



# Comparison between needs-based and one-for-one models for Syringe Exchange Programs

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## Executive Summary

Syringe exchange programs (SEPs) are effective in reducing the spread of blood-borne diseases (including HIV, hepatitis B virus and hepatitis C virus) among people who inject drugs (PWID). It is common among PWID to share or re-use needles and syringes, which places them at high risk for getting blood borne-diseases. PWID should use a new, sterile needle and syringe for each injection. SEPs provide PWID access to sterile syringes and often other prevention services such as HIV testing. The importance of SEPs was brought to light by the recent HIV outbreak in Scott County, Indiana, where 87.8% of the people diagnosed with HIV infection had injected the prescription opioid oxymorphone. The HIV outbreak in Indiana shows the necessity of proactive public health interventions, such as making a SEP available, to prevent or limit future HIV outbreaks.

Models of SEPs range from needs-based SEP dispensation policy (least restrictive, where PWIDs receive as many syringes as they need without regard to the number of syringes returned) to strict one-for-one exchange. The central aim of SEPs – i.e. to provide clean injecting equipment to minimize the spread of HIV and blood-borne diseases – is achieved by increasing the availability of clean injecting equipment to prevent re-use of contaminated equipment. This is the paradigm of the needs-based syringe exchange policy, an approach supported by the United Nations System. The overarching general principle from research is that increased syringe access correlates to a reduction of re-use and sharing of syringes leading to better prevention of HIV. In addition to serving as a public health intervention by providing PWID access to clean needles and syringes, SEPs offer HIV prevention materials and injection materials as well as provide drug counseling, referrals to drug treatment programs, hepatitis B vaccinations, hepatitis C screenings and referrals for hepatitis C treatment.

LMSEP uses a modified needs-based negotiation syringe exchange policy, an approach that has proven successful. It is likely that the Louisville PWID community will suffer dire health consequences, by bearing a greater risk of exposure to blood-borne pathogens through re-use and sharing of syringes, should LMSEP move to one-for-one syringe distribution. Research has proven that syringe re-use is lower when SEPs have less restrictive dispensation policies. It is, therefore, our recommendation that LMSEP remain as a modified needs-based SEP or transition to an even less restrictive SEP exchange policy in order to effectively protect PWID from blood-borne pathogens, the aim of SEPs.

## Introduction

Internationally, scientists and public health officials regard syringe exchange programs (SEPs) as effective in reducing the spread of blood-borne diseases (including HIV, hepatitis B virus and hepatitis C virus) among people who inject drugs (PWID).<sup>1,2,3</sup> It is common practice among PWID to share or re-use needles and syringes. Sharing needles, syringes, and other injection equipment places PWID at high risk for contracting blood-borne disease.<sup>4</sup> PWID should use a new, sterile needle and syringe for each injection.<sup>5</sup> SEPs provide PWID with access to sterile syringes and often with other prevention services such as HIV testing.<sup>4</sup> One in 10 HIV diagnoses are among PWID<sup>4</sup> and more than half of PWID used a SEP in 2015.<sup>4</sup> Only 1 in 4 PWID got all their syringes from sterile sources in 2015.<sup>4</sup> Syringe sharing was low (13%) among PWID who received all their syringes from sterile sources such as SEPs.<sup>4</sup> But syringe sharing was high (41%) among PWID who did not get all syringes from a sterile source such as a SEP.<sup>4</sup>

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From 2008 to 2014, annual HIV diagnoses among black and Hispanic / Latino PWID were reduced by 50%.<sup>4</sup> During this same timeframe diagnoses among white PWID fell by only 28%.<sup>4</sup> One possible explanation for these numbers may be that fewer blacks and Hispanics / Latinos are sharing needles and syringes while whites are more likely to share them.<sup>4</sup> SEPs “do not increase illegal drug use or crime, but do reduce HIV risk.”<sup>4</sup> HIV diagnoses are down among PWID and more access to SEPs could help further reduce HIV.<sup>4</sup>

