



Harm Reduction Strategies for Opioid Use Disorder

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Abstract

Purpose of Review This article explores the history, philosophy, and applications of harm reduction strategies for opioid use disorder (OUD). By addressing foundational principles and evidence-based interventions, the review aims to provide a comprehensive understanding of harm reduction's role in mitigating the health and social harms associated with opioid use.

Recent Findings Harm reduction strategies such as syringe service programs, naloxone distribution, drug testing, and supervised consumption sites have demonstrated efficacy in reducing myriad opioid related harms. Recent data underscore the importance of tailoring these interventions to address the evolving drug supply, including fentanyl contamination, and extending access to marginalized populations. Legal and social barriers continue to limit widespread adoption in many cases.

Summary Harm reduction is a vital approach for addressing OUD, combining pragmatic care with social justice. Expanding the reach of these strategies through evidence-based implementation and policy reform can reduce stigma, improve health outcomes, and foster equitable access to care.

Keywords Harm reduction · History of harm reduction · Syringe service program · Naloxone distribution · Drug testing · Supervised consumption site

Introduction

Harm reduction is a social justice movement, public health strategy, and treatment philosophy aimed at reducing the morbidity and mortality associated with drug use. Rather than emphasizing a goal of abstinence, harm reduction recognizes that drug use is integral to our culture, and as such, will never be fully abolished. Instead, harm reduction innovates an ever-evolving set of strategies dedicated to improving the health and quality of life of people who use drugs rather than aiming to eliminate drug use entirely. Broadly, these strategies range from safer use, to managed use, to abstinence, and orient themselves around the

mantra of “meeting people where they’re at.” As applied to the modern drug overdose epidemic, particularly from opioids, these strategies have been leveraged in the development of syringe service programs, naloxone distribution, drug testing, and supervised consumption sites. These initiatives have led to decreases in overdose deaths, decreases in the transmission of infectious diseases, and improvement in social and occupational functioning. As a public health strategy, harm reduction amplifies grass-roots efforts to enact law and policy change that reduce drug-related harms.

The History and Philosophy of Harm Reduction

Harm reduction has evolved as both a response to systemic inequities and a challenge to traditional punitive approaches to substance use. Rooted in social justice and public health, it emerged alongside broader civil rights and activist movements, advocating for the dignity and well-being of marginalized populations. By addressing the criminalization and stigmatization of substance use, harm reduction philosophies prioritize pragmatism, individual autonomy, and incremental progress toward better health outcomes. These

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historical and philosophical foundations of harm reduction continue to inform current practices and policies designed to mitigate the harms associated with drug use.

Defining Harm Reduction

In its provision of non-judgmental and non-coercive services and resources to people who use drugs, harm reduction privileges principles of humanism, pragmatism, individualism, autonomy, incrementalism, and accountability without termination of care. Humanism emphasizes the care of, and respect for patients as individuals, along with an understanding that moral judgements do not advance health outcomes. In contrast to moralism or puritanism, pragmatism offers the practical view that perfect health behaviors are out of reach for all, that the goal of care should instead be reduction of harm. It also acknowledges that providers may experience a degree of moral ambiguity as they work to support and temper complex health behaviors.

Individualization speaks to the diverse range of strengths and needs for each patient, and argues against a universal treatment protocol. Autonomy implicates individual patient choice and works towards patient-driven and shared decision-making. Incrementalism posits that any positive change is a step forward, and understands that trajectories can move forwards, backwards, or plateau. Accountability without termination captures the idea that patients are ultimately responsible for their behavioral choices, and that patients are not abandoned or penalized for backwards movement [1].

Harm Reduction and Drug Policy

The history of harm reduction is deeply entangled with the history of drug policy in the United States, which has historically penalized drug use. Beginning with the Harrison Narcotics Act of 1914, requiring manufactures and distributors of narcotics to register with the Bureau of Internal Revenue, Congress sought to limit access to opioids and other controlled substances [2–3]. In 1919, the Volstead Act led to the establishment of the Bureau of Prohibition, involved in enforcing the prohibition of alcohol, as well as a Narcotics Division that enforced restrictions placed on opiates by the Harrison Narcotics Act. By this time, ambulatory clinics had been created to treat those struggling with opioid use, but the Narcotics Division effectively closed these ambulatory clinics and persecuted individual physicians who treated patients with OUD [4].

