Principles of Harm Reduction for Young People Who Use Drugs

Simeon D. Kimmel, MD, MA,[a,b,c,d] Jessie M. Gaeta, MD,[b,e] Scott E. Hadland, MD, MPH, MS,[f] Eliza Hallett, MS,[f] Brandon D.L. Marshall, PhD[g]

abstract

In summarizing the proceedings of a longitudinal meeting of experts on substance use disorders among adolescents and young adults, we review 2 principles of care related to harm reduction for young adults with substance use disorders. The first is that harm reduction services are critical to keeping young adults alive and healthy and can offer opportunities for future engagement in treatment. Such services therefore should be offered at every opportunity, regardless of an individual's interest or ability to minimize use of substances. The second is that all evidence-based harm reduction strategies available to older adults should be available to young adults and that whenever possible, harm reduction programs should be tailored to young adults and be developmentally appropriate.

[a]Clinical Addition Research and Education Unit, [b]Sections of General Internal Medicine and [c]Infectious Diseases, Department of Medicine, Boston University School of Medicine and [d]Grayken Center for Addiction, Boston Medical Center, Boston, Massachusetts [e]Institute for Research, Quality, and Policy in Homeless Health Care, Boston Health Care for the Homeless Program, Boston, Massachusetts; [f]Division of General Pediatrics, Department of Pediatrics, School of Medicine, Boston University and Grayken Center for Addiction, Boston Medical Center, Boston, Massachusetts; and [g]Department of Epidemiology, School of Public Health, Brown University, Providence, Rhode Island

The guidelines/recommendations in this article are not American Academy of Pediatrics policy, and publication herein does not imply endorsement.

Dr Kimmel reviewed the literature and drafted, reviewed, and revised the manuscript; Drs Hadland and Gaeta conceptualized, designed, reviewed, and revised the manuscript; Ms Hallett drafted the evidence table; Dr Marshall conceptualized, designed, drafted, reviewed, and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

DOI: https://doi.org/10.1542/peds.2020-023523G

Accepted for publication Oct 23, 2020

Address correspondence to Simeon Kimmel, MD, MA, Sections of General Internal Medicine and Infectious Diseases, School of Medicine, Boston University and Boston Medical Center, 801 Massachusetts Ave, Second Floor, Crosstown Building, Boston, MA 02118. E-mail: simeon.kimmel@bmc.org

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: Dr Kimmel received funding from the Clinical Addiction Research and Education Unit (R25DA013582) and the National Institute of Allergy and Infectious Diseases through the Boston University Clinical HIV/AIDS Training Program (5T32AI052074). Dr Marshall is supported in part by Center of Biomedical Research Excellence on Opioids and Overdose (P20-GM125507). Dr Hadland was supported by the National Institutes of Health National Institute on Drug Abuse (K23DA045085-02 and L40DA042434-03), the Thrasher Research Fund (Early Career Award), and the Academic Pediatric Association (Young Investigator Award). The sponsors did not participate in the work. Funded by the National Institutes of Health (NIH).

POTENTIAL CONFLICT OF INTEREST: Dr Kimmel received consulting fees from Abt Associates to support a Massachusetts Department of Public Health funded project to improve access to medications for opioid use disorder in skilled nursing facilities. The other authors have indicated they have no potential conflicts of interest to disclose.

Harm reduction is defined as a set of practical strategies and ideas aimed at reducing negative consequences associated with drug use.[1,2] It is also a movement for social and health justice built on a belief in, and a respect for, the rights of people who use drugs.[3] Harm reduction programs for young adults are focused on minimizing the negative effects of substance use on young people, their families, and peers without mandating reductions in, or abstinence from, substance use to access services or receive medical treatments.[4]

In the United States, formal harm reduction programs were initially established to reduce risk for infectious diseases, such as HIV, hepatitis C, and bacterial infections transmitted through nonsterile injection practices. Amid the HIV crisis in the 1980s and 1990s, syringe service programs provided sterile injection equipment and risk reduction counseling to people who inject drugs in high-prevalence areas. As the risk for opioid overdose increased among people who used drugs throughout the early 2000s, overdose education and naloxone distribution (OEND) programs also emerged, often but not always in tandem with syringe service programs.[5] Condom distribution and HIV pre- and postexposure prophylaxis, which are aimed at reducing HIV transmission risk without specifically attempting to reduce either sexual or injection behaviors, represent other harm reduction interventions. Additional emerging harm reduction interventions include distribution of fentanyl test strips, which are used to detect fentanyl in drug samples and have been shown to be feasible and acceptable among young adults at high risk for fentanyl overdose.[6] Outside of the United States, harm reduction efforts also include supervised consumption facilities, where people use drugs in a supervised setting.

