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Commentary

The cost-effectiveness of harm reduction

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ABSTRACT

HIV prevalence worldwide among people who inject drugs (PWID) is around 19%. Harm reduction for PWID includes needle-syringe programs (NSPs) and opioid substitution therapy (OST) but often coupled with antiretroviral therapy (ART) for people living with HIV. Numerous studies have examined the effectiveness of each harm reduction strategy. This commentary discusses the evidence of effectiveness of the packages of harm reduction services and their cost-effectiveness with respect to HIV-related outcomes as well as estimate resources required to meet global and regional coverage targets. NSPs have been shown to be safe and very effective in reducing HIV transmission in diverse settings; there are many historical and very recent examples in diverse settings where the absence of, or reduction in, NSPs have resulted in exploding HIV epidemics compared to controlled epidemics with NSP implementation. NSPs are relatively inexpensive to implement and highly cost-effective according to commonly used willingness-to-pay thresholds. There is strong evidence that substitution therapy is effective, reducing the risk of HIV acquisition by 54% on average among PWID. OST is relatively expensive to implement when only HIV outcomes are considered; other societal benefits substantially improve the cost-effectiveness ratios to be highly favourable. Many studies have shown that ART is cost-effective for keeping people alive but there is only weak supportive, but growing evidence, of the additional effectiveness and cost-effectiveness of ART as prevention among PWID. Packages of combined harm reduction approaches are highly likely to be more effective and cost-effective than partial approaches. The coverage of harm reduction programs remains extremely low across the world. The total annual costs of scaling up each of the harm reduction strategies from current coverage levels, by region, to meet WHO guideline coverage targets are high with ART greatest, followed by OST and then NSPs. But scale-up of all three approaches is essential. These interventions can be cost-effective by most thresholds in the short-term and cost-saving in the long-term.

Introduction

HIV prevalence worldwide among people who inject drugs (PWID) is around 19% (World Health Organization, 2013) and almost one-third of HIV incident cases outside sub-Saharan Africa are related to injecting drug use (Open Society Institute, 2004). Injecting drug use is estimated to be responsible for around 10% of all HIV infections worldwide (UNAIDS, 2012). The spread of HIV among PWID has particularly driven epidemics throughout regions of Eastern Europe, and Central and Southeast Asia (Bridge, Lazarus, & Atun, 2010; El-Bassel et al., 2014; Wu, Shi, & Detels, 2013). Indeed, in Eastern Europe and Central Asia the majority of HIV infections have been attributed to injecting drug use and this is the region of the world currently with the largest increase in HIV epidemics (UNAIDS, 2012). Some countries in the Middle East and North Africa region have also been experiencing rapidly emerging HIV epidemics among PWID (Mumtaz et al., 2014).

Many countries in Asia and Eastern Europe have responded to injecting drug use through law enforcement measures and compulsory detention (Wu, 2013). There is no evidence to suggest that compulsory detention of people who use drugs is effective in reducing drug dependency or rehabilitative, as most detained people return to drug dependency after release (Hall et al., 2012; WHO, 2009a). An alternate approach is harm reduction, which refers to methods of reducing health risks when eliminating them may not be possible. Harm reduction can also reduce social and economic

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harms that individuals experience as a result of engaging in risky activities. In the context of HIV prevention and injecting drug use, harm reduction generally includes needle-syringe programs and opioid substitution therapy. Provision of antiretroviral therapy is also considered to be within a comprehensive package of HIV-related services for PWID. Harm reduction approaches were first introduced in the Netherlands, United Kingdom and Australia in the mid-1980s in response to AIDS epidemics (Stimson, 1989). We now have three decades of data to assess the evidence of effectiveness and cost-effectiveness of these approaches. In this commentary, we discuss the cost-effectiveness of harm reduction with respect to HIV-related outcomes. We refer the reader to a complementary commentary in this issue by Bruggman and Grebely which addresses harm reduction and hepatitis C virus (HCV) epidemics, including the large opportunity to incorporate new paradigm-shifting HCV treatments into harm reduction packages (Bruggmann & Grebely, 2015).

Although they do not necessarily reduce drug dependency, needle-syringe programs (NSPs) are public health measures which aim to reduce the spread of blood-borne infections, including HIV and HCV, among PWID through the distribution of sterile injecting equipment. NSPs operate in many different modes in different contexts and they may provide a range of services that include the provision of injecting equipment, education and information on reduction of drug-related harms, referral to drug treatment, medical care and legal and social services (Heimer, 1998; Kidorf & King, 2008). Another harm reduction strategy, opioid substitution therapy (OST), has a dualistic aim of firstly reducing drug dependency among PWID, but secondly and subsequently reducing the frequency of injection and unsafe injecting practices which thereby reduces blood-borne viral transmission via injecting drug use. Methadone or other opioid substitutes are prescribed to dependent users to diminish the use and effects of opiates. The provision of ART has also become an ethically-sound and pragmatic intervention for PWID who are also living with HIV, as it reverses disease progression to increase the length and quality of life (Lohse et al., 2007). ART also reduces viral load which is expected to also decrease the likelihood of onward HIV transmission (Cohen et al., 2011; Wilson et al., 2008). These three harm reduction strategies also comprise the main elements of a nine-component comprehensive package, endorsed by the WHO, UNODC and UNAIDS (WHO, 2009b).