In its emphasis on penalization and persecution, the Volstead Act helped lay the groundwork for the public perception of drug use as a moral failing. The Federal Bureau of Narcotics was then created in 1930, and the Drug

Enforcement Administration (DEA) followed in 1973. The criminalization of drug use has since hinged on the idea that addiction violates fundamental “ideals of manhood, morality, and mental health,” a belief that has subsequently shaped healthcare, public policy, and the law [5].

The 1960’s and 1970’s saw both the development of further strict legislation, as well as enhanced efforts to investigate effective treatment for addiction. The Narcotic Addiction Rehabilitation Act of 1966 allowed those with OUD to be civilly committed for mandated treatment, while the Controlled Substances Act of 1970 established the tiered controlled substance scheduling system still in use today. The following year, President Nixon cited substance use as “public enemy number one” and officially declared the “War on Drugs” in 1971.

Shortly after this declaration, the surge to provide treatment for patients with substance use disorders led to the establishment of the Alcohol, Drug Abuse, and Mental Health Administration in 1973, now known as the Substance Abuse and Mental Health Services Administration (SAMHSA). This umbrella organization oversees several organizations tasked with developing evidenced-based treatments, and led to the eventual development of methadone as the first effective treatment for OUD [6]. Yet out of fear of supply mismanagement, access to methadone was rapidly curtailed by the Diversion Control Act, which restricted methadone prescription to federally regulated Opioid Treatment Programs, commonly known as “methadone clinics”, that required, and continue to require, routine in-person visits to obtain treatment. Once developed, buprenorphine also faced restrictions including patient caps for prescribing providers and X-waiver requirements that endured until 2023, a change fueled by the COVID-19 pandemic.

Historical Origins of Harm Reduction

As legislative efforts to penalize drug use mounted, harm reduction emerged in part as reparations work—a movement designed to treat drug use in the face of wide criminalization and social discrimination. The National Harm Reduction Coalition identifies the inspiration for harm reduction as arising from activist movements emerging across the United States in the 1960s and 1970s, including the Black Panther Party’s survival programs such as Free Breakfast for Children, the woman’s health advocacy for reproductive rights, and the Young Lords’ creation of an acupuncture program for heroin users in the South Bronx [7–8].

In response to an intensifying drug crisis, and failed by mainstream medical institutions, a 1970 alliance of Black, Latinx, and White members at a South Bronx drug treatment program called Lincoln Detox began using acupuncture as an alternative to methadone—an integration of medical

practice with the social praxis of “serving the people, body and soul” [9]. During the AIDS crisis in the 1980’s and 1990’s, groups rooted in the LGBTQ+ and Black communities began providing syringe service programs (SSPs) to reduce disease transmission and to educate the public about safer methods of drug use; these programs also provided substance use treatment and education on overdose prevention. The propellant force behind these movements was, and continues to be, the mobilization of public health approaches towards the advancement of social justice.

From its genesis, harm reduction has been deeply implicated in addressing health inequity—the disproportionate ways in which drug use affects minority and disadvantaged communities. While health inequality describes overarching disparities in health outcomes, health inequities refer to disparities specially stemming from unjust and often racialized systemic policies and practices [10]. Since the COVID-19 pandemic, drug overdose death rates among Black individuals surpassed those of White individuals for the first time since the first wave of opioid overdose deaths in 1999, from 24.7 per 100,000 in 2019 to 36.8 per 100,000 in 2020—16.3% higher than White individuals in 2020 [11]. Underlying this statistic is differential access in treatment by income, race, and ethnicity; for instance, an examination of New York City neighborhoods showed that rates of buprenorphine access were significantly higher in areas with the highest income and lowest among Black, Hispanic, and low-income residents [12].

Moreover, harsh policies have created a system in which Black, Brown, and Indigenous people face higher rates of police raids, drug arrests, and disproportionate sentencing, further widening the chasm of drug-related harm [13, 14]. While harm reduction strategies and principles were developed in the context of the civil rights movement, attention to race and anti-racist practices remains as vital as ever. To address disparities, one call has been to imbed structural determinants of health indices into clinical practice in order to fortify the reach of harm reduction strategies for racially minoritized individuals [15].