The importance of SEPs was highlighted by the recent outbreak of HIV infections in Scott County, Indiana. From November 2014 to November 2015, 181 patients were diagnosed with HIV infection.<sup>6</sup> The majority of these patients (87.8%) reported having injected the prescription opioid oxycodone.<sup>6</sup> A public health emergency was declared, in response to this outbreak, on March 26, 2015 in a state of Indiana executive order.<sup>6</sup> By April 4, 2015, the local health department had established an emergency SEP.<sup>6</sup> This was the first SEP in the state of Indiana.<sup>6</sup> From April 2015 to October 2015, a total of 277 PWID enrolled in the program.<sup>6</sup> During this time period, the Scott County SEP distributed more than 97,000 sterile syringes.<sup>6</sup>

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There are important lessons to be learned from the Indiana HIV outbreak. One is the importance of proactive public health interventions, such as making a SEP available, to prevent or limit future HIV outbreaks in similar communities.<sup>6</sup> Scott County, Indiana had an estimated population of 14,799 people 18 to 65 years of age in 2014.<sup>6</sup> From the data collected during the HIV outbreak, the size of the PWID network and the extent of syringe sharing was startling in light of the small

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population of the town.<sup>6</sup> Yet large networks of PWID have been observed in similarly-sized communities, illustrating that such networks can be found in rural areas.<sup>6</sup> The circumstances

leading to the HIV outbreak in Indiana are not confined to that community.<sup>6</sup> While the magnitude of the outbreak was surprising, the introduction of HIV into a rural US setting is not unexpected, particularly in light of increasing trends in injection use of prescription opioid analgesics combined with the steady rise in Hepatitis C infections in central Appalachia.<sup>6</sup> Hepatitis C infections are noteworthy as they identify communities at risk for HIV.<sup>6</sup> Proactive public health interventions needed to prevent or limit future HIV outbreaks include establishment of a SEP. Heroin use has increased more than 60% (114% in whites)

in recent years.<sup>4</sup> The growing number of PWID in rural communities, such as in Indiana and central Appalachia, are vulnerable to HIV.<sup>6</sup> The Appalachian states of Kentucky, Tennessee, West Virginia and Virginia saw a 364% increase in new hepatitis C (HCV) cases from 2006 to 2012.<sup>7</sup> During 2009 to 2013 these states experienced a 114% increase in hepatitis B (HBV).<sup>7</sup> Recall that hepatitis C infections identify at-risk communities for HIV. 95.4% of the population in central Appalachia is white,<sup>8</sup> thus placing them at higher risk for heroin use. Heroin and prescription opioid epidemics may lead to new HIV outbreaks such as the one experienced by Scott County, Indiana.<sup>4</sup>

The United States is in the midst of an opioid abuse epidemic.<sup>9</sup> According to 2014 National Survey on Drug Use and Health (NSDUH), an estimated 4.3 million people engaged in non-medical use of prescription painkillers in a month.<sup>9</sup> This statistic is a call to action as people misusing prescription opioids are highly likely to transition to heroin use, increasing their vulnerability to blood-borne infections.<sup>9</sup> More access to SEPs could help reduce this risk.<sup>9</sup>

SEPs, through provision of sterile injection equipment, are an effective and cost-effective public health intervention for preventing HIV and HCV infections among PWID.<sup>10,11,12,13,14</sup> SEPs also play a role in reducing risky injection behaviors.<sup>10,11,12,13,14</sup>

This paper examines different models of SEPs which range from needs-based SEP dispensation policy (PWIDs receive as many syringes as they need without regard to the number of syringes returned) to strict one-for-one exchange. Based upon the evidence, this paper will recommend use of the most effective SEP exchange policy. SEP operational characteristics (i.e. syringe dispensation policies or syringe exchange policies) are codified in laws and regulations in the United States.

