

# Original Article

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## State laws, syringe exchange, and HIV among persons who inject drugs in the United States: History and effectiveness

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### Abstract

In 1981, when acquired immune deficiency syndrome (AIDS) was first observed among persons who inject drugs, almost all US states had laws criminalizing the possession and distribution of needles and syringes for injecting illicit drugs. We reviewed changes to these laws to permit ‘syringe exchanges’ and the provision of public funding for such programs. Most of the changes in law occurred during the 1990s, 5–10 years later than in many other countries. Public funding of syringe exchanges is associated with lower rates of human immunodeficiency virus (HIV) infection, greater numbers of syringes distributed (a possible causal mechanism), and greater numbers of health and social services provided. Experience in the United states may prove useful in other countries: state, provincial, and local governments may need to move ahead of central governments in addressing HIV infection among persons who inject drugs.

### Keywords:

HIV; PWID; drugs; laws; syringe exchange; pharmacy sales

### Introduction

The first cases of *acquired immune deficiency syndrome* (AIDS) among *people who inject drugs* (PWID) were reported in 1981.<sup>1</sup> By the mid-1980s, *human immunodeficiency virus* (HIV), the virus that causes AIDS, had been discovered,<sup>2</sup> an antibody test to detect HIV infection was developed, and it had become clear that HIV was being transmitted through the sharing of needles and syringes for the injection of illicit drugs.<sup>3</sup> Several countries,

including the Netherlands,<sup>4</sup> the United Kingdom,<sup>5</sup> and Australia,<sup>6</sup> began programs to provide sterile injection equipment to persons who injected drugs. These programs, particularly syringe exchange, in which drug users exchange used, potentially contaminated needles and syringes for new needles and syringes, would later be shown to be quite effective in reducing HIV transmission among PWID.<sup>7, 8</sup>

With over 1 million PWID in the United States during this time, there was the potential for an enormous number of HIV infections among drug injectors. But the United States did not quickly implement programs to provide access to sterile injection equipment for PWID. There were three primary factors that delayed the response in the United States. First, during the 1980s, the United States was experiencing increases in the use of crack cocaine and large increases in violent crime associated with the illicit market distribution of the drug.<sup>9</sup> This intensified the US 'War on Drugs', with greatly increased criminal penalties for possession and distribution of crack cocaine.<sup>10</sup> While the problems of violence associated with the distribution of crack cocaine and HIV infection among PWID are separable, public discussion did not separate the two, and any public health efforts that appeared to 'condone' or 'encourage' illicit drug use were extremely controversial.<sup>11</sup> This initial opposition toward syringe exchange was particularly intense among law enforcement officials and the African-American community.<sup>11</sup>

At the time AIDS was discovered among PWID, almost all states in the United States had laws that would have prohibited *syringe exchange programs* (SEPs), a second factor delaying implementation of such programs in the United States.<sup>12</sup> A variety of state laws can affect whether PWID have safe and ready access to sterile needles and syringes. Drug paraphernalia laws that criminalize the sale, distribution, and possession of syringes for the purposes of injecting illicit drugs have been used to arrest persons operating or frequenting SEPs.<sup>13</sup> Laws requiring prescriptions for the sale of syringes, and other pharmacy restrictions such as identification requirements, can also greatly restrict a drug user's ability to obtain sterile syringes. Finally, drug possession laws can be applied to the drug residue in a used syringe, creating another barrier to drug users possessing and using sterile syringes.

