From Harm Reduction to Harm Prevention:
A Cross-national Comparison of Eleven Countries

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ABSTRACT

Background – International figures show an increase in both psychoactive substance use and the harms (physical, psychological and social) that it brings. Scientific evidence from different fields of knowledge demonstrates that the use of psychoactive substances leads to addiction (substance use disorder) and inflicts serious harm to drug users, particularly to people who inject drugs, their families and their larger community.

Objective – This article discusses two different approaches to substance use disorder: harm reduction and harm prevention. Data from 11 countries that follow the 'harm reduction' approach and experience unintended collateral harms are presented to illustrate the situation.

Findings – The steady growth and seriousness of harms caused by psychoactive substance disorder worldwide indicate the importance of considering a different approach: harm prevention. Harm prevention is a multipronged approach comprising all concerted efforts by civil society, the government, and the private sector, to use prevention, rehabilitation and treatment to eradicate the harm that substance use disorder exacts upon individuals and communities. The harm prevention approach is evidence-based and incorporates current biomedical and psychosocial research on drug addiction and its predictors. Why do we need a multipronged approach? Four decades of research show that the problem of psychoactive substance use disorder requires comprehensive and multipronged solutions. Focusing only on individual addicts ignores the drug-promoting socio-cultural environment, the multifactorial nature of drug addiction, and the pathway to addiction. The pathway towards substance addiction comprises biological, psychological and sociocultural dimensions and follows three stages: misuse, abuse and addiction. Examining why individuals enter this path and proceed along it, research demonstrates that the biological, psychological and sociocultural dimensions of substance addiction are interlinked, and that young individuals and those with a genetic predisposition to drug addiction are particularly vulnerable.

Introduction

The problem of psychoactive substance use is global. The United Nations Office on Drugs and Crime (UNODC) estimate that in 2017 about "5.5% of the global population aged 15-64", that is, "271 million people worldwide … had use drugs at least once the previous year", an increase from 4.8% in 2009 (UNODC, 2019a:2). The number of years of healthy life lost to the use of drugs worldwide has risen from about 25 million in 1991 to over 40 million in 2017 (UNODC, 2019a:20). Moreover, "opioids present the greatest harm to the health of users": the worldwide number of 'past-year' opioid users in 2017 was estimated at 53.4 million and "opioids accounted for 110,000 (66%) of the 167,000 deaths attributed to drug use disorders" (UNODC, 2019a:12). Perhaps more concerning is the continued upward trend of adolescent drug users (12 to 17 year-olds), considering scientific evidence that the brain is not fully developed yet at that age and thus adolescents are even more vulnerable than older users to long-term serious harms caused by psychoactive drugs consumption (UNODC, 2019a: 13-14).

The pathway to drug addiction typically begins as recreation ('trying a drug for fun') or misuse leading to abuse and finally dependence. The serious harm that psychoactive substances inflict on addicted individuals, their families and their larger community is demonstrated by scientific evidence and is acknowledged by governments and civil society worldwide. Of the large variety of attempted solutions, two main but contrasting efforts to deal with the problem stand out. One is the harm reduction approach advocating the right to use drugs and what it deems as ways to use drugs 'safely'. The other is the harm prevention approach that focuses on the basic right of individuals to health and on the crucial role of prevention and rehabilitation. Much has been said and written about harm reduction but less about harm prevention. Thus, the objective of this brief discussion is to compare both approaches, highlighting the most important features of each.

The empirical evidence presented in this discussion of the two approaches are based on 11 countries where harm reduction services are available: Australia, New Zealand, Canada and the United Kingdom (Commonwealth countries); Germany, Portugal, Sweden and the Netherlands (European Union members); and Indonesia, Malaysia and Thailand (ASEAN members). The data sources comprise published scientific studies, official databases, and reports published by the respective national governments, agencies, as well as international organisations such as the United Nations Office on Drugs and Crime (UNODC), the World Health Organization (WHO), UNAIDS, and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), among others.