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## I. Benefits of SEPs with least restrictive syringe exchange policies

One study examined the variability in syringe dispensation policies among 24 SEPs in California.<sup>1</sup> The study's findings correlate to other research revealing that syringe re-use is lower when SEPs have less restrictive dispensation policies.<sup>15,16</sup> From a quality improvement standpoint, this study suggests that SEPs should consider providing syringes in the least restrictive manner possible.<sup>1,15,16,17</sup>

The study also found that legalizing SEPs without legalizing possession of syringes by PWID is likely to impede public health benefits.<sup>1,18,19</sup> The researchers found that PWID who were concerned about possible arrest for possessing drug paraphernalia were more likely to re-use syringes.<sup>1</sup> This reinforces other research delineating increased injection-related HIV risk among PWID due to concern over arrest for possession of drug paraphernalia.<sup>20,21</sup>

SEPs serve as a significant entry point for drug treatment and rehabilitation.<sup>22</sup> For instance SEPs may distribute HIV prevention materials (i.e. bleach, condoms), other injection materials (such as cookers, cotton, and ties), and make available other social and medical services (HIV counseling and testing, HBV vaccination, HCV screening and referral for hepatitis C treatment, and referral to drug treatment programs).<sup>1,22</sup> A large body of international literature consistently shows SEPs to be associated with reduced incidence of HIV, Hepatitis B virus (HBV) and hepatitis C virus (HCV).<sup>22</sup> In the United Kingdom and Australia, SEPs are considered the cornerstone prevention strategy.<sup>22</sup>

## II. Needs-based SEPs minimize the spread of blood-borne diseases

The central aim of SEPs – i.e. to provide clean injecting equipment to minimize the spread of HIV and blood-borne diseases – is achieved by increasing the availability of clean injecting equipment to prevent re-use of contaminated equipment.<sup>23</sup> This is the paradigm of the “needs-based” exchange policy, an approach supported by the United Nations System.<sup>24</sup> In fact, UN Guidelines specifically steer governments toward the removal of barriers to needle and syringe access.<sup>25</sup> But implementation of SEP policies worldwide has varied, depending on “the tendency for morality and politics, rather than science, to inform priorities.”<sup>26</sup> It is important to consider the role of different syringe exchange policies in terms of HIV and blood borne disease prevention goals.<sup>23</sup>

At the restrained end of the syringe dispensation policy continuum is the “one-for-one” exchange policy with strict limits, where one syringe is provided only in exchange for each used syringe returned to the SEP.<sup>23</sup> At the other end of the spectrum is the “needs-based” or unlimited distribution exchange policy, which is not conditional on return of used syringes.<sup>23</sup> In between are varying degrees of conditional exchange policies, marked by measures such as “capping” the number of syringes per visit.<sup>23</sup>

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### III. SEPs should transition to a needs-based syringe exchange policy to maximize health benefits among PWID

International experience has frequently revealed an “evolutionary process” in expanding SEPs and syringe exchange policy.<sup>27,28,29</sup> Often, authorities are initially ideologically opposed to introducing HIV prevention interventions, such as SEPs, that could be perceived as encouraging drug use.<sup>23</sup> But with experience and evidence (including process evaluation), among other things, SEPs gain acceptance and legitimacy.<sup>23</sup> They can then move toward maximizing HIV prevention goals through the least restrictive syringe dispensation policies.<sup>23</sup> A global survey of 81 cities with available data on PWID estimated that HIV prevalence decreased on average by 5.8% per year in 29 cities with established SEPs.<sup>10</sup> However, HIV prevalence increased on average by 5.9% per year in 51 cities without SEPs.<sup>21</sup> Thus, SEPs are effective in curbing the spread of HIV. Both international experience and a growing body of evidence show that restrictive syringe exchange policy encourages syringe re-use.<sup>23</sup> If SEPs are forced to use a restrictive syringe exchange policy, it should be an interim measure.<sup>15</sup> During the implementation of the restrictive syringe distribution policy, there should be advocacy by the SEP geared to “alleviate the concerns of community and relevant authorities, so that the exchange policy can soon be relaxed.”<sup>23</sup> Even with initial use of restrictive syringe distribution policies, it is suggested that strict one-for-one policies be avoided.<sup>23</sup> Instead less constrained measures, such as “one-for-one plus,” where SEP staff are granted some discretion in meeting clients’ syringe needs, should be applied.<sup>23</sup>