Decades of evidence have revealed that many harm reduction strategies are highly effective in decreasing the transmission of infectious diseases, preventing overdose, and reducing other sources of morbidity and mortality among people who use substances, including young people who use illicit drugs.[7–11] Harm reduction programs can also serve as a critical access points for additional resources, health care, and treatment.[12,13] However, despite a compelling body of scientific evidence, the uptake and dissemination of harm reduction programs for young people who use drugs continues to be limited in the United States.[4,14] Youth-focused harm reduction programs face substantial social, political, and structural barriers to their implementation in jurisdictions throughout the country.

In this article, we describe 2 key principles related to harm reduction for young adults that were discerned by a workgroup of experts as part of a longitudinal meeting on substance use disorders (SUDs) in young adults convened by Boston Medical Center's Grayken Center for Addiction. The recommendations in this article are not American Academy of Pediatrics policy, and publication herein does not imply endorsement. We present evidence in support of these principles (Table 1) and summarize practice considerations. We describe opportunities for expansion of harm reduction interventions focused on young adults and for incorporating harm reduction approaches into clinical programs to maximize public health impact. Additionally, we highlight obstacles to successful implementation and expansion and strategies to overcome these challenges.

PRINCIPLES OF CARE

Principle 1: Harm Reduction Services Are Critical to Keeping Young Adults Alive and Healthy and Can Offer Opportunities for Future Engagement in Treatment

Guidance

The workgroup recommended that the harms of substance use be reduced at every opportunity, regardless of an individual's interest or ability to minimize use of substances. Young adults who use substances or who meet criteria for an SUD have a right to the same care as those who do not, care that is nonjudgmental, dignified, and optimizes their ability to reach their own goals. Harm reduction programs are designed to be facilitative and incremental, meaning that they should address an individual's needs by facilitating any positive change, regardless of how small or incremental that change may be. The workgroup concluded that the evidence was clear that rather than enabling or increasing substance use, harm reduction services are safe, pragmatic, evidence-based interventions that reduce the harms from substance use.[2,15] Such programs should therefore be offered to adolescents and young adults with SUDs.

Evidence

Robust evidence (Table 1) supports both the efficacy and effectiveness of harm reduction interventions to improve the health of people who use drugs. As mentioned, myriad harm reduction strategies exist; we limit our discussion to strategies directly linked to safer drug use practices.

Distribution of sterile syringes and injecting equipment reduces HIV transmission and soft tissue infections.[8,10,16] In fact, the volume of syringes distributed and made available is directly linked to proportionally lower rates of subsequent HIV infections.[17]

TABLE 1 Selected Summary of Experimental and Quasi-Experimental Evidence About Harm Reduction Interventions

Author, y	Sample	Setting	Study Period	Design	Outcome	Main Findings	Contribution to Summit Principles
Fernandes et al,[11] 2017	Studies on effectiveness of NSPs	13 systematic reviews (which cite 133 unique studies from around the world)	Studies published until May 2015	Review of systematic reviews of the association of NSPs and blood-borne infection transmission and IRBs	Summarize the evidence on the effectiveness of NSPs in reducing blood-borne infection transmission and IRBs among PWID	NSPs were effective in reducing HIV transmission and IRB among PWID, with mixed results around reduction in HCV infection. Full harm reduction interventions provided at the structural level and in multicomponent programs, with high levels of coverage, were more beneficial.	Syringe exchanges reduce HIV transmission and may reduce HCV infection, especially when combined with additional services (referrals, MOUDs).
Gonsalves and Crawford,[19] 2018	Individuals infected in an opioid-driven HIV outbreak	Scott County, Indiana	October 2014 to November 2015	Mathematical modeling study of harm reduction interventions and HIV infections in an outbreak	Estimated differential HIV infections based on timing of public health intervention	Scale-up to earlier intervention times could have substantially reduced the total number of HIV infections in the Scott County outbreak.	Syringe exchanges and other harm reduction interventions reduce HIV infections in an outbreak.
Guse et al,[58] 2012	Studies on the impact of digital media-based interventions targeting adolescents aged 13–24	10 studies	Studies published between January 2000 and May 2011	Systematic review of the impact of digital media interventions targeting adolescents	Intervention impact on sexual health knowledge, attitudes, and/or behaviors	Seven interventions significantly influenced psychosocial outcomes, such as condom self-efficacy and abstinence attitudes. Six studies increased knowledge of HIV, sexually transmitted infections, or pregnancy.	Harm reduction services can be delivered through digital media.
Krieger et al,[6] 2018	*N* = 93 young adults aged 18–35 who reported injecting drugs or using illicit substances in the past 30 d	Rhode Island	May 2017 to September 2017	Nonrandomized pilot study of fentanyl test strips	Use of rapid fentanyl test strips (binary yes or no), No. test strips with positive results	Of 81 participants who returned for follow-up, 77% reported using at least 1 test strip, 98% reported confidence in their ability to use the test strips, and 95% wanted to use them in the future.	Use of rapid fentanyl test strips is feasible and acceptable to young adults.
Platt et al,[18] 2017	*N* = ~1817 incident HCV infections	28 studies from around the world	Studies published until November 2015	Systematic review of association of OST and NSPs and HCV infection	Acquisition of HCV among people who inject drugs	OST is associated with a reduction in the risk of HCV acquisition, which is strengthened in studies that assess the combination of OST and NSPs. High NSP coverage was associated with a reduction in the risk of HCV acquisition in studies in Europe.	OST when paired with NSPs reduces the risk of HCV acquisition.
Potier et al,[15] 2014	Studies on benefits and harms of SIS	75 studies (85% originated from Vancouver, British Columbia, Canada, or Sydney, Australia) Peer-reviewed reviews	Studies published until January 2014	Systematic review of SIS use benefits and harms	Synthesized evidence for SIS-induced benefits and harms	SIS promoted safer injection conditions, enhanced access to primary health care, and reduced overdose frequency while decreasing public drug injections. SIS were not found to increase drug injecting, drug trafficking, or crime.	SIS reduce multiple harms from injection drug use without increasing injection drug use or crime.