Third, in 1988 the government instituted a ban on federal funding of syringe exchange. It has remained in effect except for a one-year period in 2009.<sup>14</sup> This ban served as both a political message in opposition to SEPs and as a limiting factor for the funding of SEPs in areas that support these programs. The ban also affects the US government's response to AIDS internationally. The US federal government is the single largest donor to international AIDS efforts, primarily through the President's Emergency Program for AIDS Relief (PEPFAR); however, it is impermissible to use PEPFAR funds to support SEPs. These domestic and international policies may create the impression that the US as a country is unequivocally opposed to syringe exchange, despite all of the evidence supporting the effectiveness of SEPs.<sup>15, 16</sup> In the United States most responsibility for public health resides not with the federal government, but with the state governments. It is primarily at the state government level that policy decisions to approve and implement SEPs are made. State governments have had to address the morbidity and mortality consequences of HIV infection, both in preventing deaths and avoiding the high financial costs of treating HIV infection.<sup>17</sup>

In this report, we provide information on when states implemented laws permitting the legal operation of SEPs and over-the-counter (OTC) sales of sterile injection equipment, as well as the relationships between public funding of SEPs and (i) trends in estimated state level HIV incidence among PWID; (ii) the numbers of syringes exchanged; (iii) the provision of other SEP-based health services; and (iv) the current absolute numbers of newly diagnosed cases of HIV among PWID. We also consider implications of US SEP policies for other countries where HIV infections among PWID remain an important public health problem.

## **Methods**

### **Syringe exchange survey data collection**

Since 1994, staff from Beth Israel Medical Center and from the North American Syringe Exchange Network (NASEN) have surveyed SEP directors in the United States. Each spring, we mailed a survey to the directors of all US SEPs known to NASEN. Questions asked about syringes exchanged, services provided, program characteristics, community relationships, as well as budgets and funding for the previous calendar year.

### **HIV data collection for newly diagnosed cases of HIV among PWID**

We gathered publicly available data from state department of health websites to obtain annual numbers of newly diagnosed cases of HIV among PWID. We used these as the numerators for calculating annual state HIV incidence among PWID. (A list of the state health department websites and the dates we accessed the websites is available from the corresponding author.)

We also used these data to classify states as having very high absolute numbers of newly diagnosed cases of HIV among PWID. Examination of the data showed a naturally occurring cut-off point for very high numbers of newly reported cases: four states had 140 or more cases of HIV among PWID in the most recent reporting year, while all other state had 100 or fewer HIV cases.

### **Numbers of PWID in each state**

We derived estimates of PWID populations using PWID estimates from Metropolitan Statistical Areas (MSAs) obtained from the dataset of Tempalski *et al* (2009).<sup>18</sup> We aggregated PWID MSA population estimates for the MSAs in the same state. If an MSA included more than one state, we allocated the PWID population to the state where the majority of the MSA population resided. We did so based on the assumption that PWID are likely to be concentrated in inner city areas, which are likely to be in the state where the majority of the MSA population resides.

### **Trends in estimated HIV incidence**

Annual HIV incidence among PWID was calculated by dividing the number of newly diagnosed cases of HIV for each year by the estimated state-level PWID population. We

classified each state's annual estimated incidence as high ( $>2/1000$  person-years) versus low ( $\leq 2/1000$  person-years) using the national incidence estimate. There are an estimated 4000 new HIV infections per year among PWID in the United States<sup>19</sup> and an estimated 1.3 million persons who inject drugs in the United States.<sup>20</sup> This gives an estimated incidence of  $3/1000$  person-years at risk among PWID in the United States. We classified low incidence to be lower than the national estimate for two reasons: we wanted to ensure we were not classifying states as low incidence if they were truly not low incidence, or if further reductions in current incidence are needed.

We first determined trends in estimated HIV incidence by visually examining the data to see if there were any states that could not be clearly classified with respect to high versus low incidence (states that repeatedly changed between high and low incidence); there were no states that fit this classification. We then used incidence data from the first and last years from each state to classify the states into the following groups: (i) states with initially high rates of HIV incidence among PWID that remained high (high-remaining-high), (ii) states with initially high rates that transitioned to low rates (high-to-low), and (iii) states with initially low rates that remained low (low-remaining-low). There was one state (Oklahoma) that had an initially low incidence but then transitioned to high incidence in the last year for which data were available. We were reluctant to consider this a meaningful transition based on the data from this single last year, so we analyzed Oklahoma first as a state with initial low estimated incidence that remained low, and then as a state that did transition from low to high estimated incidence.