The effectiveness of SEPs in reducing HIV prevalence among PWID is well-established. A report released by New York State’s AIDS Institute showed that in 1992, 52% of newly diagnosed AIDS cases in New York were among PWID.<sup>30</sup> However, by 2012, only 3% of new HIV diagnoses involved PWID.<sup>30</sup> This reduction in HIV cases among PWID resulted from New York State’s establishing SEPs in 1994.<sup>30</sup> Many countries have started SEPs with a strict “one-for-one” policy. There are benefits to initiating SEPs with such restrictive syringe exchange policy, such as appeasing government and law enforcement concern that SEPs may result in an increase in publicly discarded syringes.<sup>23</sup> But these benefits often come at the expense of effective HIV prevention goals.<sup>1,31,32,33</sup> For example, Canadian research revealed that a strict one-for-one exchange policy is ineffective in HIV prevention when there is a high prevalence of stimulant injectors.<sup>23</sup> People who frequently inject cocaine or amphetamines may take several injections over an evening.<sup>23</sup> This high frequency of injecting, as compared to opioid users, shows that stimulant injectors need more syringes if they are not to remain at very high risk of acquiring and transmitting HIV. Anecdotal evidence from Louisville Metro SEP clients reveals that now, with the prevalence of fentanyl, opioid injectors are also injecting more frequently with a smaller volume each time, for fear of overdosing.

An HIV outbreak among PWID in Vancouver was exacerbated by the one-for-one exchange policy in place at the time.<sup>34,35,36</sup> Furthermore, a study in Montreal found a causal connection between one-for-one exchange and HIV incidence.<sup>37</sup> Some interpreted the higher HIV prevalence rates among PWID in Vancouver as suggesting that SEPs contribute to the spread of HIV.<sup>36</sup> Researchers investigated the association between SEP attendance and HIV to determine if SEPs are causally linked to the spread of HIV.<sup>36</sup> 694 PWID from the downtown eastside of Vancouver were enrolled into this study, all of whom were HIV-negative at recruitment. Over a 15-month period, 64 seroconverted to HIV-positive status.<sup>35</sup>

## ...ONE-FOR-ONE EXCHANGE MAY COMPROMISE THE HIV AND BLOOD BORNE DISEASE PREVENTION GOAL OF SEPs

Of the 405 frequent SEP attendees, 47 seroconversions were observed.<sup>36</sup> Among the 289 infrequent SEP attendees, 17 seroconversions were observed.<sup>29</sup> The HIV infection rate among frequent attendees (11.8 +/- 1.7%) was significantly elevated in comparison to the infrequent attendees (6.2 +/- 1.5%). However, among frequent SEP attendees, there was a clear pattern of greater baseline risk.<sup>36</sup> Researchers

found that the number of new HIV infections among frequent SEP attendees was close to what was predicted from their higher baseline risk behavior. They therefore concluded that SEPs do not contribute, as suggested by some, to the spread of HIV.<sup>36,37</sup>

### IV. Needs-based syringe exchange policies reduce multi-person syringe use and thereby reduce risk of blood-borne pathogen infections

If we reduce sharing of syringes then we will reduce the rate of HIV infection among PWID. Rapid exchange of syringes is associated with decreased multi-person use.<sup>38</sup> However, for syringes to be exchanged rapidly, an enabling environment, one where syringe access is convenient, safe, and has minimal conditions, is required.<sup>23</sup> Numerous studies revealed that unlimited, “needs-based” and other less restrictive syringe distribution policies are more effective in reducing multi-person syringe use.<sup>1,15,16,30</sup> These studies also showed that restrictive syringe distribution policy does not ensure that syringes are not re-used or shared.<sup>1,15,16,32</sup> The overarching general principle from research is that increased syringe access correlates to a reduction of re-use and sharing of syringes, leading to better prevention of HIV.<sup>23</sup> Syringe coverage is a predictor of injecting-related HIV transmission risk behavior. Coverage, whether estimated by numbers of people served by a SEP or by reported frequency of injection (where every injection should involve sterile syringes), is compromised by restrictive syringe distribution policies.<sup>23</sup>