TABLE 1 Continued

Author, y	Sample	Setting	Study Period	Design	Outcome	Main Findings	Contribution to Summit Principles
Stockings et al,[4] 2016	Studies on effectiveness of various intervention programs for young people		Studies published until April 2015	Systematic review of reviews of substance use interventions for young people	Summarize the evidence for effectiveness of prevention, early intervention, harm reduction, and treatment of problem use	There is limited available research on interventions for problematic substance use in young people. Interventions that are effective with adults should be tested with young people.	Interventions have been designed and studied in adults; further efforts are needed to study and tailor interventions for young people.
Walley et al,[5] 2013	Individuals who use opioids at risk for overdose and individuals in their social network	19 communities in Massachusetts with at least 5 fatal opioid overdoses in each of the years 2004–2006, with and without OEND programs	2002–2009	Interrupted time series analysis comparing overdose in communities with and without OEND programs	ARR for annual deaths related to opioid overdose and use of acute care hospitals	Community-year strata had significantly reduced ARRs compared with communities with no implementation (ARR 0.73 [95% CI 0.57–0.91 for <100 enrollments per 100 000]; ARR 0.54 [95% CI 0.39–0.76 for >100 enrollments per 100 000]).	Increased access to naloxone for people who use drugs is associated with reduced overdose death in those communities.

Studies are listed alphabetically. ARR, adjusted rate ratio; CI, confidence interval; IRB, injecting risk behavior; MOUD, medication for opioid use disorder; NSP, needle and syringe program; OST, opioid substitution therapy; PWID, people who inject drugs; SIS, supervised injection services.

Hepatitis C infections can also be dramatically decreased when distribution of sterile syringes is paired with ready access to medication to treat opioid use disorder.[18] When syringe service programs close or are not scaled up in the setting of outbreaks, behaviors associated with increased risk for HIV and subsequent HIV infections increase.[19,20] Additionally, community-based programs that distribute naloxone dramatically reduce fatal opioid overdose.[5] A strong body of evidence from outside the United States reveals that supervised consumption facilities are acceptable to marginalized and structurally vulnerable individuals, promote safer injection practices, reduce overdose mortality and public injecting, and increase access to treatment without increasing overall drug use or crime in a neighborhood.[13,15,21,22] Growing evidence suggests that drug checking, in which the contents of a drug is confirmed before consuming, may promote harm reduction behaviors.[23] Although most harm reduction programs are located outside the hospital setting, emerging evidence suggests many of these interventions, including syringe distribution[24] and hospital-based supervised consumption, are of interest to people who use drugs and can be integrated into traditional clinical settings, including clinics and hospitals.[25]

Abstinence-only approaches and stigma associated with drug use drive individuals at high risk for drug-related complications away from services and care.[26–31] Nearly half of individuals who died of opioid overdose in Massachusetts in 2014 did not have an encounter in the health care system related to opioid use disorder.[32] Harm reduction programs and approaches offer an opportunity to engage these individuals and, if and when they are able, ultimately offer subsequent opportunities for treatment and

services. Additionally, harm reduction programs can provide valuable infrastructure for broader public health interventions, such as HIV and hepatitis C testing and immunizations.[33]