Philosophy of Harm Reduction - Applied

Harm reduction as a humanizing orientation towards the relief of suffering has led to numerous approaches to reduce morbidity and mortality across a variety of health domains. For instance, the decriminalization of commercial sex work has been identified as an important harm reduction strategy to protect sex workers [16]. In addition, the two-dose smallpox vaccine has been proposed as a method to reduce m-pox transmission in sex workers, either to offer protection or as post-exposure prophylaxis (PrEP) [17]. A proposed approach to first-trimester abortion has included

teaching women to self-administer misoprostol, rather than resorting to self-instrumentation or abdominal trauma [18].

But perhaps the area of medical care that has been most transformed by adoption of harm reduction principles is addiction treatment. A broad spectrum of novel and creative harm reduction approaches have been developed, and while they have frequently met resistance to implementation, they are gaining greater recognition and acceptance [19]. Harm reduction strategies in drug use include the recommendation for PreEP for HIV as part of disease prevention for people who inject drugs. Mobile clinics have been used to deliver healthcare services including buprenorphine initiation and harm reduction supplies [20–21].

Harm Reduction and Opioid Use Disorder

The history and philosophy of harm reduction provide a crucial foundation for understanding its practical applications in addressing substance use disorders. While harm reduction principles aim to alleviate the broader harms of substance use, they also inform specific, evidence-based strategies tailored to opioid use disorder (OUD). These strategies seek to mitigate risks associated with opioid use, improve health outcomes, and bridge individuals toward recovery without requiring immediate abstinence. In this section, we explore six key harm reduction interventions: syringe service programs, naloxone distribution, drug testing, and supervised consumption sites. Each highlights the adaptability and effectiveness of harm reduction in reducing the morbidity and mortality associated with OUD while addressing social and systemic challenges.

Syringe Service Programs

Syringe service programs (SSPs) originated in response to the AIDS epidemic of the 1980s, becoming one of the first widely implemented and well-publicized harm reduction measures [22]. The primary aim of SSPs is to provide access to sterile drug injection equipment, thereby reducing the transmission of bloodborne infections, particularly HIV and Hepatitis C. Initially, SSPs followed a “one-for-one” model, exchanging sterile syringes for used ones. However, most programs now distribute sterile syringes without requiring an exchange. Additionally, SSPs often provide education on safe injection practices and referrals to social services and treatment programs.

Since their proliferation in the 1980s and early 1990s, SSPs have been extensively studied, and their efficacy in reducing infectious disease transmission is well-established. Research demonstrates that individuals who use SSPs experience significantly reduced rates of HIV and Hepatitis C

transmission [23–24]. Beyond disease prevention, SSPs can serve as a gateway to addiction treatment and other support services as well. For example, studies have found that participants in SSPs are 75% more likely to reduce drug use, are five times more likely to enter treatment, are over three times more likely to achieve drug abstinence as compared to non-participants [25–26]. These findings underscore the dual role of SSPs as harm reduction tools and pathways to recovery.

Despite these benefits, SSPs have faced significant legal and social barriers. Some state and local laws restrict their implementation, and federal support remains limited. The benefits of SSPs were recognized on a national level in 2016 with passage of the Federal Consolidated Appropriations Act, which provided federal funding for SSPs; however, it explicitly prohibited the use of these funds to purchase needles or other drug-use paraphernalia. Misconceptions about SSPs also hinder their expansion, with critics mistakenly claiming that they promote drug use or crime. However, studies consistently refute these claims, showing no association between SSPs and increased crime, substance use, or public drug use.

Naloxone Distribution

Naloxone, a potent mu-opioid receptor antagonist, has become a cornerstone of harm reduction efforts aimed at reducing opioid overdose deaths. When administered during an overdose, naloxone can quickly reverse opioid effects, providing a critical opportunity to save lives. Naloxone is typically available as a nasal spray or in vials for intramuscular or subcutaneous injection. In addition to the medication itself, distribution programs often include education on overdose prevention and response.

Numerous studies have shown the benefits of naloxone distribution programs. Community-based initiatives have been shown to significantly reduce opioid overdose mortality rates with minimal adverse events [27]. For example, Canada's free naloxone programs, implemented nationwide since 2016, have demonstrated widespread success, with studies linking increased access to reductions in opioid-related fatalities [28–29].

Initially focused on individuals who use opioids, naloxone programs have expanded to equip laypersons, including family members, friends, and community members. Research shows that non-medical individuals can effectively assess overdoses and administer naloxone, challenging the misconception that overdose reversal requires advanced medical training [30]. Some programs even train and equip children as young as six to administer naloxone, empowering them to potentially save family members [31].