### V. Shortfalls and problems of one-for-one syringe exchange policies

A key problem with one-for-one exchange policy is that PWID must find and return a used needle before they can receive a new one. When PWID cannot find or return the used syringe, they are forced to re-use or share equipment, thus running the risk of acquiring or transmitting HIV and hepatitis.<sup>23</sup> In this context, one-for-one exchange may compromise the HIV and blood borne disease prevention goal of SEPs.<sup>23</sup> The PWID may be impeded in exchanging syringes one-for-one by the following factors:

- a. Police practices and laws restricting possession of syringes, resulting in PWID disposing of injecting equipment as soon as possible after use<sup>23</sup>
- b. Injectable stimulants and opiates are available in the unregulated black market. As such, there is unpredictable availability, type and purity of drugs for sale. But

availability, type and purity of drugs all affect injecting frequency and the syringe needs of PWID. Thus it is difficult for a client to predict syringe needs, and virtually impossible for such needs to be met through a one-for-one exchange policy<sup>23</sup>

- c. PWID use of drugs at night is associated with HIV risk behavior.<sup>39</sup> Syringe access at night is limited, so clients who are not permitted access to “extra” syringes are put at risk of having to re-use or share syringes<sup>23</sup>
- d. Use and discarding syringes is associated with complex socio-economic and demographic characteristics.<sup>13</sup> Economically advantaged PWID are more likely to:
  - i. Acquire syringes from a single source
  - ii. Inject in their own or a friends’ home (rather than a public venue)
  - iii. Dispose of syringes in private garbage cans (rather than public garbage facilities or roadways)<sup>40</sup>
- e. Geographical and other access issues, as well as simply forgetting to return a syringe, should not be handled by exposing PWID to ongoing HIV risk by refusing to provide sterile syringes.<sup>23</sup>

Restrictive syringe distribution policies limit syringe availability and increase risk of HIV and blood borne disease transmission.<sup>22</sup> Volumes of international evidence show that coverage increases as restrictions on exchange policies decrease.<sup>1,31,32,41</sup> As previously noted, restrictive exchange policies usually accompany new SEPs opening in a country with limited harm reduction experience and with “significant distrust of the efficacy” of SEPs.<sup>23</sup> Such restrictive policies compromise HIV prevention goals in order to appease concerns of authorities and the community at large.<sup>23</sup> Generally, as SEPs gain experience and come to see drug dependency as a “complex socio-medical issue” they adopt a less restrictive syringe exchange policy that increases client access to sterile syringes.<sup>23</sup> Experience allows SEPs, authorities and communities to learn for themselves that too many constraints discourage client participation in SEPs, thereby hampering HIV prevention efforts.<sup>23</sup>

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## VI. Conclusion

Thus, to have the most beneficial public health results, SEPs should transition to the least restrictive syringe dispensation policy possible. This will generate more clients with adequate syringe coverage. However, legalizing SEPs alone will not achieve maximum public health benefits. It is also necessary to legalize possession of syringes so that PWID do not fear arrest for possession of drug paraphernalia. SEPs also serve as a public health intervention for they offer HIV prevention and injection materials, in addition to providing drug counseling, referrals to drug treatment programs, hepatitis C screening and referral for HCV treatment, and hepatitis B vaccinations. When considering SEPs as a public health intervention, consideration should be given to the direct and indirect effects of SEPs on the population at-large as discussed above.