Practice Considerations

Harm reduction programs and approaches are needed to reduce the negative consequences from substance use for all young people. Existing interventions with strong evidence need expansion to better reach young adults who use drugs, and additional studies are needed to evaluate novel harm reduction interventions for these populations. However, harm reduction programs require additional financial and human resource investments. Additionally, in many states, syringe distribution is illegal[34]; as of late 2019, the country still does not have a legally sanctioned supervised consumption facility.[35]

Past experiences with stigma, pain, trauma, and restrictions in the traditional health care and addiction treatment system often prevent individuals from seeking care.[28,29,31] Harm reduction programs offer important opportunities to engage these individuals who may not otherwise seek care. Integrating clinical services to address the needs of individuals who access service in syringe service programs may be desirable in some facilities. For example, some syringe service programs would benefit from integrating primary care and infectious disease care (eg, pre- and postexposure prophylaxis, abscess care, HIV and hepatitis C virus [HCV] treatment), as well as low barrier buprenorphine prescribing, into these settings. Clinicians should be mindful that such integration of clinical services should be driven by syringe service program staff and participants, who have expertise about their programs and service needs, respectively.[36] New funding streams may be needed to support the expansion of these clinical services.

Additionally, clinicians should integrate harm reduction principles into their routine clinical work in every setting, especially for young adults who use drugs. The adoption of harm reduction approaches may counter the fear of medical care and addiction treatment and begin to confront the stigma that keeps many people who use drugs from accessing needed clinical care.[28,37] Clinicians must develop the skills, approaches, and referral capacity to successfully engage and treat people who use drugs to improve their overall health. Clinicians and clinical programs should learn to provide harm reduction–centered, pragmatic, humanistic care without abstinence as a precondition for engagement. Additional trainings may be necessary not only to teach about harm reduction principles but also to increase capacity to counsel directly with patients about injection practices and overdose risk.

Principle 2: All Evidence-Based Harm Reduction Strategies Available to Older Adults Should Be Available to Young Adults

Guidance

The workgroup recommended that whenever possible, harm reduction programs should be tailored to young adults and developmentally appropriate. The group identified several developmental issues that make engaging young adults in harm reduction services especially challenging: problematic relationships with authority, reluctance to engage in adult-led interventions, high degree of self-reliance, protection of autonomy, cynicism toward personnel in helper roles, and distrust of all but close peers. Efforts are needed to address these challenges and ensure that interventions are youth-friendly. The summit workgroup advised that young people who use drugs be meaningfully involved in all aspects of harm reduction program design, implementation, service delivery, and evaluation. Although youth participation in the design and implementation of harm reduction programs is rare,[38] successful models of youth-driven (and entirely youth-led) harm reduction interventions exist. Young people who use drugs have been engaged as peer educators, mentors, program designers, and evaluators, all of which increase relevance of the intervention for the target population, foster prosocial relationships with peers, and may improve program outcomes. The workgroup concluded that this involvement can also promote harm reduction programs offering services and resources in locations where youth congregate and through accessible media that are most relevant to young people.

Evidence

Just as young adults are less likely to receive evidence-based medications for treatment of opioid use disorder,[39–42] they are less likely to use evidence-based harm reduction interventions than older adults.[14,16,43–45] Existing harm reduction services were largely developed, studied, and funded to focus on older individuals who use drugs. Thus, many of these services are likely to need significant adaptation to reach young adults. Youth access harm reduction resources less frequently than older people who use drugs, despite riskier injection practices, including reuse or sharing of syringes and higher rates of concurrent sexual risk factors. As a result, young people bear disproportionate risk for HIV and HCV infection compared with older people who use drugs.[46–48] Rather than access existing community services, young people often employ harm reduction approaches within their social networks. For example, youth may attempt to minimize risk

by using with other people around or using intranasally rather than by injection to reduce risk for harm.[49,50] Barriers to engaging with existing services include distance from services, desire to avoid neighborhoods where an individual may have previous substance-related experiences, and homelessness.[49] As a result, the youth who do use harm reduction services are particularly vulnerable. For example, they are more likely to experience homelessness, incarceration, and psychological distress than older participants.[51] Fear of law enforcement, presence of older people who use drugs, and age restriction are other identified barriers.[52] Youth also frequently report that programs focus too narrowly on the harm from drug use rather than on their broader social and psychological needs.[49] Notably, girls and young women may be even less likely to be engaged in harm reduction services and more concerned about having their substance use exposed and having their service use tied to male partners.[52] Finally, youth may lack information or may believe that services are not needed, despite higher overdose risk, or may prefer to access services from friends or pharmacies.[51,52]

