000a, 2000b; Sivatcheva et al., 2002). In Pskov Oblast, for example, local researchers note that the early introduction and sustained coverage of syringe distribution may have contributed to the prevention of increases in HIV incidence within the IDU population. In contrast to Pskov City where the rate of reported new cases has remained stable (at under 4 per 100,000 population between 1998 and 2001), recent increases in the number of HIV cases have occurred in Velikie Luki (from 4.3 in 2000 to 26.9 per 100,000 population in 2001) and Opochka (to 71.4 per 100,000 population in 2001), both cities in which syringe exchange is recent and where coverage is inadequate (Pskov Oblast AIDS Centre, 2002). It has also been noted that whereas 78% of 27 registered HIV cases in Opochka and 88% of 50 registered HIV cases in Velikie Luki are associated with IDU, only 28% of 28 registered HIV cases are associated with IDU in Pskov. A study of HIV prevalence among 741 clients participating in the Pskov syringe-exchange project found under 1% to be HIV positive (Sivatcheva, 2000; Sivatcheva et al., 2002). Similarly, routine monitoring associates the presence of syringe exchange with a reduction over time in reported new cases of HIV among syringe-exchange clients in Niznhny Novgorod (Moshkovich, 2001; Moshkovich et al., 2000a, 2000b), Verhnaya Salda, Sverdlovsk Oblast (Sofina, Aristova, Fedotova, & Shirshov 2002), and Vladivostock (Zavadskaya et al., 2002).

A recent cost effectiveness study based on annual new client and syringe distribution data from 16 harm reduction projects in Russia, all of which were established for at least 2 years, attempted to model the number of HIV infections averted as a result of harm reduction (Bobrik, 2002). Assuming that the background prevalence of HIV was 5% among IDUs, that 30% of those not in contact with syringe exchange regularly share needles and syringes, that 10% of those in contact with syringe exchange regularly share needles and syringes (in keeping with study estimates above), that syringes were shared in groups of three persons at any one time, and that syringes were effectively cleaned on 50% of occasions, the study estimated that 36 new HIV infections would occur in a year among IDUs in contact with harm reduction projects compared with 108 among IDUs not in contact with harm reduction projects. While acknowledging its methodological limitations, the modelling predicts 72 averted cases of HIV per harm reduction project (Bobrik, 2002).

In addition to reductions in needle and syringe sharing, the Des Jarlais et al. (2002) study associates risk reduction among syringe-exchange participants in ‘front-loading’ or ‘back-loading’ (from 58% before syringe-exchange attendance to 48% during attendance) and shows some indication of change in the shared use of utensils, such as spoons and glasses (from 82% before syringe-exchange attendance to 73% during attendance).

There is also suggestive evidence that IDUs in contact with syringe-exchange interventions may report slightly higher levels of condom use. In Sverdlovsk, for example, whereas 13% of IDUs reported consistent condom use in the last 4 weeks before first attending a syringe exchange, this is increased to 19% among those in contact with the syringe exchange. Additionally, an evaluation of syringe exchange in Belgorod suggested reductions in the proportions of IDUs reporting unprotected sex from 45 to 37% (Tarakanova et al., 2002). Yet, studies also highlight that syringe-exchange projects may have little impact on sexual behaviour change: in Astrahan 80% of the clients of the syringe exchange (which has been operating for 1.5 years) still reported unprotected sex (Tadzhiev, 2001); while in Volgograd, only modest increases in consistent condom use overtime—from 24% in 2000 to 36% in 2001—were reported among syringe-exchange participants (Shelkovnikova, 2002a, 2002b).

HIV prevention

Historical development

The first documented projects in harm reduction in Russia were established in 1996. These included a peer-driven intervention and syringe exchange in Yaroslavl funded by the International Harm Reduction Development (IHRD) Programme of the Open Society Institute (OSI) (Sergeev et al., 1999); a short-lived mobile syringe-exchange project in Moscow, also funded by IHRD; and a street outreach, counselling and condom distribution project for IDUs (without syringe distribution) in Moscow funded by the Dutch section of Medecins Sans Frontieres (MSF-H). By January 1997, a mobile syringe-exchange project had also been established in Saint Petersburg. This project was implemented by Medecins Du Monde (MDM) in collaboration with a local non-governmental organisation (NGO) (Vozvrashenie) and funded between the TACIS Lien Program and MDM (ODCCP/UNAIDS, 2001).

Of key significance in the development of HIV prevention for IDUs in Russia was the formation, in 1997, of a network of harm reduction development projects. This was brought about by a joint Memorandum of Understanding between MSF-H and the Ministry of Health (MoH) to implement a training programme for health professionals

focused specifically on HIV prevention strategies targeting IDUs. At the same time, a new international collaborative initiative—Russia AIDS Prevention Initiative Drugs (RAPID)—was formed, involving IHRD, MSF-H, MDM, OSI-Russia, Interactive Drogenhilfe and the University of Connecticut (Burrows et al., 1998; Onishenko & Narkevich, 2000). This initiative comprised training in harm reduction, and following rapid assessment in participating cities, the submission of local project proposals in HIV prevention for potential funding by OSI-Russia. By the end of 2000, 200 participants from 63 regions had completed the training, 61 rapid assessments had been completed and 36 harm reduction projects had received funding from OSI. As of February 2003, there were 51 projects in harm reduction in Russia receiving funding from OSI, 40 in major cities and 11 in small towns.

Extent and coverage

We are aware of 75 harm reduction projects in Russia (as of February 2003). Of these, 42 are implemented by governmental organisations, and 33 by NGOs. According to surveys (Badrieva, Karchevsky, & Bidordinova, 2001), nearly all harm reduction projects operate fixed-site syringe exchanges, and in 2001, 14 of 27 projects surveyed operated mobile services in 12 cities (Badrieva et al., 2001). This survey showed there to be a median of 5.5 outreach staff per harm reduction project ($n = 27$), and a monthly average number of client contacts per outreach worker of 72, of which 17.5 were new contacts. In addition to direct face-to-face outreach, 21 of 26 harm reduction projects surveyed in 2001 reported that they undertook secondary distribution of needles and syringes, said to account for approximately 25% of all syringes distributed (Burrows, 2001).