### **Inclusion/exclusion criteria for states in the different analyses**

Given the large number of laws relevant to accessing injection equipment and the large number of states, we limited the number of states in analyses. Because the primary purpose of the research was to examine associations between state laws and HIV infection among PWID, limitations in the data on HIV among PWID provided a rationale for excluding several states. We excluded states from the analyses if:

1. We did not have MSA data in the state for estimating the PWID population.
2. We had evidence of substantial numbers of PWID in the state who did not reside in the MSAs. Substantial numbers of PWID living outside of MSAs would lead to an overestimation of HIV incidence.
3. States had very few recently identified cases of HIV among PWID (fewer than 10 cases per year). These states typically had very small estimated numbers of PWID. The combination of small HIV case numbers and small PWID estimates made assessing trends in HIV incidence very difficult – small variations in year to year cases of newly diagnosed cases of HIV among PWID would appear to create large changes in incidence.

Applying these criteria to the combined 52 states (including the District of Columbia and the territory of Puerto Rico as 'states') led us to exclude 20 states from our analyses of state laws regarding syringe exchange and over the counter sales, leaving 32 states in the analyses.

For our analysis of the relationship between public funding of SEPs and estimated HIV



incidence, we excluded an additional five states for which we did not have information on public funding of SEPs. We excluded the state of Nevada because it enacted a law permitting syringe exchange in 2013, so there was insufficient time for syringe exchange to have an effect on HIV incidence among PWID. New Mexico has multiple programs but a single statewide public funding budget. Because we were not able to determine services at the individual programs in New Mexico, we excluded this state, leaving 25 states for this analysis.

As we used the entire population of states that met our inclusion criteria, and there was no sampling error for measuring the relationship, standard statistical testing based on sampling from a population was not appropriate.<sup>21</sup>

We assessed the relationship between public funding and the provision of SEP services for 25 states in which there were SEPs that reported (i) program-level public funding data in any survey year and (ii) service delivery data at the program level for the same survey year. For states where we had more than one year of data, we used the most recent year. We assessed relationships at the program level using a simple regression, with the strength of the relationship expressed by the coefficient of determination ( $R^2$ ).

## **Legal data collection**

We collected information from laws (legal data) related to four topics: (i) SEPs, (ii) drug paraphernalia laws, (iii) drug possession laws, and (iv) pharmacy laws on syringe distribution/sales. We collected these data for laws in existence in 1980, or enacted between 1980 and 2012.

Our sources included statutes, session laws, regulations, and case law from two legal databases: LexisNexis and the HeinOnline Session Law Library. We searched LexisNexis for cases, statutes, and regulations using search strings piloted and refined before use.

Research assistants who completed a first round of document searching used very broad inclusionary parameters. A second review by a legal professional assured all laws that had been found were relevant. We classified laws according to whether they explicitly or implicitly permitted SEPs and OTC sales. Sales are implicitly permitted when (i) no laws prohibit the intervention; (ii) the criminal law decriminalizes syringes by explicitly excluding syringes from the definition of drug paraphernalia or by purposely omitting their reference; (iii) laws restricting syringe sale, delivery, or possession are limited to minors only; or (iv) such laws are interpreted by legal authorities to provide special exemptions to SEPs. States with explicit authorization of SEPs and OTC sales affirmatively legalize these interventions, often providing exceptions to drug paraphernalia laws for SEP participants and operators or for others who legally purchased syringes, including from pharmacies.