Several youth-centered harm reduction models have emerged to address disparities and ensure that youth have access to resources that can improve their health. Peer-led naloxone trainings improve attitudes, altruism, and perceptions of programming among youth at risk for overdose.[53] In addition to ensuring that peers are involved, establishing harm reduction programming in locations and venues that are easily and safely accessed by young adults can also improve treatment acceptance. For example, including harm reduction services in community pharmacies, in mobile units, and at venues where young people are likely to use drugs (eg, festivals, universities, and colleges) may improve service uptake.[54] Incorporating harm reduction education into health curriculum and services in schools has also been attempted and requires further study.[55]

Although young adults use social networking sites at high rates, and social media venues have been used effectively to recruit study participants, further studies are needed to understand whether these sites can serve as effective mediums for engaging young people who use drugs in harm reduction education and services.[56–58] Internet-based sexual health and risk reduction education has been used effectively to reach diverse young populations.[59] The Internet and social media may provide an opportunity to deliver overdose prevention and safe injection practice education to a broader group of young people who use drugs.

Despite barriers and obstacles, when harm reduction services are available and youth focused, young adults will access them.[14] In one study, high-risk youth who lived or spent time near a supervised consumption facility were more likely to use the services than young people using drugs who lived farther away.[60] Additionally, in other studies, young adults accessed naloxone[53] and fentanyl test strips if they were available at sites they used.[6] In addition to reducing harm from drug use, these programs also engage young people with the highest risk of drug-related harms.[61]

To ensure that programs for youth achieve the greatest public health impact, young people who use drugs must be involved at every level of harm reduction programming, including in planning, staffing, implementation, and evaluation, in all harm reduction programs designed for young adults.[62]

Practice Considerations

To ensure equitable access to harm reduction interventions for young adults, new harm reduction models, designs, and implementation are needed. Although existing harm reduction programs may make changes to improve access for young people, the evidence suggests that targeted programming will also be necessary. To achieve these goals, young adults will need to be trained as harm reduction peers and will need to develop the capacity to engage at every level of programming, including evaluation and dissemination. Additionally, there may be opportunities to integrate harm reduction–oriented peers into existing clinical settings, with the goal of improving clinical engagement. To effectively care for young adults who use drugs, clinicians will also need to establish relationships with community programs.

Young adults who use drugs face a wide array of sociopolitical, organizational, and structural barriers to accessing harm reduction services, including stigma and social condemnation associated with substance use, fear of law enforcement, and, in some settings, policies that restrict access on the basis of age. In a Joint United Nations Programme on HIV and AIDS technical report, it was found that many countries place age restrictions or requirements for parental consent on harm reduction services, which makes them effectively inaccessible for adolescents <18 years of age.[38] In addition, many harm reduction interventions are not youth centered and may be perceived as targeting an older population, which increases youth's reluctance to use these services.[38]

In the United States, federal and state laws prohibiting harm reduction programs and/or restricting access to funding have long impeded the implementation of such interventions, particularly in jurisdictions hardest hit by the opioid crisis. For example, expansion of harm reduction education in school health curriculum, nurse distribution of

harm reduction materials, and naloxone access in schools may require changes to local laws. Good Samaritan laws, which encourage individuals to call for help when witnessing an overdose, can encourage help-seeking and engagement by protecting witnesses from drug-related arrests. In locations where syringes are criminalized, fear of arrest may be even more pronounced, and individuals may avoid seeking out services. Supervised consumption spaces remain criminalized in the United States as well, although legal challenges are underway.[63] Many such laws are founded on the unsubstantiated belief that harm reduction programs promote substance use among young people. In these cases, program development must be paired with legal and political efforts to ensure that harm reduction interventions reach young people most at risk, including minors.

CONCLUSIONS

Given the scale and scope of the opioid crisis in the United States, it is past time for policy makers, public health professionals, and clinicians to support harm reduction programs commonplace in other countries, including syringe access, supervised consumption facilities, and drug-checking programs. Moreover, to reach a broader population of young people at risk, expansion of harm reduction approaches into nontraditional venues, such as pharmacies, schools, drop-in centers, clubs, social service agencies (including shelters), and online environments, should be considered.

Such interventions will often require strong community and institutional support and, in some cases, may necessitate changes to local or state laws. Pediatricians, family physicians, addiction medicine providers, and other clinicians who work with young adults will need to join these efforts. As screening and treatment of SUDs are increasingly integrated into medical settings, youth-focused clinicians will inevitably work with young adults who would benefit from harm reduction services. Although physicians are often not taught the principles of harm reduction in traditional medical training, they are nonetheless familiar with the pathophysiologic considerations underlying overdose and transmission of blood-borne diseases. They also routinely counsel young adults on other harm reduction approaches, such as using condoms during sexual intercourse. Thus, they are well poised to integrate harm reduction services for people who use substances into their medical practices. Given their clinical understanding of adolescent and early adult development, clinicians can also support community-based harm reduction programs in designing developmentally appropriate and youth-friendly services.