While the sources are official, a caveat is in order. The main challenge for studies on psychoactive substance users - people who use drugs (PWUD) in general and people who inject drugs (PWID) - is the nature of the data. Given the difficulties of reaching the entire population of PWUD and PWID, most statistics are estimates. One common hurdle is reaching the PWUS/PWID population. Regular illicit drug consumption, particularly drug injecting, usually takes place in private and concealed locations. Cross-national studies face an additional challenge: not all countries collect or report annual data systematically or use the same standard classification for all drug-related problems. The EMCDDA publishes figures on PWID as well as prevalence of 'high-risk drug users' (a category that combines intensive use of psychoactive drugs as well as drug injecting). The most recent EMCDDA data - that is, 2016-2017 - on five of the 11 countries, show that the problem of 'high-risk' drug use is more intense in the United Kingdom (prevalence of 8.09 per 1,000 population aged 15-64) and Portugal (4.97) compared to Germany (1.95) and the Netherlands (1.25). There are no figures on 'high-risk drug users' for the other seven countries in the study. The number of drug-related deaths suggest an increasing trend from

2010 to 2018, with the exception of Australia that reported a sharp decrease during the same period (see Table 1). Unfortunately, no countrywide statistics on drug-related deaths are available for the three Asian countries, and the most recent data on New Zealand are for 2010-2014.

The discussion of both approaches is presented in four steps: (1) what is harm reduction; (2) the unintended collateral harm of harm reduction services; (3) what is harm prevention; and (4) how the harm prevention approach averts collateral harm.

The Harm Reduction Approach

Harm reduction is the approach promoted by Harm Reduction International (HRI), a non-governmental organisation initiated in England in 1990 (HRI, 2012, 2019a). Due to its strong advocacy character, some experts consider HRI as 'a movement' (Van Wormer and Davies, 2003:27). HRI explains that "there is no universally accepted definition of harm reduction" but that harm reduction "refers to policies, programmes and practices that aim to minimize negative health, social and legal impacts associated with drug use, drug policies and drug laws" (HRI, 2019a). HRI declares that

Recognising that only a small percentage of people who use drugs experience problematic use, harm reduction may also help people maximize any potential benefits that they gain from using drugs. … Many

Table 1. Drug-related Deaths, High-Risk Drug Users, Injecting, NSP and Hepatitis C Prevalence [a]

Country	(1) Number of Drug-related Deaths (Overdose)		(2) Estimated Number of NSP Kits Distributed per Injecting Drug User/Year		(3) Prevalence of PWID: Estimated Number of Injecting Drug Users per 1,000 Population Aged 15-64		(4) Prevalence of High-Risk Drug Users per 1,000 Population Aged 15-65
	2010-2014	2017-2018	2011-2014	2017-2018	2012-2013	2017- 2018	2016-2017
Commonwealth							
Australia	8,547	1,795	203	624,881	6.4	5.7	nd
New Zealand	200	nd	277	233	4.5	5.6	nd
Canada	nd	11,500	23	nd	3.2	3.6	nd
UK	2,000	3,256	nd	nd	2.2	2.8	8.09
Europe							
Germany	1,250	1,272	2	nd	1.1	2.4	1.95
Portugal	25	30	110	116,271	1.6	2.0	4.97
Sweden	370	626	214	214	0.1	1.3	nd
Netherlands	95	262	nd	nd	0.1	0.1	1.25
Asia							
Indonesia	nd	nd	44	2.5	0.4	0.2	nd
Malaysia	nd	nd	522	18	5.9	5.3	0.677
Thailand	nd	nd	12	10	0.6	1.4	nd

people who use drugs do not need treatment, and those experiencing problems associated with drug use may be unwilling or unable to enter abstinence-only treatment for myriad reasons. While abstinence from drug use may be the goal for some people who use drugs this is an individual choice and should not be imposed, or regarded as the only option. (HRI, 2019a).