There is an urgent need for a systematic assessment of the extent of IDU population coverage achieved by HIV prevention projects, especially projects seeking to distribute and exchange needles and syringes. A discussion of coverage, and how best to define and measure it at project, city or federal level, is outside the scope of this paper. For our purposes here, we will take coverage to mean the proportion of IDU who have contact with syringe distribution/exchange projects, be these fixed-site, outreach or secondary exchange projects.

In a survey of 26 harm reduction projects in 2001, Burrows provides a crude estimate of coverage for 23 cities derived from the estimated number of IDUs in each city (estimated from rapid assessments and usually not from capture–recapture studies) and the estimated number of clients reached directly by projects in the previous month (not including secondary contacts). This yields an overall estimated project coverage of 0.74% of the IDU population (Burrows, 2001). This survey suggests that 65% (15/23) of the syringe distribution and exchange projects in Russia regularly reach under 1% of the local IDU population, that 30% (7/23) regularly reach between 1 and 5%, and few (only one in the survey) reach over 5%.

Crude estimates of OSI-funded harm reduction project coverage may also be made on the basis of annual project reports. These data are available for 35 projects in 2000–2001 (Zhumagaliev, 2002). Based on a combination of local IDU population estimates derived from rapid assessment studies or officially registered IDUs, and total number of IDUs having contacted projects at least twice in 2000–2001, these data suggest that harm reduction projects in Russia reach 16% of their target IDU population (Zhumagaliev, 2002). If it is assumed that the IDU population is 2% of the total city population (Max Planck Institute, 2000; UNAIDS, 2000), project data suggests a coverage rate of 14% of the target IDU population. It is important to treat these estimates with considerable caution given the crudeness of the IDU population estimates in each city (which in Arkhangelsk, Barnaul, Ekaterinburg, Novosibirsk, Omsk, Samara, Vladivostock and Voronezh are estimates derived from officially registered IDUs), and the fact that the coverage rate is based on an estimate of clients contacting projects at least twice within a year rather than by a measure of more regular or frequent project contact (it is questionable to what extent such limited contact with a project would result in behavioural change or regular access to clean injecting equipment). It is also important to acknowledge that project coverage rates may have since changed.

According to OSI annual project data, the harm reduction projects achieving the highest estimates of IDU population coverage (based on IDU estimates derived from rapid assessments or official registration data) are: Belgorod (80%); Pskov (79%); Ulan Ude (61%); Omsk (43%); and Kazan (28%). Three of 35 OSI projects (8.5%) therefore reach the 60% coverage rates endorsed by the UNAIDS Task Force on HIV Prevention Among IDU. When assuming that the IDU population is 2% of the total population, none of these projects achieve such a high rate of coverage, and the highest coverage rates achieved are by projects where the IDU population is estimated to be small (∼4000 and under).

In addition to IDU population coverage, the annual reports made by OSI projects suggest that an average of 47.4 needles/syringes per client were distributed in 2001, ranging from 11 per client in Verhnaya Salda, Sverdlovsk (6424 needles/syringes among 597 clients) to 195 per client per year in Vladivostok (82,508 needles/syringes among 423 clients). Combining data on the volume of needles and syringes distributed alongside IDU population estimates, OSI project data suggest an annual average of 7.6 needles/syringes distributed per IDU per year in each city (Zhumagaliev, 2002). The locations in which needle/syringe distribution per estimated number of IDU in the city is highest include: Belgorod (58 per IDU); Pskov (37 per IDU); Barnaul (31 per IDU); Elista (31 per IDU); Vladivostock (27 per IDU); and Ulan Ude (25 per IDU). This suggests that four of the projects achieving the highest rates of population coverage are also achieving the highest rates of needle/syringe distribution

among the city IDU population. Most of the projects with high rates of needle/syringe distribution per client tend to have contacted smaller numbers of clients.

In the sites where project data suggests that at least 60% IDU population coverage rate was achieved as well as high rates of needle/syringe distribution coverage among IDUs in the city (Belgorod, Pskov, Ulan Ude), a maximum of 72, 46 and 41 needles/syringes were distributed per clients contacting the project per year. This emphasises that it is clearly possible for projects to suggest adequate population coverage at the same time as *inadequate* needle/syringe distribution, both per client as well as per IDU. Conversely, the survey by Burrows showed the potential for relatively high levels of needle/syringe distribution among clients despite low IDU population coverage in the city. In his survey of projects in 2001, an average of 31 needles and syringes were distributed per each regular primary IDU contact per month, equivalent to an average of 372 per each primary IDU contact per year (Burrows, 2001). If the average IDU in Russia injects between twice and three times a day (Bogdanov et al., 2002; Kozhevnikova et al., 1998; Rhodes, Lowndes, et al., 2002), a crude estimate of 730–1100 new needles and syringes may be required per each IDU per year. According to the estimates provided by Burrows, this could imply that between a third and a half of total needles and syringes required per average IDU were provided to primary contacts of syringe-exchange projects. The OSI derived estimate of 47 needles/syringes distributed per average IDU client per year is less positive. The cost effectiveness analysis by Bobrik (2002) based on 16 longer established (at least 2 years) harm reduction projects suggests 65 needles/syringes distributed per new IDU contact per year.

Funding and cost effectiveness

Of the 75 harm reduction projects we have identified, most ($n = 53$) receive funding support from OSI-Russia, while 22 receive funding from local sources. A survey of 26 harm reduction projects in 2001 showed an average project budget of approximately 28,000 USD per year, of which 68% was sourced from OSI, 30% from local funding and 2% from other international agencies (Burrows, 2001). A cost effectiveness analysis of 16 longer established OSI-funded projects in 2001 indicates that the share of OSI funding was 62% of total project budgets and amounted to an approximate average of 25,000 USD per project, with the total annual cost of harm reduction projects estimated at 40,662 USD (Bobrik, 2002).