Furthermore, the landscape of naloxone distribution has shifted along with that of the rapidly changing illicit drug market. During this current Fourth Wave of the drug overdose epidemic, illegal drugs being advertised as stimulants, benzodiazepines, and even cannabis, increasingly contain fentanyl, putting those who use these drugs at increased risk of opioid overdose [32]. In fact, many naloxone distribution programs, including large organizations such as the Veterans Health Administration are advocating that naloxone be given out to all patients with an active substance use disorder other than tobacco use disorder [33].

Drug Testing

Drug testing technologies, particularly tools that detect fentanyl and other adulterants, represent an emerging harm reduction strategy. The rapid proliferation of potent synthetic opioids like fentanyl has dramatically increased overdose risk, as these substances are often covertly mixed into the drug supply.

Fentanyl test strips (FTS), which utilize immunoassay technology, are small, inexpensive, and highly effective, with a sensitivity of 98.5% and specificity of 89.2% [34]. Costing under \$2 per test and providing results within minutes, FTS empower individuals to make informed decisions about drug use. FTS have been associated with safer behaviors, such as avoiding fentanyl-contaminated substances or using with a partner to who can respond to an emergency if needed.

FTS have been generally well adopted by people who use drugs. Utilizing FTS has been associated with increases in positive safety behaviors [35]. Although the safety, accuracy, and feasibility of FTS has been demonstrated, as a relatively recent technology the association of FTS availability with reduced overdose mortality has yet to be established [36]. In addition to testing for the presence of fentanyl, immunoassay drug testing technology is starting to be implemented for other adulterants such as xylazine [37].

Similar to other harm reduction measures, widespread implementation of drug testing has faced challenges. In some jurisdictions, FTS are classified as drug paraphernalia, restricting their availability. This inconsistent regulatory landscape creates confusion and impedes broader adoption [38]. Federal agencies have expressed support for FTS but lack a unified stance on their distribution or regulation [39–40].

Supervised Consumption Sites

Supervised consumption sites (SCSs) are facilities where individuals can use drugs under the supervision of trained medical staff. These sites provide sterile injection equipment

and monitor for signs of overdose, administering naloxone or arranging emergency care as needed. SCSs often offer additional services, including mental health counseling, peer support, and addiction treatment referrals.

Evidence from established SCSs highlights their effectiveness. For instance, the first North American SCS in Vancouver, Canada, was associated with a 26% reduction in local overdose deaths [41]. People who utilize SCS have an increased rate of utilizing services such as addiction treatment and medical care [42]. Importantly, SCSs achieve these outcomes without increasing crime or public nuisance [43].

Despite their proven benefits, SCS implementation in the U.S. has been contentious. While Europe established SCSs as early as the 1980s, the U.S. did not open its first officially sanctioned sites until 2021, following prolonged legal battles. Currently, only two recognized SCSs operate in the U.S., both in New York City, although proposals for additional sites are under consideration. In the interim, some individuals use unsanctioned or underground SCSs, which still likely provide some measure of overdose protection [44].

Civil Commitment

Civil commitment is a form of involuntary commitment that allows the judicial court system to mandate an individual to SUD treatment in a medically supervised setting. This treatment approach is typically used when other options have been exhausted, and the criteria for involuntary psychiatric treatment are otherwise met: criteria capture individuals who are “gravely disabled,” or who pose a threat to self/other due to cognitive deficits related to substance use [45]. Civil commitment laws differ by state and vary widely in terms of diagnostic requirements, treatment type (ex. outpatient or residential), mandated treatment duration, and type of treatment.

This heterogeneity significantly challenges efforts to establish the effectiveness of civil commitment laws in SUD outcomes. For instance, data from three linked prospective cohort studies of people who use drugs in Canada found no statistically significant reductions in outcomes for those mandated to treatment, those attending voluntary treatment, and those receiving no treatment [46]. In the US, a retrospective study found that in the post-COVID era, rates of opioid overdose deaths from 2010 to 2021 increased at a faster rate in states with civil commitment laws compared to states without civil commitment laws [47]. This difference may reflect heightened vulnerability to overdose following a period of abstinence or initiation of MOUD treatment, or may be purely correlary: i.e. these laws may have been

enacted as an emergency response in states with already-escalating rates of drug overdose deaths.