Accordingly, HRI promotes 'safer' use of "illicit and licit drugs". HRI defines 'safer use' as drug use that is less likely to spread blood-borne infections, mainly HIV, hepatitis B, and hepatitis C infections. HRI fosters four main free or "inexpensive" services for the 'safe use' of drugs: distribution of clean injecting kits through needle and syringe programmes (NSP); 'supervised injection facilities' (SIFs) also known as 'Drug Consumption Rooms' (DCRs); and naloxone peer-distribution programme (naloxone is a drug to counter opioid overdose) - also known as 'Take-Home-Naloxone' (THN) in the United Kingdom (HRI, 2019a). A supplementary harm reduction service offered in some European cities is street-mounted automatic injection kit dispensers (AIKD) that "enable the self-operated exchange of injection equipment" (EMCDDA, 2019:5).

Three significant and related global developments over the past decade challenge the harm reduction goal of 'safe' drug use. First, scientific evidence of serious health damage caused by psychoactive substance use is increasing (e.g., UNODC 2019;

(5) Hepatitis C (HCV) Prevalence among PWID (%)		(6) HIV Prevalence among PWID (%)
2005-2014	2015-2018	2018
53.5	51.0	1.7
57.0	nd	0.2
68.0	nd	10.9
46.0	53.0	1.0
73.1	nd	4.9
87.7*	88.3	21.3
81.7	54.6	0.4
55.3	76.2	10.2
63.5	nd	28.8
67.1	nd	13.5
nd	88.2	20.5

Sources and notes:

(a) Countries vary in the time period (range of years) used to report data. Some use range of years while others report specific year. This table shows time periods to facilitate comparison. Figures for all countries are estimations as provided in the sources.

1. EMCDDA (2019b) Country Drug Reports; Government of Canada (2019); Morrow (2018: 59). Australia's earliest figure is for the decade 2001-2012 (Roxburgh et. al., 2017) but the 1,795 drug-induced deaths occurred in one year, 2017 (AIHW (2019).

2. NSP (Needle and Syringe Programme). Sources: HRI (2012); Stone at al (2018). Data for 2017-2018 calculated from UNAIDS (2019) and EMCDDA (2019a: 92) New Zealand's 2011-2014 figure was calculated based on its estimation of "10,000 needle exchange attendees" in 2014 (UNAIDS, 2015b:5) and its total population in 2013 (WHO, 2015)

3. Sources for the period 2012-2013: UNAIDS (2015b); WHO (2015). For the period 2017-2018: Stone et. al. (2018) and UN (2019).

4. EMCDDA (2019b) Country drug reports http://www.emcdda.europa.eu/countries/drug-reports/2019/. The EMCDDA (2019c) defines 'high-risk drug use' as "the use of psychoactive substances (excluding alcohol, tobacco and caffeine) intensively and/or by high-risk routes of administration [injecting] in the last 12 months".

5. The sources for the 2005-2014 figures are Mathers et. al. (2010); Romelsjo et. al. (2010:16225); IDT (2010a); AIHW (2015a), and INCB (2015:96). The UK are for 2005/06 and 2007/08. Portugal's figures are for 2003, 2007 and 2012. The figure for New Zealand refers to persons with "severe problem with opioid abuse" (INCB, 2015:96). Data for 2017-2018 are from UNODC (2019) Table 3.1.

6. UNAIDS (2019) Country Factsheets https://www.unaids.org/en/regionscountries/countries/

7. Malaysian National Anti-Drug Agency (2019) Drugs Statistics-Laman Web Rasmi Agensi Anti Dadah Kebangsaan. The figure refers to users of opioids, methamphetamine and amphetamine-type stimulants in 2018.