In addition to population coverage, one additional useful indicator, especially in terms of the planning of HIV prevention scale-up, is not merely unit project cost but unit cost per contacted client. The recent cost effectiveness analysis by Bobrik shows an annual total of 1734 unique IDU contacts across 16 harm reduction projects (108 new clients contacted per project), giving an average 23.4 USD per new client contacted, and an annual total of 112,611 needles and syringes distributed (7038 per project), giving an average of 0.36 USD per needle and syringe distributed (Bobrik, 2002). As noted above, this study estimated 72 IDU HIV cases averted as a result of participation in syringe exchange, giving an average cost of 564 USD per each case averted per harm reduction project.

Discussion

Recognising the relative dearth of published material exploring HIV transmission and HIV prevention associated with injecting drug use in Russia, we have provided a preliminary review of the evidence base, including that derived from Russian language sources.

HIV transmission

This review reiterates the continuing critical importance of injecting drug use in HIV transmission in Russia. Almost three quarters of all HIV infections registered in eastern European and central Asian countries are located in Russia (Rhodes, Platt, et al., 2002). Studies estimating HIV prevalence among survey samples of IDU emphasise marked differences between cities—from estimates of over 50% in Togliatti, Tver and Irkutsk (Rhodes, Lowndes, et al., 2002; Smolskaya et al., 2002a) to estimates under 1% in Pskov and Nizhny Novgorod (Sivatcheva et al., 2002; Moshkovich et al., 2000a, 2000b). Taken together, the evidence base indicates the continuing potential for rapid spread associated with drug injecting. Additionally, in cities with longer histories of HIV outbreaks among IDUs—such as Kaliningrad—there is evidence of increases in HIV case reports associated with sexual transmission (Pokrovsky et al., 2002; Seltsovsky et al., 2002). This raises concerns about the longer term HIV transmission potential associated with sexual transmission between injecting drug users and their sexual partners (Grassly et al., 2003; Lowndes et al., 2003).

Findings emphasise an interplay of behavioural and situational risk factors conducive to continuing HIV spread. Principal among these are recent rapid diffusions in patterns of drug injecting (including in the availability of heroin) combined with decreasing trends in age at first injection, the formation of drug use cultures in which injecting is integral, the ubiquity of injecting within group situations wherein the collective sharing of injecting equipment may be common, and relatively high background levels of injecting risk behaviour. While some estimates of the proportions of Russian IDUs regularly sharing needles and syringes are as high as 50% (Bogdanov et al., 2002; Golubkova et al., 2000; Morozov & Fridman, 2000; Moshkovich et al., 2000a), most surveys would suggest that between 30 and 40% of IDUs report receptive needle and syringe sharing in a 4-week period (e.g. Des Jarlais et al., 2002; Rhodes, Judd, et al., 2003; Rhodes, Lowndes, et al., 2002). Studies also show that the distribution of drug solutions via ‘front-loading’ is common

as is the shared use of filters and drug mixing containers. Injecting risk behaviour would appear to remain at levels sufficient to sustain HIV transmission, especially given the background HIV and STI prevalence among IDUs in some cities. Additionally, evidence also points to inconsistent condom use, limited sexual behaviour change and a high overlap between injecting drug use and an involvement in sex work.

Risk reduction and HIV prevention

There is evidence of risk reduction among Russian IDUs. In the past 2 years an increasing number of studies show risk reduction associated with IDUs' participation in syringe distribution and exchange, including in Belgorod, Ekaterinburg, Nizhny Novgorod, Pskov, Rostov-Na-Donu, Saint Petersburg, Togliatti, Volgograd and Vladivostok (Des Jarlais et al., 2002; Moshkovich et al., 2000a, 2000b; Power & Nozhkina, 2002; Rhodes, Judd, et al., 2003; Sivatcheva et al., 2002; Sofina et al., 2002; Zavadskaya et al., 2002). In keeping with international evidence determining syringe distribution and exchange as a means of HIV prevention (Des Jarlais et al., 1996; Gibson et al., 2001; Hurley et al., 1997), our review identifies an emerging Russian evidence base largely comprising a combination of project-based evaluation and 'before and after' assessments of risk behaviour among syringe-exchange attenders. It may become necessary to supplement these studies with follow-up and cohort designs to demonstrate the impact of interventions on HIV incidence and behaviour in conjunction with studies to assess overall syringe distribution coverage (including from pharmacies) and its likely impact in HIV cases averted (see, e.g. Vickerman & Watts, 2002).

We identified a total of 75 harm reduction projects incorporating syringe distribution or exchange in Russia (as of February 2003). At present, there are only crude (and unpublished) data available estimating the likely IDU population coverage of harm reduction projects. Estimates in 2001 suggested that the majority of projects in Russia regularly reached under 1% of the local IDU population (Burrows, 2001). More recent estimates suggest that between 14 and 16% of local IDU populations are reached at least twice a year by harm reduction projects with an average of 47.4 needles/syringes distributed per client per year (Zhumagaliev, 2002). The cost of each new IDU contacted by Russian harm reduction projects has been estimated at 23.4 USD, each needle/syringe distributed at 0.36 USD, and each HIV case averted as a result of participation in syringe exchange at 564 USD (Bobrik, 2002).

Taken together, findings point to the recent introduction and development of harm reduction projects in Russia, associated evidence of risk reduction among participating IDUs and likely cost efficacy, but inadequate IDU population coverage both in terms of syringes distributed and IDUs regularly reached. While it is important to recognise that the majority of IDUs in most Russian cities purchase injecting equipment from pharmacies, restricted coverage of syringe distribution is a critical determinant of needle and syringe sharing (Bastos & Strathdee, 2000). This becomes especially important in the context of additional situational factors—such as local policing practices—which potentially mitigate against syringe distribution access. Studies have indicated that a fear of being stopped or searched by police among Russian IDUs as well as the confiscation of injecting equipment by police can restrict syringe distribution access as well as increase the odds of syringe sharing (Grund et al., 2001; Rhodes, Judd, et al., 2003; Rhodes, Mikhailova, et al., 2003). Relations with policing agencies—especially between policing agencies and syringe exchanges—are a critical determinant of HIV prevention in Russia.