Numerous studies have examined the effectiveness of each harm reduction strategy. Each approach has clear evidence of impact on reducing drug dependency or reducing risk behaviours and ultimately averting HIV transmission (among other important benefits). A recent systematic review of HIV prevention programs through Asia and Eastern Europe found that interventions targeted at specific population groups, including harm reduction programs for PWID, demonstrated evidence of effectiveness and cost-effectiveness when compared to non-targeted other HIV interventions aimed at the general populations (Craig, 2014). This commentary assesses NSPs, OST and ART in isolation and then broadly the evidence of them in combination. The amount of money which society, governments and other funders are willing to pay for health and societal benefits is substantially different between settings, interventions and populations. We do not define a specific willingness-to-pay threshold for harm reduction; rather, we comment on general conclusions from studies on the cost-effectiveness ratios calculated.

Effectiveness and cost-effectiveness of NSPs

NSPs have been shown to be safe and effective in reducing HIV transmission in diverse settings (Bastos & Strathdee, 2000; Jenkins et al., 2001; Kwon et al., 2009; Vickerman et al., 2006; Wodak, 2006). A recent review of reviews found sufficient evidence of NSPs to reduce self-reported risky injecting behavior and tentative evidence of effectiveness of NSPs to reduce HIV transmission (Palmateer et al., 2010). Two recent comprehensive reviews found compelling evidence that NSPs are associated with favorable outcomes for PWID (Gibson, Flynn, & Perales, 2001; Wodak & Cooney, 2005) with the more recent review finding that increasing the availability of sterile injecting equipment to PWID reduces HIV infection; 23 of 33 studies reviewed found positive outcomes on HIV risk behavior, with one finding negative outcomes, 5 having indeterminate outcomes, and 6 investigating a variety of other outcomes with either positive or indeterminate results (Wodak & Cooney, 2005). Further, a review of ecological data from 81 cities across Europe, Asia and North America found that HIV prevalence increased by an average of 5.9% per year in the 52 cities without NSPs but HIV prevalence decreased by 5.8% per year in the 29 cities with NSPs (Hurley, Jolley, & Kaldor, 1997); note that mortality rates at the time of this study may have influenced prevalence trends. A particularly notable example of impact was demonstrated in New York, where the introduction of NSPs was associated with a sharp decrease of HIV incidence in the early 1990s from 4% per year to 1% (Des Jarlais et al., 1996, 2005). There are many examples where the lack of NSPs has led to large increases in HIV incidence. For example, HIV prevalence in Cebu, Philippines recently escalated drastically from 0.5% in 2009 to 53% in 2011; similarly rapidly exploding epidemics have been observed in Sargodha (Pakistan), Bangkok (Thailand) and Manipur (India) where HIV prevalence increased from near zero within a few months to reach levels of 20–50% (Choopanya et al., 1991; Emmanuel et al., 2009; Sarkar et al., 1993). NSPs reduce the probability of transmission of HIV and other blood-borne diseases by lowering the rates of sharing of injecting equipment among PWID. Surveillance in Victoria and Vancouver, Canada found that there were similar behaviors in the two cities with NSPs but subsequent to the closure of needle-exchange clinics in Victoria, needle sharing became significantly more prevalent (23%) in Victoria compared to Vancouver (8%) where needle exchange clinics remained open (Ivsins et al., 2010).

NSPs are relatively inexpensive to implement. The average cost of NSP provision has been estimated by UNAIDS to be US$23–71 per person per year (Wilson & Nicole, 2013) depending on region of the world and delivery system (pharmacies, specialist programme sites, vending machines, mobile outreach vehicles) (Schwartlander et al., 2011). Given their relatively low costs and evidence of effectiveness, NSPs are recognized as one of the most cost-effective public health interventions ever funded (International, 2012). Studies in numerous countries have repeatedly provided compelling evidence that NSPs are cost-effective both from societal and health sector perspectives (Vickerman, Miners, & Williams, 2008; Wodak & Maher, 2010). A systematic review found that all 12 included studies that examined the impact of NSPs on HIV infection found that NSPs were cost-effective according to the studies' defined willingness-to-pay thresholds (Jones, Pickering, Sumnall, McVeigh, & Bellis, 2008). Increasingly, evidence has found net financial benefits of NSPs across all regions and in high- and low-income settings (Belani Hrishikesh & Muennig, 2008; Guinness et al., 2010; Ni et al., 2012). For example, NSPs are cost saving when compared to the lifetime costs of HIV/AIDS antiretroviral treatment (Jones et al., 2008) and a recent study estimated that not only did NSPs reduce the incidence of HIV by up to 74% over a 10 year period in Australia but found that they were cost savings and had a return on investment of between $1.3 and $5.5 for every $1 invested (Kwon et al., 2012). Table 1 illustrates the cost-effectiveness ratios of NSPs in Eastern Europe and Central Asia where injecting drug use is prevalent.