WHO 2019a; Degenhardt et. al., 2017; Jekeran et. al, 2017). Second, scientists, policy makers and law enforcement experts agree that the last stage of the drug use trajectory, substance use disorder, is an illness. More specifically, it is a chronic rather than acute illness and it is labelled 'dependence syndrome' in the 10th revision of the International Statistical Classification of Diseases or ICD-10 (WHO, 2010). The American Psychiatric Association (APA) and the international medical community appear to now accept the evidence-based notion that a person affected by 'dependence syndrome', also known as 'substance use disorder', is unable to stop the illness on his/her own, and thus requires assistance to begin rehabilitation (e.g., Leshner, 2003; Cohen, 2004; Arias et. al., 2016). Third, as policy makers, communities, and families become aware of the increased seriousness and scope of drug addiction harms, it is essential for international organisations and governments to explore conscientiously other approaches. As stated by the UNODC,

Using narcotic drugs and psychoactive substances without medical supervision, is associated with significant health risks. For this reason, the production, sale, distribution and use of these substances have been regulated under the control of the international treaties … with the aim to avoid negative consequences that could significantly undermine health and security. (UNODC, 2017:2).

This position reflects the current inclination of most international agencies and governments facing the drug problem (including the governments of the 11 countries in the study) to follow scientific evidence on the serious harm brought about by psychoactive substance use disorder. Consequently, it is important to examine and compare the two approaches, harm reduction and harm prevention.

Unintended Collateral Harm of Harm Reduction Services

Social science research findings show that Newton's third law of motion, 'for every action there is … a reaction', applies in a general sense to social behaviour. More importantly, social actions typically have unintended consequences. The impact of unintended consequences is substantiated by a wealth of evidence-based social science research over the past century and it is most visible in the unintended adverse consequences or spillover effects of policies and programmes envisioned by their designers to assist individuals and communities. Three of the four main harm reduction services—NSP, SIFs and DCRs— provide PWID with both clean injecting paraphernalia and a supportive and private setting for drug injecting. That is, these services support injecting as a mode of drug use. Herein lies the most vivid illustration of unintended collateral harm of the NSP, SIFs, DCRs and AIKDs. Harm Reduction literature assert that the NSP and DCRs/SIFs teach and facilitate "safer drug use" including provision of clean injecting and counselling on the risks of shared used of injecting equipment, in order to prevent infection transmission. HRI recommends that the NSP should aim for 'high coverage' stating that less than 100 needles per injector is 'low coverage'; 100-199 needles per injector is 'average coverage'; and 200 or more needles per injector is 'high coverage' (HRI, 2012:28).

Unfortunately, the good intentions of harm reduction advocates do not lead to the expected goal of 'safe injecting'. Harm reduction services that support drug injecting have negative unintended consequences. These are the most elementary reasons for the unintended consequences: (1) 'Safe

injecting rooms' and 'safe injecting facilities' are not the only locations where PWID go for drug injecting. (2) Providing clean injecting kits through NSP and aiming for 200 or more needles per injector simply increases the number of needles and syringes each injector has, but does not guarantee that the injectors would stop sharing them. And (3), teaching PWID how to take the necessary precautions to avoid infections, does not assure they would take those precautions every time they inject drugs. On the contrary, research show that the provision of information and free sterile injecting kits to PWID does not preclude them from sharing of needles and injecting equipment or their circumventing pre-injection skin cleaning and other infection-preventing practices (e.g, Bonar & Rosenberg, 2014).

Injecting increases the probability of transmission of blood-borne infections - mainly HIV and Hepatitis C and B. The prevalence of HIV infection shows signs of decreasing around the world, as well as among PWID, but Hepatitis C (HCV) is rising, as shown in Table 1. In 2018, the prevalence of HIV among PWID ranged from 0.2% (New Zealand) to 28.8% (Indonesia). In contrast, HCV prevalence per 1,000 PWID in 2017-2018 ranged from 51.0% (Australia) to 88.3% (Portugal). Drug injecting inflicts many other serious harms to PWID in addition to these blood-borne infections. The promotion of injecting equipment and quiet locations to inject appear to foster these and other serious unintended collateral harms including overdose, infective endocarditis and groin injecting.