In individuals committed to substance use treatment in lieu of criminal justice involvement, rates of overdose and crime recidivism after release from compulsory treatment are high [48]. While civil commitment laws may offer short-term relief to a vulnerable population, the long-term benefit of civil commitment practices as a harm reduction strategy in SUD has yet to be established.

Harm Reduction to Non-Users

While harm reduction strategies have traditionally focused on reducing harm to individuals who use drugs, emerging data has highlighted ways in which individuals peripherally exposed to drug use are affected. Much like tobacco smoking, opium smoking can lead to second- and third-hand exposures. Second-hand exposure refers to directly inhaling air in which opium has been exhaled. Third-hand exposure reflects physical contact with residues left behind on surfaces after smoking. A technical report prepared for the US Department of State’s Bureau For International Narcotics and Law Enforcement Affairs examined the effects of second- and third-hand exposures to opium smoke in 50 unique homes in Afghanistan - which at the time of publication produced 90% of the world’s supply of opium. The report found significant concentrations of opium products (morphine and codeine) as well as heroin metabolites in the air, in residents’ hair (including children as young as 9 months), and on home surfaces of those smoking opium [49]. Research on harm reduction strategies for second- and third-hand exposures to opium is limited, and represents an important area of further study.

Similarly, open-air drug use has been criticized for exposing non-users (including minors) to the visible landscape of drug use. Visibility is made increasingly accessible by the exploitation of video coverage of people who use drugs on social media platforms. A recent trend involves TikTokers traveling to Philadelphia’s Kensington Avenue (touted as the East Coast’s largest open-air drug market) to film viral videos of people using drugs in a “dark and voyeuristic type of content creation referred to as ‘tranq tourism’” [50–51]. The dissolution of homeless encampments by involuntary displacement is a primary means by which municipalities attempt to reduce homelessness visibility, which leads to adverse consequences for those displaced [52]. A cohort microsimulation model estimating the long-term health outcomes of involuntary displacement for people who inject drugs in 23 cities projected that compared to “no displacement,” “continual involuntary displacement” led to between 15.6% and 24.4% additional deaths over a 10-year period [53]. Public health policies that prioritize safe sheltering,

known as harm reduction housing (HRH), offer co-located harm reduction services and OUD treatment without requiring abstinence. These policies adhere to a “housing first” approach optimize harm reduction for both users and non-users [54].

Implications of Harm Reduction Strategies

Overall, harm reduction strategies save lives and improve morbidity. A prospective cohort analysis of people newly prescribed MOUD through harm reduction and homeless services programs demonstrated a significant decrease in annual mortality rate in the intervention group relative to the comparison group (0.45% versus 2.2%), while emergency department overdoses did not differ [55]. A retrospective observational study in the province of Alberta found that after the opening of a safe consumption site, opioid-related emergency departments visits decreased by 20% per month in Calgary, and opioid-related deaths decreased by 55% per month in Edmonton. Yet contextual variations, such as differences in drug supply, can vary harm reduction outcomes even in municipalities utilizing similar interventions. For instance, the same study observed that following the implementation of a community-based naloxone program in urban Alberta, emergency department visits increase by 46% and urban opioid-related deaths increased by 40% - results that may be related to illicit drug supply toxicity [56].

It is likely that a layering of harm reduction strategies is more effective than stand-alone interventions. A Connecticut simulation study of the impact of combined harm reduction strategies (specifically, maximally scaling up naloxone distribution and augmenting MOUD access in the community) found that 5-year overdose deaths can be reduced by 33% while saving \$338,000 per capita over a lifetime [57].

Conclusion

Harm reduction is a pragmatic and compassionate approach that prioritizes the dignity and well-being of individuals with substance use disorders. Rooted in social justice and public health, it offers practical strategies that mitigate the risks of substance use while providing pathways to recovery. The strategies discussed—syringe service programs, naloxone distribution, drug testing, supervised consumption sites, harm reduction measures targeted towards non-users, and possibly civil commitment—are effective in reducing overdose deaths, disease transmission, and other harms associated with opioid use.

Despite significant legal and social barriers, harm reduction remains a critical tool in addressing the opioid crisis. Its continued success will depend on evidence-based

implementation, policy reform, and a sustained commitment to meeting individuals where they are. By expanding harm reduction strategies, we can reduce stigma, save lives, and create a more equitable and effective public health response.

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Declarations

Human and Animal Rights and Informed Consent No animal or human subjects by the authors were used in this study.

Competing Interests The authors declare no competing interests.

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