Limits and scope

It is important to note two main limitations of our review. First, it is not exhaustive. While seeking to maximise our coverage of the published relevant literature, we have generated a synthesis rather than exhaustive description of key findings. Second, the evidence upon which the review draws is of varying scientific quality. We found an absence of cohort or longitudinal and a lack of large cross-sectional studies investigating HIV transmission and risk behaviour or risk reduction among IDUs. Our review suggests that Russian estimates of HIV transmission, prevalence and incidence tend to rely on routine case reports derived from large screening programmes rather than targeted published epidemiological studies based on IDU population samples. There remains a need for epidemiological and intervention-based studies of injecting risk behaviour and risk reduction using core standardised measures of risk and behaviour change.

Conclusion

In the context of continuing levels of risk behaviour sufficient to sustain HIV transmission alongside evidence associating Russian syringe distribution and exchange programmes with risk reduction among IDUs, we note the critical importance of policy interventions to maximise syringe distribution coverage among IDU populations. We also note the importance of strengthening the Russian evidence base by introducing studies to estimate syringe distribution coverage and its likely cost effectiveness and impact in HIV cases averted in different city contexts.

Acknowledgements

We are grateful to the UK Government Department for International Development for supporting this work as part of the DFID Knowledge Programme in HIV/AIDS based at Imperial College. We would also like to thank Dr. Tatiana Smolskaya for her comments on an earlier draft of this paper and Vitaly Zhumagaliev at the Open Health Institute,

Moscow, for contributing data on the extent and location of harm reduction projects in Russian cities. We are also grateful to Mark Davis (City University), Katya Filatova (UNDP, Moscow) and Rachel Fitzgerald (Imperial College) for their assistance.

References

Abdala, N., Carney, J., Durante, A., Klimov, N., Ostrovski, D., Somlai, A., Kozlov, A., & Heimer, R. (2003). Estimating the prevalence of syringe-bourne and sexually transmitted diseases among injecting drug users in St Petersburg. *International Journal of STD and AIDS*, *14*, 697–703.

Abdala, N., Stephens, P. C., Griffith, B. P., & Heimer, R. (1999). Survival of Human Immunodeficiency Virus type 1 in syringes. *Journal of Acquired Immune Deficiency Syndrome and Human Retroviruses*, *20*, 73–80.

Atlani, L., Caraël, M., Brunet, J. B., Frasca, T., & Chaika, N. (2000). Social change and HIV in the former USSR: The making of a new epidemic. *Social Science and Medicine*, *50*, 1547–1556.

Badrieva, L., Karchevsky, E., & Bidordinova, A. (2001). *Survey among harm reduction projects in the Russian Federation*. Kazan: Harm Reduction Project (Original in Russian).

Balakireva, O. M., & Varban, M. Y. (2002). *Behavioural practices and associated risk among IDUs in Kharkiv, Ukraine*. XIV International AIDS Conference, Barcelona, Spain (Abstract C10767).

Barabanshikov, G. S., & Konrad, A. E. (1999). Narcology situation: The case of school children and students in Moscow. *Puls*, *9*, 207 (Original in Russian).

Bastos, F. I., & Strathdee, S. (2000). Evaluating the effectiveness of syringe exchange programmes. *Social Science and Medicine*, *51*, 1771–1782.

Bezruchenko-Novachuk, M., & Romantsov, V. (1998). *Sentinel surveillance conducted within the frame of the project of HIV prevention among IDUs in the town of Svetlogorsk, Gomel region, Belarus*. 12th World AIDS Conference, Geneva, Switzerland (Abstract 43467).

Bobkov, A., Kazennova, E., Khanina, T., Bobkova, M., Selimova, L., Kravchenko, A., Pokrovsky, V., & Weber, J. (2001). An HIV Type 1 Subtype A strain of low genetic diversity continues to spread among injecting drug users in Russia: Study of the new local outbreaks in Moscow and Irkutsk. *AIDS Research and Human Retroviruses*, *17*, 257–261.

Bobkova, M., Buravstova, E. V., Ladnaya, N. N., Detkova, N., V., Sukhanova, L. L., Goltsov, V. A., & Pokrovsky, V. (1998). *Prevalence of viral infections among injecting drug users in Russia*. 12th World AIDS Conference, Geneva, Switzerland (Abstract 22212).

Bobrik, A. (2002). HIV prevention among drug users in Russian cities: Cost-effectiveness analysis. *Russian Family Doctor*, *4*(6), 30–36 (Original in Russian).

Bogdanov, S., Khalidova, M., Dontsov, G., & Degtyar, E. (2002). *Social and demographic factors of drug addicts, their narcological status and risk factors for spread of HIV and other blood-borne infections among different groups of youth in Ekaterinburg*. Unpublished paper (Original in Russian).

Bogoyavlensky, G. V., Mebel, B. D., Davydova, A. A., Makarenko, G. A., Akhtyrskaya, N. A., & Sizova, N. V. (2000). HIV infection in Saint Petersburg: The changing face of the epidemic. *Microbiology and Epidemiology*, *4*, 27–28 (Original in Russian).

Bolekham, V., & Zmushko, E. I. (1998). *Home-made drugs as an active factor of HIV transmission in Russia*. 12th World AIDS Conference, July, Geneva (Abstract 23186).

Burrows, D. (2001). *A best practice model of harm reduction in the community and in prisons in the Russian Federation: Final project report*. Washington, DC: World Bank.

Burrows, D., Rhodes, T., & Trautmann, F. (1998). HIV associated with drug injecting in Eastern Europe. *Drug and Alcohol Review*, *17*, 452–463.

Bykov, A., Hudyakova, E., & Lazareva, I. (2000). *Aspects of HIV prevention work with youth in Samara Oblast*. Proceedings Scientific-Practice Conference Applying Contemporary Methods in the Fight with HIV/AIDS in Russia. Saint-Petersburg, 45 (Original in Russian).

Dehne, K., Khodakevich, L., Hamers, F., & Schwartlander, B. (1999). The HIV/AIDS epidemic in eastern Europe: Recent patterns and trends and their implications for policy-making. *AIDS*, *13*, 741–749.