Overdose

Current scientific evidence demonstrate that injecting opioid users "are at an elevated risk of death" (Jekeran et. al., 2017:424), and that injecting is strongly associated with disease burden and opioid overdose deaths (e.g, Degenhardt et. al., 2017; Roxburgh et. al., 2017; UNODC, 2017, 2018; WHO, 2019a). To illustrate, eight of the 11 countries in the study have records on drug-related deaths. Their reported figures show an increase in deaths - most of them caused by opioid overdose - from the period 2010-2014 to 2017-2018 (see Table 1). Canada reported the highest number: 11,500 deaths in 2017-2018, followed by the United Kingdom with 3,256; Australia 1,795; and Germany 1,272.

As mentioned earlier, one of the services promoted by the harm reduction approach is naloxone, a drug to counter opioid overdose. Harm reduction advocates advise PWID to keep naloxone at home to use in an emergency, to be administered by family members or friends of the drug injector in the event of an overdose (EMCDDA, 2015:71). Naloxone was classified as dangerous in the hands of non-medical persons (UNODC/WHO, 2013). In most Asian countries, naloxone is "a scheduled drug" that "cannot be sold over the counter" (HRI, 2012:33). However, WHO now advises "to make naloxone available in communities without prescription" (WHO, 2019a:6).

Infective Endocarditis

Infective endocarditis (IE) refers to the inflammation of the endocardium - the lining membrane of the heart cavities and connective tissue - due to infection with bacteria, fungi and other microorganisms. Infective endocarditis is becoming "increasingly common among people who inject drugs" (Weir et. al., 2019:93; Wurcel et. al., 2016). More specifically,

> ***Injection drug use … can lead to IE through direct injection of bacteria or through spread from skin and soft tissue abscesses into the bloodstream. … it is estimated that anywhere between 5% and 20% of people who inject drugs have had IE. ... [Compared to IE patients with non-drug use] people with [injection drug use-related] IE have … higher mortality after valve replacement and increased frequency of repeated endocarditis. (Wurcel et. al., 2016:1)***

Medical researchers explain that bacteria on the skin is common among PWID because intravenous

drug injectors tend to have "high nasal and cutaneous colonization rates with staphylococcus aureus"; and that "repetitive cocaine injection leads to vasospam and distant thrombosis" (Starakis, Panos & Mazokopakis, 2012:249).

There is no sufficient published information on the impact of IE in all the 11 countries in the study. Table 1 illustrates two other serious harms experienced by PWID namely, drug-related deaths and Hepatitis C virus (HCV) infection. However, we may reasonably assume IE is common among PWID in the 11 countries as IE is associated with repetitive drug injecting. Some studies define frequent injecting as exceeding 120 times per month and involving a combination of substances including heroin, prescription and non-prescription opioids, crack cocaine and other drugs (Roy et. al., 2017:18). In fact, consumption of psychoactive substances via injection tend to be repetitive because "opioids cause physical dependence that compels PWID to inject daily" (Roy et. al., 2017: 22). According to the UNODC, "Due to the short duration of their effects, injection of stimulant drugs is frequently associated with rapidly repeated injecting, with some individuals reporting more than 20 injections a day" (UNODC, 2019b:23).

Groin Injecting

Some PWID practise groin injecting, which is particularly dangerous. In 2013, 38% of British PWID surveyed reported groin injecting (EMCDDA, 2014a:65). The trends of groin injecting and of injecting a mix of crack and heroin called 'speedball', highlight the expanding danger and controversy over the needle exchange programme (Palmateer et. al., 2010). According to D. A. Zador from the National Addiction Centre in London,

… groin injectors are currently managed largely with advice from harm reduction agencies on sterile injection practice, guidance on the 'safe' distinction of the femoral vein from the artery prior to injection and other information. These practices deserve serious questioning. Can groin injecting behavior be made safer with a shelf-full of 'safe' groin injecting pamphlets? Possibly not. … Recent work using ultrasonography demonstrates that chronic deep vein injecting can alter the usual neurovascular anatomy of the femoral region, hence it is unlikely that groin injecting can ever be taught as a safe procedure. … How far should we protect user freedom to engage in high-risk behaviours and when should prevention and/or discouragement of these behaviours take priority? In other words, in terms of harm reduction, where should one 'draw the line? (Zador, 2007: 1791).