## Louisville Metro Syringe Exchange Program (LMSEP)

The Louisville Metro Syringe Exchange Program (LMSEP) is established under a modified needs-based negotiation syringe exchange policy. This approach has been successful as predicted by the research above. New participants receive a week's supply of syringes (# of syringes used per day x 7) based on participants' self-reported use. Participants who return used syringes receive twice as many syringes up to a maximum of a one week supply. No one receives more than a week's worth of syringes. From July 1, 2016 to November 30, 2016, the LMSEP provided 314,847 syringes to clients and collected 187,765 syringes from clients. That is a 1.7 to 1 ratio of distributed to returned syringes. This data indicates that if LMSEP operated as a one-to-one SEP rather than under a needs-based model there would most likely have been needle re-use and sharing by LMSEP clients. From June 10, 2015 to June 30, 2016, LMSEP provided 454,989 syringes and collected 267,746 syringes. Again, this is approximately a 1.7 to 1 ratio of provided to collected syringes. Consistently, the data highlight the deleterious health effects that could result at a one-for-one SEP operation. Consider a snapshot of LMSEP from November 2016. In that month, a total of 64,963 syringes were distributed while a total of 36,695 syringes were returned. The percentage of returned syringes to distributed syringes for November 2016 was 56.49%. Thus, if LMSEP had been operating on a strict one-for-one syringe exchange policy, there may have been significant numbers of PWID left without access to clean, uncontaminated syringes. The data reveals that LMSEP has about a 2 to 1 ratio of distributed to returned needles suggesting that if LMSEP goes to a one-for-one syringe exchange policy, many clients will be without needles to return to LMSEP, thus hampering PWID's access to sterile syringes.

**IF LMSEP GOES TO A ONE-FOR-ONE SYRINGE EXCHANGE POLICY, MANY CLIENTS WILL BE WITHOUT NEEDLES TO RETURN TO LMSEP, THUS HAMPERING PWID'S ACCESS TO STERILE SYRINGES**

## RECOMMENDATION

Based upon both the data gained from LMSEP and the extensive research done on health benefits of needs-based versus one-for-one SEPs, it is likely that the PWID community will suffer dire health consequences by bearing a greater risk of exposure to blood-borne pathogens through re-use and sharing of syringes should LMSEP move to one-for-one syringe distribution. It is, therefore, our recommendation that LMSEP remain as a modified needs-based SEP or transition to a less restrictive SEP exchange policy to effectively protect PWID from blood-borne pathogens.

1. Bluthenthal, R. N., Ridgeway, G., Schell, T., Anderson, R., Flynn, N. M., and Kral, A. H. Examination of association between syringe exchange program (SEP) dispensation policy and SEP client-level syringe coverage among injection users. *Addiction* (2007); **102**: 638-646.
2. Kral, A. H., Bluthenthal R. N. What is it about needle and syringe programs that make them effective for preventing HIV transmission. *Int. Journal of Drug Policy* (2003); **14**: 361-363
3. Ksobiech, K. Assessing and improving needle exchange programs: gaps and problems in the literature. *Harm Reduction Journal* (2004); **1**: 4.
4. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. HIV and Injection Drug Use: Syringe Services Programs for HIV Prevention. Centers for Disease Control and Prevention (2016). Available at <http://www.cdc.gov/vitalsigns/hiv-drug-use>. Accessed Marcy 6, 2017.
5. National Institute on Drug Abuse. Principles of HIV prevention in drug-using populations: a research based guide. Bethesda, MD: National Institutes of Health (2002). NIH publication no. 02-4733. Available at [http://www.nida.nih.gov/pohp/faq\\_1.html](http://www.nida.nih.gov/pohp/faq_1.html). Accessed March 6, 2017.
6. Peters, P. J., Pontones, P., Hoover, K. W., et al. HIV Infection Linked to Injection Use of Oxymorphone in Indiana, 2014-2015. *The New England Journal of Medicine* (2016); **375**: 229-39.
7. Centers for Disease Control and Prevention. Antidepressant prescription claims among reproductive-aged women with private employer-sponsored insurance – United States, 2008 – 2013. *MMWR* (2016); 65(3): 41-75.
8. U.S. Census Bureau, 2010 Decennial Census.
9. Allen, S. T., Ruiz, M. S., Jones, J., Turner, M. M. Legal space for syringe exchange programs in hot spots of injection drug use – related crime. *Harm Reduction Journal* (2016); **13**: 1 – 7.
10. Hurley, S., Jolley, D., Kaldor, J. Effectiveness of needle-exchange programmes for prevention of HIV infection. *Lancet* (1997); **349**: 1797-1800.
11. Kerr, T., Small, W., Buchner, C., et al. Syringe sharing and HIV incidence among injection drug users and increased access to sterile syringes. *Am J Public Health* (2010); **100**(8): 1449 – 1453.
12. Ksobiech, K. A meta-analysis of needle sharing, lending, and borrowing behaviors of needle exchange program attenders. *AIDS Educ Prev.* (2003); 15(3): 257-268.