Dehne, K., & Kobyshcha, Y. (2000). *The HIV epidemic in central and eastern Europe: Update 2000*. Geneva: UNAIDS.

Des Jarlais, D. C., Grund, J.-P., Milliken, J., Paone, D., Zadoretzky, C., Perlis, T., Titus, S., Bodrova, V., & Zemlianova, E. (2002). HIV risk behaviour among participants of syringe exchange programs in central/eastern Europe and Russia. *International Journal of Drug Policy*, *13*, 165–170.

Des Jarlais, D. C., Marmor, M., Friedmann, P., Titus, S., Aviles, E., & Deren, S. et al. (2000). HIV incidence among injection drug users in New York City 1992–1997: Evidence for a declining epidemic. *American Journal of Public Health*, *90*, 352–359.

Des Jarlais, D. C., Marmor, M., & Paone, D. et al. (1996). HIV incidence among injection drug users in New York City syringe-exchange programmes. *Lancet*, *348*, 987–991.

Federal AIDS Centre. (2003). *HIV Infection: Informational Bulletin* (Number 25). Moscow: Federal AIDS Centre.

Fedotova, G., Balueva, L., Romanova, N., Dubrovina, M., & Kravchenko, O. (2002). *Epidemiological characteristics of HIV-infection in Ekaterinburg* (pp. 38–40). Ekaterinburg/London: Ministry of Health of Sverdlovsk Oblast, State Center of Sanitary-Epidemiological Surveillance, Ural State Medical Academy, International Family Health, Medical School of London University, Department for International Development (Original in Russian).

Fedotova, T., Zemerov, V., & Yefimova, O. (2002). *Characteristics of the epidemiological process for HIV infection in Sverdlovsk Oblast* (pp. 25–31). Ekaterinburg/London: Ministry of Health of Sverdlovsk Oblast, State Center of Sanitary-Epidemiological Surveillance, Ural State Medical Academy, International Family Health, Medical School of London University, Department for International Development (Original in Russian).

Filatov, A., & Suharsky, D. (2002). *Peculiarities of HIV infection among intravenous drug users in Mirninsk district, Yakut area* (pp. 37–38). 4th European AIDS Conference, Vilnus, Lithuania.

Filonenko, N., Isaev, V., & Petrov, P. (2002). *Factors influencing HIV prevention among injecting drug users in the city of Stavropol* (pp. 34–36). Russian Scientific-Practice Conference on HIV and Blood Borne Viral Hepatitis, Suzdal (Original in Russian).

Frost, L., Bijl, M., & Tchertkov, V. (2001). *Prisoner risk taking in the Russian Federation*. 12th International Conference on the Reduction of Drug Related Harm, New Delhi, India.

Frost, L., Burrows, D., & Murdo, B. (2000). *Rapid situation assessment (RSA) results from the Russian Federation: Summary report of 63 RSAs conducted by participants in Medecins Sans Frontieres harm reduction training program in the Russian Federation, 1998–2000*. 11th International Conference on the Reduction of Drug-related Harm, Jersey, United Kingdom.

Gabbasov, S., Dayanova, Z., & Ruchev, Y. (1998). Epidemiological specifics of HIV infection in individuals using narcological substances in the Republic of Barshkostan. *Public Health*, *2*, 13–14.

Gibson, D. R., Flynn, N. M., & Perales, D. (2001). Effectiveness of syringe exchange programs in reducing HIV risk behavior and HIV seroconversion among injecting drug users. *AIDS*, *15*, 1329–1341.

Golubeva, L., & Bogonis, E. (2002). *Prevention of HIV-infection among drug-addicted individuals in Kemerovo* (p. 20). Proceedings of Russian Scientific-Practice Conference on HIV and Blood Borne Viral Hepatitis (Original in Russian).

Golubkova, A. A., Dubrovina, M. P., & Kadyrova, O. Y. et al. (2000). Behaviour of intravenous drug users that leads to HIV infection. *Epidemiology of Infectious Diseases*, *4*, 32–35.

Grassly, N. C., Lowndes, C., Rhodes, T., Judd, A., Renton, A., & Garnett, G. (2003). Modelling emerging HIV epidemics: The role of injecting drug use and sexual transmission in the Russian Federation, China and India. *International Journal of Drug Policy*, *14*, 25–43.

Grund, J. P. C., Kobzev, D., Melnikov, V., Zadoretsky, C., Zemlianova E., & Titus, S., et al. (2001). *Drug use patterns and HIV risk behaviors of Russian syringe exchange participants*. Twelfth International Conference on the Reduction of Drug-Related Harm, New Delhi, India.

Hamers, F. (1997). *HIV infection in Ukraine*. Saint Maurice, France: European Centre for the Epidemiological Monitoring of AIDS.

Hankins, C. A., Friedman, S. R., Zafar, T., & Strathdee, S. A. (2002). Transmission and prevention of HIV and sexually transmitted infections in war settings: Implications for current and future armed conflicts. *AIDS*, *16*, 1–8.

Hurley, S. F., Jolley, D. J., & Kaldor, J. M. (1997). Effectiveness of needle-exchange programmes for prevention of HIV infection. *Lancet*, *349*, 1797–1800.

Ivanov, I. (2002). *Research in Tver (Russia) on injecting drug users' sexual behaviour*. XIV International AIDS Conference, Barcelona, Spain (Abstract ThPeD7629).

Jose, B., Friedman, S. R., Neaigus, A., & Curtis, R. et al. (1993). Syringe-mediated drug sharing (backloading): A new risk factor for HIV among injecting drug users. *AIDS*, *7*, 1653–1660.

Kalichman, S., Kelly, J., Sikkema, K., Koslov, A., Shaboltas, A., & Granskaya, J. (2000). The emerging AIDS crisis in Russia: Review of enabling factors and prevention needs. *International Journal of STD and AIDS*, *11*, 71–75.

Kartchevski, E., & Badrieva, L. (2002). *Constructing a net of volunteers: Secondary needle exchange and peer education*. 13th International Conference on the Reduction of Drug Related Harm, Ljubljana, Slovenia (Abstract A125).