The Harm Prevention Approach

In contrast to harm reduction, harm prevention is an evidence-based, multipronged approach comprising all concerted efforts by civil society, the private sector, and the government, to avert the harm that drug addiction exacts upon both the individual and the collective (family, school, workplace, recreation networks, community and nation), through prevention, treatment and rehabilitation. At the individual level, the harm prevention approach comprises various modalities of psychosocial therapy including "strengths-based" and other personalised therapeutic counselling such as the Twelve-Step Approach, Motivational Enhancement Therapy (MET), and other cognitive behavioural strategies; and abstinence-oriented treatment that may be residential and may include a combination of detoxification, rehabilitation, counselling, vocational/occupational training and aftercare. In contrast to the harm reduction approach, counselling, therapy and rehabilitation in the harm prevention approach are abstinence-oriented and medically supervised. The harm prevention approach applies current medical and psychosocial research evidence on psychoactive substance dependence and its predictors and,

consequently, it is fundamentally different from the harm reduction approach (Quah, 2017).

The harm prevention approach applies the biomedical terms 'dependence syndrome' and 'substance use disorder' as interchangeable labels for the illness of drug addiction. WHO's definition of 'dependence syndrome' follows the APA's Diagnostic and Statistical Manual of Mental Disorders' latest edition DSM-5 (APA 2013). The only difference is that APA removed its earlier distinction between drug dependence and drug abuse and now uses the term "substance use disorder" to diagnose a person who meets two or more of these 11 characteristics: "(1) used larger amounts of substance/longer; (2) repeated attempts to quit/control use; (3) much time spent using; (4) craving; (5) neglected major roles to use; (6) social/interpersonal problems related to use; (7) activities given up to use; (8) hazardous use; (9) physical/psychological problems related to use; (10) tolerance; (11) withdrawal" (Norko and Fitch, 2014: 443-44).

Four principles - three of them evidence-based and one ethics-based - support the harm prevention approach. Those principles are: (1) substance use disorder or dependence syndrome is the final of three stages along a trajectory that begins with trying psychoactive drugs as recreation; (2) a combination of social and psychological factors nudge the person along that trajectory from recreation to regular use and then on to dependence; (3) the final stage is an incapacitating illness - substance use disorder or dependence syndrome - that renders the drug user powerless to stop drug consumption independently, thus requiring external help to recover. Principle (4) is ethics-based: given the universal ethical norm that health is a basic human right (e.g., WHO, 2019a:9), the harm prevention approach deems rehabilitation as a fundamental right of people who are affected by substance use disorder. Accordingly, from the perspective of the harm prevention approach, denying rehabilitation to persons affected by an illness - such as substance use disorder or dependence syndrome - that impairs his/her ability to make decisions on his/her own welfare, is a violation of that person's right to health.

How the Harm Prevention Approach Averts Collateral Harm

The above four principles illustrate how the harm prevention approach averts collateral harm. Let us examine each in turn.

(1) Substance use disorder is not an event but the outcome of a process. Thus, in order to preclude the problem as early as possible, it is important to understand why a person begins taking drugs. Studies show that behaviour can be learned and can be modified and changed. That is, for a regular individual, "the path towards substance addiction comprises biological, psychological and sociocultural processes" (Rotgers, 2003:167). Besides genetic predisposition, a person's path to the illness is also influenced by many factors including his/her social and cultural environment shaping "the easiness and frequency of drug availability"; "drug-related cues as reminders of drug use (for example, relationships, situations, 'sights, smells, sounds', music)"; and "the presence of a 'drug-free alternative' activities" (Doweiko, 2009:33-35). Consequently, providing a drug-free environment at home, in schools, the workplace, recreational locations and services, and in the community at large, is the first basic step towards preventing substance use disorder. The harm prevention approach seeks to mobilise the entire community in this effort and to promote a drug-free culture.