13. Palmateer, N., Kimber, J., Hickman, M., Hutchinson, S., Rhodes, T., Goldberg, D. Evidence for the effectiveness of sterile injecting equipment provision in preventing hepatitis C and human immunodeficiency virus transmission among injecting drug users: a review of reviews. *Addiction* (2010); **105(5)**: 844-859.
14. Ruiz, M. S., O'Rourke, A., Allen, S. T. Impact evaluation of a policy intervention for HIV prevention in Washington, DC. *AIDS & Behav.* (2015).
15. Bluthenthal, R. N., Malik, R., Grau, L. E., Singer, M., Marshall, P., Heimer, R. Sterile syringe access conditions and variations in HIV risks among drug injectors in three cities. *Addiction* (2004); **99**: 1136-1146.
16. Kral, A. H., Anderson, R., Flynn, N. M., Bluthenthal, R. N. Injection risk behaviors among clients of syringe exchange programs with different syringe dispensation policies. *Journal of Acquired Immune Deficiency Syndrome* (2004); **37**: 1307-1312.
17. Des Jarlais, D. C., Braine, N. Assessing syringe exchange programs. *Addiction* (2004); **99**: 1081-1082.
18. Grund, J. – P. C., Heckathorn, D. D., Broadhead, R. S., Anthony, D. L. In Eastern Connecticut, IDUs purchase syringes from pharmacies but don't carry syringes. *Journal of Acquired Immune Deficiency Syndrome Human Retrovirol* (1995); **10**: 104-105 (Letter).
19. Martinez, A. N., Bluthenthal, R. N., Lorvick, J., Anderson, R., Flynn, N. M., Kral, A. H. The impact of legalizing syringe exchange programs on arrest among injection drug users in California. *Journal of Urban Health* (2007); **84(3)**: 423-435.
20. Bluthenthal, R. N., Kral, A. H., Erringer E. A., Edlin B. R. Drug paraphernalia laws and injection-related infectious disease risk among drug injectors. *Journal of Drug Issues* (1999); **29**: 1-16.
21. Bluthenthal, R. N., Lorvick, J., Kral, A. H., Erringer, E. A., Kahn, J. G. Collateral damage in the war on drugs: HIV risk behaviors among injection drug users. *International Journal of Drug Policy* (1999); **10**: 25-38.
22. Bastos, F. I., Strathdee, S. A. Evaluating effectiveness of syringe exchange programmes: current issues and future prospects. *Social Science & Medicine* (2000); **51**: 1771-1782.
23. Birgin, R., Zheluk, A. AIDS Projects Management Group. A review of needle and syringe exchange policy in harm reduction programs with recommendations for Russian Harm Reduction Network. *APMG* (2007).
24. United Nations. Preventing the transmission of HIV among drug abusers. A position paper of the United Nations System. *Annex to the Report of 8<sup>th</sup> Session of ACC Subcommittee on Drug Control* (2000); 28-29.
25. United Nations. International Guidelines on HIV/AIDS and Human Rights. *UN Publication* (1998).
26. Sherman, S.G. Critical condition facing needle exchange programs: the politics of science. *Subst Use Misuse* (2006); **41(6-7)**: 827-829.
27. Henman, A.R., Paone, D., DesJarlais, D.C., Kochems, L.M., Friedman, S.R. From ideology to logistics: the organizational aspects of syringe exchange in a period of institutional consolidation. *Subst Use Misuse* (1998); **33(5)**: 1213-1230.
28. Downing, M., Riess, T.H., Vernon, K., Mulia, N., Hollinquest, M., McKnight, C., DesJarlais, D.C., Edlin, B.R. What's community got to do with it?