Khodakevich, L., Kobyshcha, Yu., & Shcherbinskaya, A. M. (1997). *Development of HIV epidemics in Belarus, Moldova and Ukraine*. 8th International Conference on the Reduction of Drug Related Harm, Paris, France.

Kolesov, V. M. (2002). *Trends in the spread of HIV infection and drug addiction in Russia*. 14th International AIDS Conference, Barcelona, Spain (Abstract ThPeC7443).

Koshkina, E. (2000). The spread of the use of narcotic drugs and other psychoactive substances in Russia. *Microbiology and Epidemiology*, *4*, 15–19 (Original in Russian).

Koshkina, E. (2002). *Dynamic of drug addiction in the Russian Federation* (pp. 87–89). Proceedings of Russian Scientific-Practice Conference on HIV and Blood Borne Viral Hepatitis (Original in Russian).

Koshkina, E., Koryakin, S., & Tsarev, S. (2002). A study of the 'latent' contingent of drug addicts by the method of 'repetitive capture' in the town of Chapayevsk of Samara Region in 2000–2001. *Voprosy Narkologii Journal (Addiction Problems)*, *N4*, 46–52 (Original in Russian).

Kozhevnikova, G., Alikeeva, G., Shamov, A., & Yushuk, N. (1998). Risk factors for acquiring hepatitis among drug users. *Epidemiology and Infectious Diseases*, *N3*, 47 (Original in Russian).

Kozhevnikova, G., & Pokrovsky, V. (1999). Parallel viral infections in drug users. *Medical Help*, *2*, 23–26 (Original in Russian).

Lakhulamani, V. (1997). The prostitution situation in a number of cities of Russia. *Journal of Microbiology and Immunology*, *1*, 102–104 (Original in Russian).

Loktev, A. V., Navarro, V. J., Heimer, R., Butkin, V. N., Ryder, R. W., & Netesov, S. V. (2001). *Injection drug users as sentinel indicators for rapid spread of HIV, HCV and HBV infection in Western Siberia*. Unpublished conference abstract.

Lowndes, C. M., Renton, A., Alary, M., Rhodes, T., Grassly, N., Garnett, G., & Stimson, G. (2003). Conditions for widespread heterosexual spread of HIV in the Russian Federation: Implications for research. *International Journal of Drug Policy*, *14*, 45–62.

Lowndes, C. M., Rhodes, T., Judd, A., Mikhailova, L., Sarang, A., Rylkov, A., Tichonov, M., Platt, L., & Renton, A. (2002). *Female injection drug users who practice sex work in Togliatti City, Russian Federation: HIV prevalence and risk behaviour*. XIV International AIDS Conference, Barcelona, Spain (Abstract MoPeC3501).

Mashkilleyson, N., & Leinikki, P. (1999). Evolution of the HIV epidemic in Kaliningrad, Russia. *Journal of Clinical Virology*, *12*, 37–42.

Max Planck Institute for Foreign and International Criminal Law. (2000). *Illegal drug trade in Russia*. Freiburg: Max Planck Institute.

Mokhnatchev, S. (2002). *Specific features of heroin addiction in women*. 13th International Conference on the Reduction of Drug Related Harm, Ljubljana, Slovenia (Abstract A139).

Morozov, A., & Fridman, A. (2000). *HIV testing, prevalence and risk behaviours among prisoners incarcerated in St Petersburg, Russia*. 13th International AIDS Conference, Durban, South Africa (Abstract MoPpCI1103).

Moshkovich, G. F. (2000). *Epidemiology of HIV-infection in Nizhny Novgorod Oblast* (p. 13). Scientific-Practice Conference Applying Contemporary Methods in the Fight with HIV/AIDS in Russia, Saint-Petersburg (Original in Russian).

Moshkovich, G. F. (2001). *Implementation of harm reduction project in Nizhny Novgorod Oblast*. First Russian Scientific-Practice Conference on HIV/AIDS and Hepatitis, Suzdal (Original in Russian).

Moshkovich, G. F., Pikovskaya, E. D., Fedotova, N. V., Shilov, D. V., Kuznetsov, A. V., & Moiseev, A. P. (2000a). Prevention of HIV infection and other blood borne infections amongst injecting drug users in Nizhny Novgorod associated with harm reduction. *Journal of Microbiolgoy, Epidemiology and Immunobiology*, *4*, 78–82 (Original in Russian).

Moshkovich, G. F., Pikovskaya, E. D., Fedotova, N. V., Shilov, D. V., Kuznetsov, A. V., & Moiseev, A. P. (2000b). Prevention of HIV infection and other blood-borne diseases among injecting drug users in Nizhny Novgorod associated with harm reduction. *Microbiology and Epidemiology*, *4*, 78–82 (Original in Russian).

Nashkhoev, M. R. (2002). *Social-psychological and behavioural characteristics of sex workers and the prevention of sexually transmitted infection in this group*. Moscow: Central Academic Research Institute of Dermatovenerology, Ministry of Health (Original in Russian).

O & K Marketing and Consulting. (2000). *Study of sexual knowledge, attitudes, practice and behaviour of young people in Saratov and Saratov Oblast*. St Petersburg: O & K Marketing/PSI Russia.

Office of Drug Control and Crime Prevention (ODCCP) and UNAIDS. (2001). *Drug abuse and HIV/AIDS: Lessons learned—Case studies in central eastern Europe and central Asia*. New York: UNOCCP/UNAIDS.

Onishenko, G., & Narkevich, M. (2000). New strategies in preventing the spread of HIV infection in Russia. *Journal of Microbiology, Epidemiology and Immunobiology*, *4*, 5–9 (Original in Russian).

Platt, L., Hickman, M., Rhodes, T., Mikhailova, L., Karavashkin, V., & Hope, V., et al. (2003). *Estimating the prevalence of injecting drug users in Togliatti City, Russian Federation*. 14th International Conference on the Reduction of Drug Related Harm, Chiang Mai, Thailand (Abstract 541).

Platt, L., Sarang, A., Khachatrian, A., Montgomery, R., & Rhodes, T. (2003). *HIV transmission and HIV transmission associated with sex work in the Russian Federation*. Submitted for publication.