(2) Biomedical and social science experts acknowledge the close link between the molecular and social dimensions of the drug problem: "Among the things that we know about addictions with reasonable scientific certainty is that they come intertwined with a host of other health, social, economic, family and mental health problems" (Miller and Miller, 2009:685; Fulton, 2014; CCSA, 2014:29;). International policy agencies acknowledge this combination of predictors of substance use disorder identified by scientific research (UNODC, 2015a:33; 2015c; 2019a; 2019a). Accordingly, the harm prevention approach activates the collaboration of mental health experts, social workers, welfare agencies,

educators and primary care physicians, to identify early signs of distress - physical, emotional, social, or economic - in adolescents and adults trying drugs recreationally, and offer them and their loved ones counselling, therapy and other assistance to prevent the onset of substance use disorder.

(3) Psychoactive substance use has negative physical impact on the user. Summarising "almost three decades of research" on the biological damage caused by drug addiction (substance use disorder or dependence syndrome), A.I. Leshner reported: "scientists have concluded that drug addiction is without doubt a brain disease—a disease that disrupts the mechanisms responsible for generating, modulating, and controlling cognitive, emotional, and social behaviour" (Leshner, 2003; Cohen, 2004:58).

(4) As psychoactive substance disorder is an illness that impacts the brain's reward system and other functions, the harm prevention approach asserts that rehabilitation is a fundamental right of people affected by substance use disorder. Let us examine this point in more detail: the key difference between the harm reduction approach and the harm prevention approach rests on their opposite positions regarding the drug user's autonomy or self-determination. Harm reduction advocates assert that a person has the right to choose to take drugs and that continuing drug consumption, regardless of the consequences, is a personal choice. The harm prevention approach considers the autonomy argument incorrect for two main reasons.

First, substance use is a self-inflicted harm that affects not only the drug user, but also his/her loved ones, immediate family, social network and the larger community (Government of Canada, 2019a; 2019b; Quah, 2017:159). Writing on liberty, J.S. Mill explained that a person's self-inflicted "mischief" that "seriously affect …those nearly connected to him … and in a minor degree society at large" … becomes amenable to moral disapprobation" (Mill, 1991:96). Mill's norm applies to substance use disorder and to the need for significant others, family and community to assist the person affected to avert drug use, or to recover if the illness has advanced.

Second, the harm reduction approach presumes that when consuming drugs, PWID are exercising their freedom of choice. In fact, this presumption that people affected by substance use syndrome are able to exercise authentic autonomy is at the core of the recommendations made by the Reference Group to the United Nations on voluntary treatments for drug dependence (UN, 2010b: 22-25). This presumption is flawed. The individual is able to exercise authentic autonomy only when he/she can make rational choices, for example, to choose the most beneficial course of action out of a range of alternatives. Research indicates that making treatment services accessible to PWUD and PWID is important but insufficient because it is highly likely that their ability to make rational choices to protect or enhance their well-being is absent or seriously impaired by their substance use disorder. The deterioration of brain functions caused by psychoactive substance use is well documented (e.g., Barbarin, 1979; Hammer et. al., 1997; Kreek, 2000; Van Wormer & Davis, 2003:95-171; Nasrallah & Smeltzer, 2003:129; Carlezon & Konradi, 2004:48; Uhl, 2004; Caplan, 2008; Verdejo-Garcia & Bechare, 2009; Doweiko, 2009; De Leon, 2010; Meier et. al., 2012). Scientist Harold Doweiko summarises it thus:

Repeated exposure to the drugs of abuse initiates a process of 'restructuring' in the brain's reward system, memory centres, and the higher cortical functions that control reward-seeking behaviour. Strong drug-centred memories are formed, helping to guide the individual to select behavioural choices that lead to further drug-induced rewards. … Essentially, a normal biological process that evolved to help early humans survived in the wild has been subverted by

the reward potential of the compounds that they have invented (Doweiko, 2009: 34).