Ultimately, because young adults are among those most heavily impacted by the national addiction and overdose epidemics, organizers of both established and emerging harm reduction programs should identify ways to ensure that their programming is youth-friendly and, if possible, youth centered. Because youth are active agents in their own health promotion and in the broader community, the meaningful inclusion of young adults who use drugs in harm reduction planning, service delivery, and evaluation is paramount to the effectiveness and success of these programs.

ABBREVIATIONS

HCV: hepatitis C virus
OEND: overdose education and naloxone distribution
SUD: substance use disorder

REFERENCES

1. National Harm Reduction Coalition. Principles of harm reduction. Available at: https://harmreduction.org/about-us/principles-of-harm-reduction/. Accessed April 6, 2020
2. Hawk M, Coulter RWS, Egan JE, et al. Harm reduction principles for healthcare settings. *Harm Reduct J.* 2017;14(1):70
3. O'Hare P. Merseyside, the first harm reduction conferences, and the early history of harm reduction. *Int J Drug Policy.* 2007;18(2):141–144
4. Stockings E, Hall WD, Lynskey M, et al. Prevention, early intervention, harm reduction, and treatment of substance use in young people. *Lancet Psychiatry.* 2016;3(3):280–296
5. Walley AY, Xuan Z, Hackman HH, et al. Opioid overdose rates and implementation of overdose education and nasal naloxone distribution in Massachusetts: interrupted time series analysis. *BMJ.* 2013;346:f174
6. Krieger MS, Goedel WC, Buxton JA, et al. Use of rapid fentanyl test strips among young adults who use drugs. *Int J Drug Policy.* 2018;61:52–58
7. Brooner R, Kidorf M, King V, Beilenson P, Svikis D, Vlahov D. Drug abuse treatment success among needle exchange participants. *Public Health Rep.* 1998;113(suppl 1):129–139
8. Watters JK, Estilo MJ, Clark GL, Lorvick J. Syringe and needle exchange as HIV/AIDS prevention for injection drug users. *JAMA.* 1994;271(2):115–120
9. Vlahov D, Junge B, Brookmeyer R, et al. Reductions in high-risk drug use behaviors among participants in the Baltimore needle exchange program. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1997;16(5):400–406
10. Dunleavy K, Munro A, Roy K, et al. Association between harm reduction intervention uptake and skin and soft tissue infections among people who inject drugs. *Drug Alcohol Depend.* 2017;174:91–97
11. Fernandes RM, Cary M, Duarte G, et al. Effectiveness of needle and syringe programmes in people who inject drugs - an overview of systematic