Pokrovsky, V., Ladnaya, N., & Sokolova, E. (2002). *HIV epidemic in Russia and Eastern Europe: Are there any predictors for further heterosexual spreading?* 14th International AIDS Conference, Barcelona, Spain (Abstract WePeC6077).

Power, R., & Nozhkina, N. (2002). Correspondence: The value of process evaluation in sustaining HIV harm reduction in the Russian Federation. *AIDS*, *16*, 303–304.

Rakhmanova, A., Volkova, G., Yakouleu, A., Kryga, L., Chaika, N., Shelukhina, V., & Viongradova, E. (2000). *HIV/AIDS epidemiological*

situation in St Petersburg, Russia in 1999. 13th International AIDS Conference, Durban, South Africa (Abstract MoPeC2431).

Rhodes, T., Ball, A., Stimson, G., Kobyshcha, Y., Fitch, C., Pokrovsky, V., Bezruchenko-Novachuk, M., Burrows, D., Renton, A., & Andrushchak, L. (1999). HIV infection associated with drug injecting in the Newly Independent States, eastern Europe: The social and economic context of epidemics. *Addiction, 94*, 1323–1336.

Rhodes, T., Judd, A., Mikhailova, L., Sarang, A., Khutorskoy, M., Platt, L., Lowndes, C., & Renton, A. (2003). *Injecting equipment sharing among injecting drug users in Togliatti City, Russian Federation*. 14th International Conference on the Reduction of Drug Related Harm, Chiang Mai, Thailand (Abstract 571).

Rhodes, T., Lowndes, C., Judd, A., Mikhailova, L. A., Sarang, A., & Rylkov, A. et al. (2002a). Explosive spread and high prevalence of HIV infection among injecting drug users in Togliatti City, Russian Federation. *AIDS, 16*, F25–F32.

Rhodes, T., Mikhailova, L., Sarang, A., Lowndes, C., Rylkov, A., & Khutorskoy, M. et al. (2003b). Situational factors associated with drug injecting, risk reduction and syringe exchange practices in Togliatti City, Russian Federation: A qualitative study of micro risk environment. *Social Science and Medicine, 57*, 39–54.

Rhodes, T., Platt, L., Filatova, K., Sarang, A., Davis, M., & Renton, A. (2002). *Behavioural factors in HIV transmission in eastern Europe and central Asia*. Unpublished paper, UNAIDS, Geneva.

Rumyanteseva, T., Novitskaya, J., Mastakova, N., Jalabajeva, N., & Kulakov, P. (2001). *Yaroslav HIV-preventing project friends helping friends: The influences of advanced methods of penetration and work within the area of IDUs on the epidemiological situation of HIV in Yaroslav region.*12th International Conference on the Reduction of Drug Related Harm, April 1–5, 2001, New Delhi, India.

Ruzhnikov, Y. (2002). *The spread of HIV amongst injecting drug users in Sverdlovsk Oblast and preventative measures* (pp. 15–20). Ekaterinburg/London: Ministry of Health of Sverdlovsk Oblast, State Center of Sanitary-Epidemiological Surveillance, Ural State Medical Academy, International Family Health, Medical School of London University, Department for International Development (Original in Russian).

Ryabenko, S. (2001). *Services for sex workers*. 12th International Conference on the Reduction of Drug Related Harm, New Delhi, India.

Saukhat, S. (2001). *The influence of syringe exchange programme on intravenous drug users behaviour*. 12th International Conference on the Reduction of Drug Related Harm. New Delhi, India.

Saukhat, S., Tormozova, N., Dosyagaeva, L., Fomina, N., Ryndich, A., Rabinovich, B., Orlov, N., Prokopenkova, S., Kravchenko, V., Golubenko, I., Dunaev, A., Poplavskaya, T., Ternovaya, N., & Demjanova, N. (2002). *Social-epidemiological monitoring for HIV-infection in Rostov-on-Don* (pp. 71–72). Proceedings of Russian Scientific-Practice Conference on HIV and Blood Borne Viral Hepatitis, Suzdal (Original in Russian).

Saukhat, S., Tormozova, N., Poplavskaya, T., & Kravchenko, V. (2002). *The experience of harm reduction in Rostov-On-Don, southern Russia*. 13th International Conference on the Reduction of Drug Related Harm, Ljubljana, Slovenia (Abstract A127).

Savtchenko, I., Lladnaya, N. N., Bochkova, M. S., Pokrovsky, V. V., & Buravstova, E. V. (1998). *HIV-antibody testing policy and HIV-infection spreading in IDU in Russian Federation*. 12th World AIDS Conference, July, Geneva (Abstract 23225).

Seltsovsky, A., Yushuk, N., Polyakov, S., Mazus, A., Guzenkova, T., Kandaurov, S., Martynov, Y., Olshansky, A., & Pankova, G. (2002). *Social-economic consequences of HIV-infection spread in Russia*. Moscow: Moscow Government, Health Committee of Moscow, Moscow AIDS Center, Russian Institute of Strategic Research, Moscow State Medical-Dentist University (Original in Russian).

Sergeyev, B., Oparina, T., Rumyantseva, T., Volkanevskii, V., Broadhead, R., Heckathorn, D., & Madray, H. (1999). HIV prevention in Yaroslavl, Russia: A peer-driven intervention and needle exchange. *Journal of Drug Issues, 29*, 777–804.

Shapoval, A. (2000). *Monitoring of the HIV/AIDS epidemic among injecting drug users in eastern European countries*. Geneva/Kiev: WHO and MSF-Ukraine.

Shcherbinska, A., Kruglov, Y., Antonenko, S., Lyulchuk, O., & Kravchenko, N. (2002). *Some features of HIV/AIDS epidemic in Ukraine*. 14th International AIDS Conference, Durban, South Africa (Abstract C10730).

Shelkovnikova, O. M. (2002a). *Drug-related HIV harm reduction for commercial sex workers*. XIV International AIDS Conference, Barcelona, Spain (Abstract TuPeF5269).