Summarising medical research findings on the biological damage caused by drug addiction, Alan Leshner explained: "Based on almost three decades of research, scientists have concluded that drug addiction is without doubt a brain disease—a disease that disrupts the mechanisms responsible for generating, modulating, and controlling cognitive, emotional, and social behaviour" (Leshner, 2003; Cohen, 2004:58).

In essence, a person afflicted by substance use disorder needs treatment but is unable to seek it or to stop drug consumption on his/her own, due to the impairing effect of the psychoactive substance. How does the harm prevention approach solves this dilemma? The harm prevention approach offers ethical intervention. Ethical intervention is an "organised effort" of the person's "significant others" to help him/her "break through the wall of denial, rationalisation and projection" and it must to be conducted "under the supervision of a chemical dependency professional", with the person's welfare as the fundamental objective, "seeking to attain the addict's agreement to immediately seek treatment." (Doweiko, 2009: 324). The intervention process is 'the restauration of autonomy' as medical ethicist Arthur Caplan explains: "Once competency and coercion are distinguished, it is clear that both are requisite for autonomy. Mandatory treatment which relieves the coercive effects of addiction and permits the recreation or re-emergence of true autonomy in the patient can be the right thing to do" (Caplan, 2008:1920).

In addition to the ethical intervention of loved ones to help the addict with treatment and rehabilitation, the harm prevention approach involves families, community and nation as a whole in the endeavour of preventing the young from entering the path of substance use. Worldwide evidence of psychoactive substance use over the past two decades show that dependence is affecting younger populations. The UNODC's call to governments two decades ago is even more relevant today: "As a majority of people first use drugs during school age, prevention work has to set in earlier" (UNODC, 2000: 104).

Conclusion

To recap, the solutions to the increasing problem of substance use disorder offered by the harm reduction approach are NSP and SIFs for injecting drug users; and OST comprising methadone, codeine, buprenorphine and other substances. The harm reduction approach promotes these services as 'safe' modes of injecting and managing psychoactive substances use and may include some counselling and information on 'safe' injecting. In contrast, the harm prevention approach comprises different modalities of psychosocial therapy, counselling, and rehabilitation, including sustained abstinence from drugs as the one of its key objectives.

Three significant worldwide developments have unsettled the harm reduction approach since 2010. First, the harm prevention approach highlights evidence that substance use disorder - dependence syndrome - is an illness and that it must be treated as a chronic rather than acute illness (UNODC, 2015a:34). The scientific evidence refutes the position of the harm reduction approach that psychoactive drug use is the drug user's lifestyle choice.

Second, evidence-based scrutiny of the harm reduction approach shows that, given the known high risk behaviours of PWID, the NSP's effectiveness in preventing the transmission of infectious diseases (HIV, HCV, and HBV) is lower than expected as PWID routinely share needles and injecting equipment, and bypass pre-injecting skin cleaning and other infection-preventing practices. Even supporters of harm reduction acknowledged that in "the community of injecting drug users … commitment to safe-injection practices may wane as the physiological and psychological desperation associated with addiction takes precedent over all else" (Dechman, 2015:496).

Third, all the 11 countries in the study allow the co-existence of both approaches although this does not necessarily translate into allocation of public funding despite harm reduction advocacy groups' strong lobbying to seek financial support from the government. They also seek and receive support from non-governmental organisations, private individuals, foundations and civil society to support their activities and services. HRI has noted that governments' support for the harm reduction approach worldwide is lower than expected (HRI, 2019a: 2019b). The early support international agencies gave to the harm reduction approach has declined due to the lack of systematic evidence-based scrutiny of harm reduction outcomes, the growing scientific evidence of the physical, psychological and social harm inflicted on the person by psychoactive substance use, and the recognition of substance use disorder as a chronic illness. It is hoped that this discussion of the unintended collateral harms of the harm reduction approach and of the contributions of the harm prevention approach add to the search for effective evidence-based solutions to the drug problem.

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