

# The effectiveness of harm reduction in preventing HIV among injecting drug users

Alex Wodak<sup>A,C</sup> and Lisa Maher<sup>B</sup>

<sup>A</sup>Alcohol and Drug Service, St Vincent's Hospital, Darlinghurst NSW

<sup>B</sup>National Centre in HIV Epidemiology and Clinical Research, Darlinghurst NSW

<sup>C</sup>Corresponding author. Email: awodak@stvincents.com.au

**Abstract:** There is now compelling evidence that harm reduction approaches to HIV prevention among injecting drug users are effective, safe and cost-effective. The evidence of effectiveness is strongest for needle and syringe programs and opioid substitution treatment. There is no convincing evidence that needle and syringe programs increase injecting drug use. The low prevalence (~1%) of HIV among injecting drug users reflects the early adoption and rapid expansion of harm reduction in Australia. Countries that have provided extensive needle and syringe programs and opioid substitution treatment appear to have averted an epidemic, stabilised or substantially reduced the prevalence of HIV among injecting drug users. However, despite decades of vigorous advocacy and scientific evidence, the global coverage of needle and syringe programs and opioid substitution treatment falls well short of the levels required to achieve international HIV control.

In response to the newly recognised threat of human immunodeficiency virus (HIV) among and from injecting drug users (IDUs), needle and syringe programs (NSPs) were first established in the mid-1980s in the Netherlands and the United Kingdom, followed by Australia.<sup>1</sup> At the time, there was no evidence that NSPs or any other measures would be effective, safe or cost-effective in controlling HIV in this population. However, it appeared highly plausible that a package of prevention measures might be effective. This combination included educating drug users about the

risks that they faced from sharing injecting equipment, providing IDUs with sterile injecting equipment while removing used injecting equipment from circulation, increasing access to drug treatment, particularly methadone maintenance, and the meaningful involvement of drug users in responding to the epidemic. This package of measures came to be known as 'harm reduction'.<sup>2-4</sup>

A quarter century later, we have accumulated evidence of the effectiveness, safety and cost-effectiveness of the harm reduction approach to HIV prevention among IDUs. Harm reduction is one of the most effective and cost-effective measures in the entire HIV prevention repertoire. This article explores the evidence.

## Effectiveness of needle and syringe programs

A 2004 review of the evidence of the effectiveness of NSPs commissioned by the World Health Organization (WHO) found that a conservative interpretation of the published data fulfilled at least six of the nine criteria described by Bradford Hill for causality (strength of association, replication of findings, temporal sequence, biological plausibility, coherence of evidence, and reasoning by analogy) and all six additional criteria (cost-effectiveness, absence of negative consequences, feasibility of implementation, expansion and coverage, unanticipated benefits, and application to special populations).<sup>5</sup> The principal finding of the WHO review, that there was compelling evidence of effectiveness, safety and cost-effectiveness of NSPs, was consistent with eight reviews of the evidence conducted by or commissioned by the United States of America (USA) government agencies.<sup>6-13</sup> The WHO review recommended that authorities in countries affected or threatened by HIV among IDUs should rapidly establish and expand NSPs to the scale of the affected population.

The three Bradford-Hill criteria that were not met were specificity of association, biological gradient and experimental evidence. The lack of specificity of association arises from the fact that NSPs also reduce infection with hepatitis C. NSPs have not had the same dramatic impact on the hepatitis C epidemic because of the higher viral infectivity and parenteral transmission efficacy of hepatitis C<sup>14</sup> and because NSPs were established decades after hepatitis C became prevalent among IDUs in Australia.<sup>15</sup>

Since the WHO review, evidence of a biological gradient for NSPs has become available, with HIV incidence in New York found to be inversely correlated with the number of sterile needles and syringes provided.<sup>16</sup>

Experimental evidence for NSPs in the form of a randomised-controlled trial, considered the highest level of evidence in the ranking scheme, has not been possible because of the logistical and ethical problems of randomly assigning NSP access to individual or groups of IDUs.<sup>17</sup> While the hegemony of the evidence-based medicine framework now extends into all areas of health,<sup>18–20</sup> there is increasing debate regarding its appropriateness for using these forms of evidence for assessing some public health interventions.<sup>21,22</sup>

After two decades there is still no evidence that NSPs reduce the age of initiation, increase the frequency of injecting or prolong the duration of drug injecting careers.<sup>5</sup>

### Cost-effectiveness of needle and syringe programs

An analysis of 778 years of data from 103 cities around the world found that cities that had ever had NSPs had an average annual decrease in HIV prevalence of 18.6%, compared with an average annual increase of 8.1% in cities without NSPs.<sup>23</sup> A subsequent study estimated that, between 2000 and 2009, NSPs had directly averted over 32 000 new HIV infections in Australia. During 2000–2009, gross funding for NSPs was \$AUD243 million. Savings of health-care costs were estimated to be \$AUD1.28 billion. For every dollar invested in NSPs, more than four dollars was returned in direct health-care cost-savings within ten years. If the costs and productivity gains and losses of individual IDUs are considered, then the net present saving of NSPs is \$AUD5.85 billion. This means that for every dollar invested in NSPs between 2000 and 2009, \$AUD27 was returned in cost savings.<sup>24</sup>

### Effectiveness of opioid substitution treatment

The best evidence of the effectiveness of drug dependence treatment in preventing HIV transmission among IDUs is for opioid substitution treatment programs using methadone and buprenorphine.<sup>25–27</sup> The evidence is much stronger for methadone than for buprenorphine treatment.<sup>27,28</sup> Methadone substantially reduces drug injecting and thereby the sharing of injecting equipment.<sup>26,29</sup> Seroprevalence studies suggest that reductions in injecting risk behaviour can result in reductions in HIV infection but relatively few (expensive and difficult) seroincidence studies have been published.<sup>30–32</sup> However, little is known about any impact of abstinence-based treatment on risk behaviour or HIV prevalence and incidence. Most countries provide a range of options even though there is much better evidence for opioid substitution treatment. Countries

that have provided extensive NSPs and opioid substitution treatment appear to have averted an epidemic, stabilised or substantially reduced the prevalence of HIV among IDUs.