reviews. *BMC Public Health*. 2017;17(1):309

12. Strathdee SA, Celentano DD, Shah N, et al. Needle-exchange attendance and health care utilization promote entry into detoxification. *J Urban Health*. 1999;76(4):448–460
13. Wood E, Tyndall MW, Zhang R, et al. Attendance at supervised injecting facilities and use of detoxification services. *N Engl J Med*. 2006;354(23):2512–2514
14. Marshall BDL, Green TC, Yedinak JL, Hadland SE. Harm reduction for young people who use prescription opioids extra-medically: obstacles and opportunities. *Int J Drug Policy*. 2016;31:25–31
15. Potier C, Laprévote V, Dubois-Arber F, Cottencin O, Rolland B. Supervised injection services: what has been demonstrated? A systematic literature review. *Drug Alcohol Depend*. 2014;145:48–68
16. Des Jarlais DC, Hagan H, Friedman SR, et al. Maintaining low HIV seroprevalence in populations of injecting drug users. *JAMA*. 1995;274(15):1226–1231
17. Bluthenthal RN, Anderson R, Flynn NM, Kral AH. Higher syringe coverage is associated with lower odds of HIV risk and does not increase unsafe syringe disposal among syringe exchange program clients. *Drug Alcohol Depend*. 2007;89(2–3):214–222
18. Platt L, Minozzi S, Reed J, et al. Needle syringe programmes and opioid substitution therapy for preventing hepatitis C transmission in people who inject drugs. *Cochrane Database Syst Rev*. 2017;(9):CD012021
19. Gonsalves GS, Crawford FW. Dynamics of the HIV outbreak and response in Scott County, IN, USA, 2011-15: a modelling study. *Lancet HIV*. 2018;5(10):e569–e577
20. Broadhead RS, van Hulst Y, Heckathorn DD. The impact of a needle exchange's closure. *Public Health Rep*. 1999;114(5):439–447
21. Marshall BD, Milloy MJ, Wood E, Montaner JS, Kerr T. Reduction in overdose mortality after the opening of North America's first medically supervised safer injecting facility: a retrospective population-based study. *Lancet*. 2011;377(9775):1429–1437
22. DeBeck K, Kerr T, Bird L, et al. Injection drug use cessation and use of North America's first medically supervised safer injecting facility. *Drug Alcohol Depend*. 2011;113(2–3):172–176
23. Laing MK, Tupper KW, Fairbairn N. Drug checking as a potential strategic overdose response in the fentanyl era. *Int J Drug Policy*. 2018;62:59–66
24. Brooks HL, O'Brien DC, Salvalaggio G, Dong K, Hyshka E. Uptake into a bedside needle and syringe program for acute care inpatients who inject drugs. *Drug Alcohol Rev*. 2019;38(4):423–427
25. Rachlis BS, Kerr T, Montaner JSG, Wood E. Harm reduction in hospitals: is it time? *Harm Reduct J*. 2009;6:19
26. Monteiro J, Phillips KT, Herman DS, et al. Self-treatment of skin infections by people who inject drugs. *Drug Alcohol Depend*. 2020;206:107695
27. Harris RE, Richardson J, Frasso R, Anderson ED. Experiences with skin and soft tissue infections among people who inject drugs in Philadelphia: a qualitative study. *Drug Alcohol Depend*. 2018;187:8–12
28. Biancarelli DL, Biello KB, Childs E, et al. Strategies used by people who inject drugs to avoid stigma in healthcare settings. *Drug Alcohol Depend*. 2019;198:80–86
29. Bearnot B, Mitton JA, Hayden M, Park ER. Experiences of care among individuals with opioid use disorder-associated endocarditis and their healthcare providers: results from a qualitative study. *J Subst Abuse Treat*. 2019;102:16–22
30. Simon R, Snow R, Wakeman S. Understanding why patients with substance use disorders leave the hospital against medical advice: a qualitative study [published online ahead of print October 22, 2019]. *Subst Abus*. doi:10.1080/08897077.2019.1671942
31. Summers PJ, Hellman JL, MacLean MR, Rees VW, Wilkes MS. Negative experiences of pain and withdrawal create barriers to abscess care for people who inject heroin. A mixed methods analysis. *Drug Alcohol Depend*. 2018;190:200–208
32. Larochelle MR, Bernstein R, Bernson D, et al. Touchpoints - opportunities to predict and prevent opioid overdose: a cohort study. *Drug Alcohol Depend*. 2019;204:107537
33. Burr CK, Storm DS, Hoyt MJ, et al. Integrating health and prevention services in syringe access programs: a strategy to address unmet needs in a high-risk population. *Public Health Rep*. 2014;129(suppl 1):26–32
34. Cloud DH, Castillo T, Brinkley-Rubinstein L, Dubey M, Childs R. Syringe decriminalization advocacy in red states: lessons from the North Carolina Harm Reduction Coalition. *Curr HIV/AIDS Rep*. 2018;15(3):276–282
35. Kilmer B, Taylor J, Caulkins JP, et al. *Considering Heroin-Assisted Treatment and Supervised Drug Consumption Sites in the United States*. Santa Monica, CA: RAND Corporation; 2018
36. Heller D, McCoy K, Cunningham C. An invisible barrier to integrating HIV primary care with harm reduction services: philosophical clashes between the harm reduction and medical models. *Public Health Rep*. 2004;119(1):32–39
37. Drucker E, Anderson K, Haemmig R, et al. Treating addictions: harm reduction in clinical care and prevention. *J Bioeth Inq*. 2016;13(2):239–249
38. World Health Organization. *Technical Brief: HIV and Young People Who Inject Drugs*. Geneva, Switzerland: World Health Organization; 2015
39. Hadland SE, Wharam JF, Schuster MA, Zhang F, Samet JH, Larochelle MR. Trends in receipt of buprenorphine and naltrexone for opioid use disorder among adolescents and young adults, 2000-2014. *JAMA Pediatr*. 2017;171(8):747
40. Chatterjee A, Larochelle MR, Xuan Z, et al. Non-fatal opioid-related overdoses among adolescents in Massachusetts 2012-2014. *Drug Alcohol Depend*. 2019;194:28–31
41. Bagley SM, Hadland SE, Carney BL, Saitz R. Addressing stigma in medication treatment of adolescents with opioid use disorder. *J Addict Med*. 2017;11(6):415–416