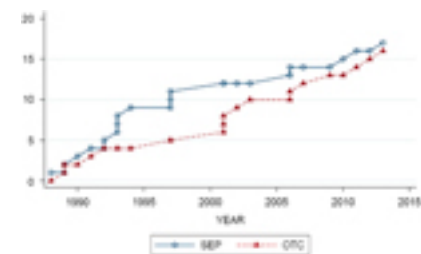
## **Results**

### **State level legal analyses**

Of the 32 states for which we reviewed state laws, those either explicitly or implicitly

authorizing SEPs and OTC syringe sales, first implemented them in the late 1980s (see [Tables 1](#) and [2](#)). States increasingly began to authorize both types of interventions during the 1990s, and the trend for passage of two laws is now increasing in parallel (see [Figure 1](#)).

**[Figure 1.](#)**



Cumulative trends in the passage of laws authorizing syringe exchange programs and OTC sales of syringes over time.

**[Full figure and legend \(45K\)](#)**

**[Table 1 - States with explicit or implicit authorization of SEPs or OTC sales.](#)**

A placeholder image for a table, showing a grid of cells with varying shades of gray, representing the content of Table 1.

**[Full table](#)**

**[Table 2 - First year of enactment of SEP and OCT laws by state.](#)**

A placeholder image for a table, showing a grid of cells with varying shades of gray, representing the content of Table 2.

**[Full table](#)**

There is a strong relationship between having state legal authorization of SEPs and state authorization of OTC sales: of the 32 states for which we examined state laws, 26 states had authorized both or neither (see [Table 3](#)). Only two states authorized OTC sales without authorizing SEPs, and only three states authorized SEPs without authorizing OTC sales.

**[Table 3 - States with and without legal authorization of SEPs and OTC sales.](#)**



[Full table](#)

Among the 26 states for which we had data on state laws and on public funding of SEPs, there was a strong relationship between state authorization of SEPs and providing public funding (see [Table 4](#)). Only one state authorized SEPs but provided no public funding, and three states did not authorize SEPs but did provide public funding. (In these states, the SEPs were authorized and funded at the city or county level government.)

[Table 4 - Public funding in states with and without state laws authorizing SEPs.](#)



[Full table](#)

### Public funding and estimated HIV incidence among PWID

Twenty-two states were in the high-to-low or low-remaining-low HIV incidence trend groups and four were in the high-remaining-high incidence group (see [Tables 5](#) and [6](#) for data on estimated incidence for each of these 26 states.) All 15 of the states with public funding of SEPs were in the high-to-low and low-remaining-low categories. In the states that had ‘negative’ outcomes (high-remaining-high estimated incidence), none had publicly funded SEPs, and in the states with positive outcomes (high-to-low or low-remaining-low estimated incidence), 68 per cent had publicly funded SEPs.

[Table 5 - Estimated HIV incidence trend group and public funding.](#)



[Full table](#)

[Table 6 - HIV incidence percentages for first and last years for which they were calculated for each state. States are ordered by category of change in HIV incidence percentage \(low-low; high-low; high-high\).](#)

[Full table](#)

Oklahoma, the state with an increase to high estimated incidence in the last year of data collection, has not authorized syringe exchange or OTC sales, and has no public funding of SEPs. If Oklahoma, as a low-to-high incidence state, were considered a ‘negative’ outcome state, then the relationship between public funding of syringe exchange and ‘negative’ versus ‘positive’ HIV incidence outcomes becomes even stronger.

We also found a relationship between OTC sales and trends in estimated HIV incidence among PWID. Of the four states in the high-remaining-high incidence group, only one authorized OTC sales.

We also examined HIV among PWID in each state. There were four states that reported 140 or more newly diagnosed cases of HIV among PWID in the most recent year of reporting:

1. *Texas*: 307 cases reported in 2011.
2. *Florida*: 195 cases reported in 2012.
3. *New York*: 159 cases reported in 2010.
4. *Louisiana*: 140 cases reported in 2011.