Shelkovnikova, O. M. (2002b). *A joint needle/syringe exchange and outreach project in Volgograd*. 4th European AIDS Conference, Vilnus, Lithuania (Abstract 51–53).

Sivatcheva, I. (2000). *First year results HIV and blood contracted hepatitis prevention among intravenous drug users in Pskov and nearest districts*. 13th International AIDS Conference, Durban, South Africa (Abstract ThpeD5491).

Sivatcheva, I., Trofimov, V., Gonchar, E., Gorodetskaya, I., & Lukicheva, T. (2002). *Some results of work of Pskov prevention program among intravenous drug users on limiting the spread of HIV prevention* (pp. 68–70). Proceedings of Russian Scientific-Practice Conference on HIV and Blood Borne Viral Hepatitis, Suzdal (Original in Russian).

Sivolap, Y., & Savchenkov, V. (2002). Sleep disorders in patients with Heroinomania: Clinical picture and therapy. *Journal of Addiction Problems, N4*, 34–39 (Original in Russian).

Sofina, O., Aristova, Y., Fedotova, G., & Shirshov, S. (2002). *Organization of preventative measures in the context of the spread of drug misuse and HIV in Ekaterinburg* (pp. 31–38). Ekaterinburg/London: Ministry of Health of Sverdlovsk Oblast, State Center of Sanitary-Epidemiological Surveillance, Ural State Medical Academy, International Family Health, Medical School of London University, Department for International Development (Original in Russian).

Smolskaya, T. T., Khodakevich, L. N., Kobyshcha, Y., Pimenov, A. S., Ostrovsky, D. V., & Shilova, E. A. et al. (2000a). Study of the spread of HIV among injecting drug users by sentinel epidemiological surveillance methods in Saint Petersburg. *Microbiology and Epidemiology, 4*, 31–33 (Original in Russian).

Smolskaya, T., Pimenov, A., Ostrovsky, D., Khodacevich, L., Kobyshcha, Y., & Kotova, S. (2000). *The hidden HIV epidemic among drug users in St Petersburg, Russia*. 13th International AIDS Conference, Durban, South Africa (Abstract MoPeC2319).

Smolskaya, T., Tretyakova, V., Ogurtsova, S., Gurvich, I., Rusakova, M., Yakovleva, A., Utyugova, V., Vorontsova, I., Fedotova, G., Kravchenko, O., Rakina, Y., Pashkovskaya, M., Bykov, A., Koryakin, S., Saukhat, S., Tormozova, N., Kolesnik, A., Perekhodchenko, E., & Dehne, K. (2002a). *Introduction of second generation HIV-surveillance in Russian Federation (pilot study)*. 4th European AIDS Conference, Vilnus, Lithuania (Abstract 176).

Smolskaya, T., Tretyakova, V., Ogurtsova, S., & Gurvich, I., et al. (2002b). *Development, adaptation and field testing of tools for measuring biological and behavioural markers used in HIV surveillance in injecting drug users in selected cities of the Russian Federation*. Saint Petersburg: UNAIDS/WHO/Saint-Petersburg Pesteur Institute (Original in Russian).

Stark, K., Muller, R., & Bienzle, U. et al. (1996). Frontloading: A risk factor for HIV and hepatitis C virus infection among injection drug users in Berlin. *AIDS, 10*, 311–317.

Tadzhiev, I. (2001). Prevention of HIV infection in Astrahan Oblast. *Epidemiology and Infectious Diseases, N1*, 49–53 (Original in Russian).

Tarakanova, V., Perutsky, N., & Zhmurovskaya, E. (2002). *The performance of the programme "HIV prevention among injecting drug users" in Belgorod*. 13th International Conference on the Reduction of Drug Related Harm, Ljubljana, Slovenia (Abstract A163).

Trofimov, V., Lukitcheva, T., Gorodezkaya, I., & Sokolov, A. (2000). *Intravenous drug using in Pskov Town and near situated districts territories*. XIII International AIDS Conference, Durban, South Africa (Abstract WeOrD572).

UNAIDS. (2000). *Global AIDS report*. Geneva: UNAIDS.

UNAIDS. (2002). *Global AIDS report*. Geneva: UNAIDS.

USAID and Centers for Disease Control. (1998). *HIV/AIDS strategy in Russia, 1998–2000*. Washington: USAID.

Vickerman, P., & Watts, C. (2002). The impact of an HIV prevention intervention for injecting drug users in Svetlogorsk, Belarus: Model predictions. *International Journal of Drug Policy*, *13*, 149–164.

Vinogradova, E., Karpets, A., Novikova, L., Filippov, G., & Tsaritsentseva, E. (2001). *Factors and context of drug abuse among youth in Orenburg Oblast*. Orenburg: Orenburg Principal Analytical Department (Original in Russian).

Volkova, G., Kutasova, T., Kryga, L., Ostrovsky, D., Boshanov, A., Ivanov, I. (1999). *Study of HIV-infection, hepatitis B and C among drug addicts as a means to improve epidemiological surveillance* (Vol. 1, pp. 32–34). Proceedings of Project Participants: Current Problems of HIV and AIDS, Saint Petersburg, Canadian-Russian AIDS Project (Original in Russian).

Volova, L., Bazilevskaya, I., & Orlova, G. (1999). *HIV-infection in Yamalo-Nenetsky Autonomous District* (Vol. 1, pp. 50–53). Proceedings of Project Participants: Current Problems of HIV and AIDS, Saint Petersburg, Canadian-Russian AIDS Project (Original in Russian).

Zavadskaya, E., Kolesnikova, V., & Berezkin, N. (2002). *Realization of the harm reduction program among intravenous drug users in Vladivostok* (pp. 53–54). Proceedings of the Russian Scientific-Practice Conference on HIV and Blood Borne Viral Hepatitis (Original in Russian).

Zaznobova, N. A., & Ivanova, N. V. (2000). Epidemic of HIV infection in Irkutsk in the context of drug addiction. *Microbiology and Epidemiology*, *4*, 38–39 (Original in Russian).

Zhumagaliev, V. (2002). *Harm reduction development*. Meeting of the Russian Harm Reduction Project Coordinators, Moscow (Original in Russian).