- Implementation models of syringe exchange programs. *AIDS Educ Prev* (2005); **17(1)**: 68-78.
29. Power, R., Nozhkina, N. The value of process evaluation in sustaining HIV harm reduction in the Russian Federation. *AIDS* (2002); **16(2)**: 303-304.
  30. Nahmias, L. Report documents success of state needle exchange program. *Politico*. December 4, 2014. <http://www.politico.com/states/new-york/albany/story/2014/12/report-documents-success-of-state-needle-exchange-program-017909>. Accessed February 8, 2017
  31. Archibald, C.P., Ofner, M., Strathdee, S.A., Patrick, D.M., Sutherland, D., Rekart, M.L., Schechter, M.T., O'Shaughnessy, M.V. Factors associated with frequent needle exchange program attendance in injection drug users in Vancouver, Canada. *J Acquir Immune Defic Syndr Hum Retroviral* (1998); **17(2)**: 160-166.
  32. Bastos, F.I., Malta, M., Hacker M.A., Petersen, M., Sudbrack, M., Colombo, M., Caiaffa, W.T. Assessing needle exchange operations in a poor Brazilian community. *Subst Use Misuse* (2006); **41(6-7)**: 937-951.
  33. Hankins, C.A. Syringe exchange in Canada: Good but not enough to stem the HIV tide. *Subst Use Misuse* (1998); **33**: 1129-1146.
  34. Kerr, T., Wood, T. Needle Exchange Programs and the HIV Outbreak among Injecting Drug Users in Vancouver, Canada: Addressing some common misperceptions. *Canadian HIV/AIDS Legal Network* (2005).
  35. Spittal, P.M., Small, W., Wood, E., Johnston, C., Charette, J., Laliberte, N., O'Shaughnessy M.V., Schechter, M.T. How otherwise dedicated AIDS prevention workers come to support state-sponsored shortage of clean syringes in Vancouver, Canada. *International Journal on Drug Policy* (2003); **15**: 36-45.
  36. Schechter, M.T., Strathdee, S.A., Cornalisse, P.G. Do needle exchange programs increase the spread of HIV among injection drug users?: an investigation of the Vancouver outbreak. *AIDS* (1999); **13(6)**.
  37. Bruneau, J., Lamothe, F., Franco, E., Lachance, N., Desy, M., Soto, J. High rates of HIV infection among injecting drug users participating in needle exchange programs in Montreal: Results of a cohort study. *American Journal of Epidemiology* (1997); **146(12)**.
  38. Shrestha, S., Smith, M.W., Broman, K.W., Farzadegan, H., Vlahov, D., Strathdee, S.A. Multiperson use of syringes among injection drug users in a needle exchange program: a gene-based molecular epidemiologic analysis. *Acquir Immune Defic Syndr* (2006); **43(3)**: 335-343.
  39. Wood, E., Kerr, T., Spittal, P.M., Small, W., Tyndall, M.W., O'Shaughnessy, M.V., Schechter, M.T. An external evaluation of a peer-run "unsanctioned" syringe exchange program. *J Urban Health* (2003); **80(3)**: 455-464.
  40. Buchanan, D., Shaw, S., Wei Teng, Hiser, P., Singer, M. Neighborhood Differences in Patterns of Syringe Access, Use and Discard Among Injection Drug Users: Implications for HIV Outreach and Prevention Education. *J Urban Health* (2003); **80(3)**.
  41. Valenciano, M., Emmanuelli, J., Lert, F. Unsafe injecting practices among attendees of syringe exchange programmes in France. *Addiction* (2001); **96(4)**: 597-606.

For further information on Kentucky Syringe Exchange programs, visit <http://chfs.ky.gov/dph/epi/HIVAIDS/prevention.htm>