### Health education of injecting drug users

There is no rigorous evidence that educating IDUs about the risks of HIV or community development approaches per se helps to reduce the spread of the infection. However, the effectiveness of these interventions is plausible and they are inexpensive. Moreover, evidence from recent US randomised-controlled trials indicates that behavioural interventions, including peer-driven interventions, reduce the risk of HIV and hepatitis C acquisition by encouraging safer behaviours and increasing access to health services.<sup>33,34</sup>

### Effectiveness of drug law enforcement

The effectiveness, cost-effectiveness and lack of serious unintended negative consequences of harm reduction<sup>5,35</sup> stands in stark contrast to the relative ineffectiveness, cost-ineffectiveness and serious unintended negative consequences of drug law enforcement.<sup>36</sup> Yet drug law enforcement is the mainstay of the response to illicit drugs by governments in Australia and other countries and the major beneficiary of government resources.<sup>37</sup> An increasing number of studies suggest that vigorous drug law enforcement can inadvertently increase the potential for transmission of HIV and other bloodborne infections among IDUs.<sup>38–43</sup>

### Adoption of harm reduction approaches

The scientific debate about harm reduction is now over. Harm reduction approaches to HIV prevention among IDUs have faced relentless international and national opposition and criticism. But they are now accepted as mainstream global drug policy. Almost all agencies of the United Nations with responsibility for drug policy now support harm reduction. NSPs have been established in 70 countries and opioid substitution treatment is available in 82 countries including 66 countries which provide both interventions.<sup>44</sup>

However there is no room for complacency. Globally, IDUs are estimated to account for 10% of people living with HIV.<sup>44</sup> In Australia, approximately 30–40 HIV notifications each year are attributed solely to injecting drug use.<sup>45</sup> Mathematical modelling suggests that while HIV remains low and stable among IDUs, even relatively minor reductions in current levels of NSP coverage could result in a significant increase in incident infections.<sup>46</sup> Moreover, if an HIV epidemic were to eventuate among IDUs in Australia, it is likely that this would involve one or more vulnerable populations with poor HIV prevention access and coverage. This includes IDUs from Aboriginal and Torres Strait Islander communities<sup>24</sup> and culturally and linguistically diverse backgrounds, especially ethnic

Vietnamese,<sup>47</sup> and incarcerated IDUs.<sup>48</sup> Despite evidence of major benefits of prison NSPs in the absence of significant negative consequences and ample documentation of injecting drug use in Australian prisons, repeated efforts to establish these facilities have proved unsuccessful.<sup>49</sup> Moreover, as in other settings, the success in changing injecting risk behaviour has not been matched by changes in sexual risk behaviour among IDUs in Australia. Harm reduction has had little impact on the sexual transmission of HIV among and from IDUs. Particular attention is required for the provision of harm reduction strategies to bridge populations (such as men who have sex with men and sex workers who are also IDUs).

The evidence-based medicine framework emerged after the international community began to deal with the threat of an HIV epidemic among IDUs. This experience should remind public health practitioners and policy makers of the risks of applying this framework too mechanistically. Evidence-based medicine provides little guidance when dealing with newly emerging major health threats where there has been insufficient time to evaluate a range of options. However, after more than two decades of advocacy and a robust body of evidence supporting the effectiveness of harm reduction in preventing HIV among IDUs, global coverage remains grossly inadequate.<sup>44</sup> While Australia has the second highest rate of needle and syringe coverage in the world (213 clean needles per IDU per year), globally only 8% of IDUs have had access to NSPs in the previous year with less than half the countries with known IDU populations providing access to opioid substitution treatment.<sup>44</sup> The global average is still only 22 needles and syringes per IDU per year.<sup>44</sup> Globally, only 8% of IDUs receive opioid substitution treatment while only 4% of HIV-positive IDUs receive antiretroviral treatment. Funding for global harm reduction amounts to \$US 180 million per year of an estimated annual requirement of \$US 2.13 billion.<sup>50</sup> These disparities are particularly apparent in some countries in South East Asia where HIV prevention for IDUs is further hampered by repressive legal and policy environments.<sup>51</sup> At the current rate of expansion, adequate coverage of harm reduction will probably take another 20 to 30 years.

## Conclusion

The highly efficacious HIV prevention interventions for IDUs known as 'harm reduction' urgently need to be expanded to scale internationally after compelling evidence that harm reduction approaches to HIV prevention among IDUs are effective, safe and cost-effective.

## Acknowledgments

The authors would like to thank Ms Leah McLeod for her assistance with the manuscript. Lisa Maher is supported by an NHMRC Senior Research Fellowship and the National Centre in HIV Epidemiology

and Clinical Research is funded by the Australian Government Department of Health and Ageing, and is affiliated with the Faculty of Medicine, The University of New South Wales.

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