New York almost certainly has the largest number of PWID of any state in the country.<sup>22</sup> New York has public funding of SEPs, and its HIV incidence among PWID declined by approximately 80 per cent after public funding began.<sup>23</sup> Our data show estimated incidence to be less than 2/1000 person-years currently. The other three states (Texas, Florida, and Louisiana) did not show declines in our incidence trend analysis, and according to their own state data, clearly have very large numbers of new cases of HIV among PWID.

### **Public funding and provision of services at SEPs**

We found a strong positive relationship between receipt of public funding and service provision. In particular, there was a positive correlation between public funding and the number of syringes distributed by SEPs ( $R^2=0.42$ ), as well as SEPs offering a greater number of other services to PWID ( $R^2=0.52$ ). Public funding correlated positively with SEPs offering HIV counseling and testing ( $R^2=0.45$ ), chronic Hepatitis C virus testing (HCV) testing ( $R^2=0.28$ ), condom distribution ( $R^2=0.47$ ), hepatitis prevention services ( $R^2=0.46$ ), overdose prevention services with naloxone ( $R^2=0.28$ ), overdose prevention services without naloxone ( $R^2=0.38$ ), and STD and HIV prevention services other than condom distribution ( $R^2=0.46$ ).

### **Supplementary analysis**



Having excluded 23 states from our primary analyses because we had limited resources and the HIV and PWID population data were limited, we did conduct a descriptive analysis of public health problems of HIV among PWID in these excluded states. We present results of this descriptive analysis by the reasons for exclusion:

1. Twelve states lacked MSA data to estimate the number of PWID: Alaska, Idaho, Iowa, Maine, Mississippi, Montana, New Hampshire, North Dakota, South Dakota, Vermont, West Virginia, and Wyoming. Nine of these (Alaska, Idaho, Iowa, Maine, Montana, North Dakota, Vermont, West Virginia, and Wyoming) had fewer than 10 cases of newly diagnosed HIV among PWID in their most recent reporting year and are clearly not experiencing major epidemics of HIV transmission among PWID. Two of these states (Maine and Vermont) had publicly funded SEPs.
2. Eleven more states, in addition to those above, (Alabama, Arkansas, Delaware, Georgia, Hawaii, Indiana, Kansas, Kentucky, Minnesota, Nebraska, and Rhode Island) with low numbers of recently identified cases of HIV among PWID, reported fewer than 10 newly diagnosed cases of HIV among PWID in their most recent reporting year. These states typically had low numbers of PWID in their MSAs (fewer than 10 000). The combination of low numbers of HIV cases and low numbers of PWID would make trend analyses unreliable. These states are not experiencing large epidemics of HIV among PWID. Further, of the 20 states reporting fewer than 10 newly diagnosed cases of HIV among PWID in their most recent reporting year, seven (Delaware, Georgia, Hawaii, Maine, Minnesota, Rhode Island, and Vermont) reported having publicly funded SEPs.

While limitations of the data kept us from estimating HIV incidence in these 23 states, the presence of publicly funded SEPs in 7 of them is consistent with the findings of the primary analysis that showed the association between publicly funded syringe exchange and current low HIV incidence among PWID.

## Discussion

As noted in the introduction, when AIDS was first observed among PWID, almost all US states had laws that made it very difficult for PWID to obtain and use sterile injecting equipment. Notably, laws that criminalized distribution and possession of needles and syringes for injecting illicit drugs made SEPs difficult to establish. Changes in state laws began in the late 1980s and accelerated during the 1990s.

We found that provision of public funding for SEPs was associated with estimated HIV incidence remaining low over time, or reductions in estimated HIV incidence. Conversely, lack of public funding of SEPs was associated with estimated HIV incidence remaining high over time and with relatively large numbers of newly diagnosed cases of HIV among PWID. Public funding of SEPs was also strongly associated with numbers of syringes distributed, which might suggest a causal mechanism for reducing HIV transmission among PWID.<sup>24</sup> Public funding of SEPs was also associated with provision of other health services to PWID.