42. Bagley SM, Larochelle MR, Xuan Z, et al. Characteristics and receipt of medication treatment among young adults who experience a nonfatal opioid-related overdose. *Ann Emerg Med*. 2020;75(1):29–38

43. Bassetti S, Battegay M. Staphylococcus aureus infections in injection drug users: risk factors and prevention strategies. *Infection*. 2004;32(3):163–169

44. Cedarbaum ER, Banta-Green CJ. Health behaviors of young adult heroin injectors in the Seattle area. *Drug Alcohol Depend*. 2016;158:102–109

45. Mateu-Gelabert P, Guarino H, Jessell L, Teper A. Injection and sexual HIV/HCV risk behaviors associated with nonmedical use of prescription opioids among young adults in New York City. *J Subst Abuse Treat*. 2015;48(1):13–20

46. Broz D, Pham H, Spiller M, et al. Prevalence of HIV infection and risk behaviors among younger and older injecting drug users in the United States, 2009. *AIDS Behav*. 2014;18(suppl 3):284–296

47. Fennema JS, Van Ameijden EJ, Van Den Hoek A, Coutinho RA. Young and recent-onset injecting drug users are at higher risk for HIV. *Addiction*. 1997; 92(11):1457–1465

48. Holtzman D, Barry V, Ouellet LJ, et al. The influence of needle exchange programs on injection risk behaviors and infection with hepatitis C virus among young injection drug users in select cities in the United States, 1994-2004. *Prev Med*. 2009;49(1):68–73

49. Bozinoff N, Small W, Long C, DeBeck K, Fast D. Still "at risk": an examination of how street-involved young people understand, experience, and engage with "harm reduction" in Vancouver's inner city. *Int J Drug Policy*. 2017;45: 33–39

50. Jenkins EK, Slemon A, Haines-Saah RJ. Developing harm reduction in the context of youth substance use: insights from a multi-site qualitative analysis of young people's harm minimization strategies. *Harm Reduct J*. 2017;14(1): 53

51. Calvo M, MacFarlane J, Zaccaro H, et al. Young people who use drugs engaged in harm reduction programs in New York City: overdose and other risks. *Drug Alcohol Depend*. 2017;178:106–114

52. Krug A, Hildebrand M, Sun N. "We don't need services. We have no problems": exploring the experiences of young people who inject drugs in accessing harm reduction services. *J Int AIDS Soc*. 2015;18(2, suppl 1):19442

53. Mitchell K, Durante SE, Pellatt K, Richardson CG, Mathias S, Buxton JA. Naloxone and the Inner City Youth Experience (NICYE): a community-based participatory research study examining young people's perceptions of the BC take home naloxone program. *Harm Reduct J*. 2017;14(1):34

54. Jones L, Pickering L, Sumnall H, McVeigh J, Bellis MA. Optimal provision of needle and syringe programmes for injecting drug users: a systematic review. *Int J Drug Policy*. 2010;21(5): 335–342

55. King R. Science over stigma: saving lives–implementation of naloxone use in the school setting. *NASN Sch Nurse*. 2016;31(2):96–101

56. Ramo DE, Prochaska JJ. Broad reach and targeted recruitment using Facebook for an online survey of young adult substance use. *J Med Internet Res*. 2012;14(1):e28

57. Chiauzzi E, Dasmahapatra P, Lobo K, Barratt MJ. Participatory research with an online drug forum: a survey of user characteristics, information sharing, and harm reduction views. *Subst Use Misuse*. 2013;48(8):661–670

58. Katz N, Fernandez K, Chang A, Benoit C, Butler SF. Internet-based survey of nonmedical prescription opioid use in the United States. *Clin J Pain*. 2008; 24(6):528–535

59. Guse K, Levine D, Martins S, et al. Interventions using new digital media to improve adolescent sexual health: a systematic review. *J Adolesc Health*. 2012;51(6):535–543

60. Hadland SE, DeBeck K, Kerr T, et al. Use of a medically supervised injection facility among street youth. *J Adolesc Health*. 2014;55(5):684–689

61. Paterson BL, Panessa C. Engagement as an ethical imperative in harm reduction involving at-risk youth. *Int J Drug Policy*. 2008;19(1):24–32

62. Henderson M. On the ground: programmes serving the needs of key populations. 2014. Available at: https://apps.who.int/iris/bitstream/handle/10665/145002/WHO_HIV_2014.50_eng.pdf;jsessionid=B5F38279954DE062618C4786370E6DFF?sequence=1. Accessed October 16, 2019

63. Gostin LO, Hodge JG Jr., Gulinson CL. Supervised injection facilities: legal and policy reforms. *JAMA*. 2019;321(8): 745–746