OTC syringe sales are a second way to provide access to sterile injection equipment. Studies from Connecticut and New York indicate that when implemented simultaneously in the same area, both contribute to reductions in injecting risk behavior (which would

include multi-person use – ‘sharing’ – of needles, syringes, drug preparation equipment, and using syringes to divide drug solutions), but syringe exchange makes the larger contribution.<sup>25, 26</sup> We were not, however, able to assess the size of any independent contribution OTC sales to trends in estimated HIV incidence.

## **Potential parallels to other countries**

Findings from this study may have direct relevance to other countries where there is substantial HIV infection among PWID and central governments have resisted implementation of evidence-based interventions. Individual provinces or cities may have considerable latitude in addressing public health problems. We note that historically there has been great variation among provinces in China<sup>27</sup> and Vietnam<sup>28</sup> with respect to implementing evidence-based HIV prevention; currently a severe disagreement between the central government of Canada and the province of British Columbia continues over safer injection sites (locations where PWID can inject without consequence of arrest for drug possession while also having access to clean needles and injection equipment).<sup>29</sup> Policy differences between the central and provincial governments also delayed implementation of syringe exchange and harm reduction in the Philippines.<sup>30</sup> HIV infection is increasing in many countries in Eastern Europe, Central Asia, and Southeast Asia.<sup>31, 32</sup> While we did not include an international survey on the relationships between provincial versus central governments with respect to HIV among PWID, we believe that the ‘lessons to be learned’ from the US experience – that state, provincial, and local governments may need to move ahead of central governments in addressing HIV infection among PWID – may apply to many other countries.

## **Limitations**

There are a number of limitations to this study. Numerators for HIV incidence estimates were taken from newly diagnosed cases of HIV among PWID in each state. There is a lag between the occurrence of an HIV infection and that infection being diagnosed and reported to state health authorities. These lag times may vary over time and across states. States may also have varying numbers of HIV infections for which the route of transmission is not determined. Denominators for incidence estimates were based upon aggregated MSA population estimates of PWID, which would have missed PWID living outside MSAs. It was also necessary to allocate the PWID estimates to the largest city in an MSA when the MSA covered multiple states.

Finally, there are a number of factors in addition to legal access to sterile injecting equipment and public funding of SEPs that may influence the course of HIV epidemics in PWID populations. These would include density and turnover rates in injecting networks, types of drugs injected, availability of substance use treatment programs, and sexual transmission of HIV. We could not measure and control for such factors.

Despite problems in the data, our summed state level incidence results were quite similar to the national incidence estimate. We did observe clear relationships between public funding of SEPs and HIV infection among PWID in the states.

One must consider the possibility of systematic bias in imperfect data, but it seems very unlikely that the patterns we observed were the result of systematic bias. For systematic bias to have generated the patterns, states such as Florida, Texas, and Louisiana would have to have been misclassifying large numbers of recent cases of HIV (as occurring among PWID when the cases should have been assigned to other transmission groups), or more skillfully identifying recent cases of HIV among PWID than the other states. Neither of these seems a plausible explanation for the patterns we observed in the data.

## Conclusions

At the time AIDS was discovered among PWID, state laws prohibited distribution and possession of needles and syringes in almost all US states. Reducing HIV transmission among PWID involved a two-step legal/political process: changing the laws, then providing public funding for SEPs. The process was not always so simple, as variations existed in the complex laws on access to sterile injection equipment. Were syringe exchange and OTC sales explicitly or implicitly permitted? The process required decades and remains incomplete. Approximately 4000 new HIV infections occur among PWID per year in the United States.<sup>19</sup> Increased public funding of syringe exchange – particularly in states with high numbers of newly identified cases of HIV among PWID – as well as repealing the existing ban on federal funding of SEPs<sup>33</sup> would represent important steps towards an ‘AIDS free generation’ in the United States.

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