# Between Emergency Department Visits: The Role of Harm Reduction Programs in Mitigating the Harms Associated With Injection Drug Use

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Injection drug use is a major public health problem in the United States. Cocaine, heroin, and methamphetamine are the most commonly injected illicit drugs, whereas opioids are responsible for the majority of overdose fatalities. Although recent emergency department (ED) efforts have focused on expanding capacity for buprenorphine induction for opioid use disorder treatment, the injection of illicit drugs carries specific health risks that require acknowledgment and management, particularly for patients who decline substance use treatment. Harm reduction is a public health approach that aims to reduce the harms associated with a health risk behavior, short of eliminating the behavior itself. Harm-reduction strategies fundamental to emergency medicine include naloxone distribution for opioid overdose. This clinical Review Article examines the specific health complications of injection drug use and reviews the evidence base for 2 interventions effective in reducing morbidity and mortality related to drug injection, irrespective of the specific drug used, that are less well known and infrequently leveraged by emergency medicine clinicians: syringe service programs and supervised injection facilities. In accordance with the recommendations of health authorities such as the Centers for Disease Control and Prevention, emergency clinicians can promote the use of harm-reduction programs in the community to reduce viral transmission and other risks of injection drug use by providing patients with information about and referrals to these programs after injection drug use–related ED visits. [Ann Emerg Med. 2021;77:479-492.]

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## INTRODUCTION

Injection drug use is a major public health problem in the United States, with harmful health effects on persons who inject drugs. A meta-analysis combining survey data found that the lifetime prevalence of injection drug use in the United States is 2.6% (95% confidence interval [CI] 1.8% to 3.3%).[1] Men inject drugs more frequently than women, with lifetime use of 3.6% (95% CI 2.4% to 4.8%) compared with 1.6% (95% CI 1.1% to 2.0%), respectively. These estimates place the number of US persons who have ever injected any drug at approximately 6.6 million (range 4.6 to 8.6 million).

In the last 2 decades, there has been an increase in injection-related overdose deaths. Total overdose deaths were 16,849 in 1999 and have increased every year to 70,237 in 2017, an increase of greater than 400%.[2] From 2003 to 2013, heroin use more than doubled,[3] and by 2017, approximately 68% of overdose deaths involved an opioid.[2] Prescription opioids were responsible for most deaths between 1999 and 2009, with heroin increasingly responsible for overdose deaths starting in 2010 and illicitly manufactured fentanyl contributing an increasing proportion of deaths after 2013, both typically injected.[4] Data from the National HIV Behavioral Surveillance system indicate that the use of methamphetamine as the most frequently injected drug increased from 2.1% in 2005 to 29.6% in 2015 among persons who inject drugs in Denver.[5] Furthermore, concurrent heroin and methamphetamine injection was common (50%) and associated with a 2.8-fold (95% CI 1.7 to 4.5) increase in overdose risk compared with heroin-only injection.[5]

According to the 2011 data report from DAWN, the Drug Abuse Warning Network, there were 1.25 million emergency department (ED) visits involving illicit drug use nationwide. Cocaine (40.3% of these ED visits), heroin (20.6%), and methamphetamine (12.8%) were the most commonly injected illicit drugs. Concurrent use of alcohol or mixing of illicit drugs frequently complicated illicit drug use–related ED visits, with 27.9% of visits also involving alcohol and 56.3% involving multiple drugs.[6] One recent multisite study found concurrent methamphetamine use in 38% of ED patients with untreated opioid use disorder, and 79% reported drug injection in the preceding 30 days compared with 47% of those without concurrent methamphetamine use.[7]

**Table 1.** Commonly injected drugs.

| Drug Name | Street Names | Intoxication Symptoms | Long-term Health Risks |
|---|---|---|---|
| Heroin | Big H | Analgesia | Addiction |
| | Dope | Dry mouth | Insomnia |
| | Hell dust | Euphoria | Constipation |
| | Horse | Flushed, clammy skin | Mental disorders |
| | Smack | Impaired coordination | Sexual dysfunction |
| Fentanyl | Apache | Nausea and vomiting | Respiratory failure |
| | China girl | Severe itching | Risks of chronic opioid injection (while sedated): |
| | Dance fever | Sedation | Vessel injury/scarring |
| | Goodfella | Weakness | Infective endocarditis (tricuspid valve most commonly affected) |
| | Jackpot | Respiratory depression | Skin infections |
| | Murder 8 | Respiratory arrest | |
| | TNT | | |
| | Tango & Cash | | |
| Ketamine | Cat valium | Analgesia | Addiction |
| | Dorothy | Delirium | Anxiety |
| | Kit kat | Dissociation | Cognitive difficulties |
| | Special K | Hallucinations | Depression |
| | Vitamin K | Impaired motor function | Memory loss |
| | | Impaired memory | Nausea |
| | | Respiratory depression | Paresthesia |
| | | Respiratory arrest | Tremors |
| Cocaine | Blow | Anxiety | Addiction |
| | Coke | Euphoria | Cardiovascular disease (myocardial infarction, stroke) |
| | Crack | Feeling of exhilaration | Hypertension |
| | Rock | Increased energy | Insomnia |
| | Snow | Irritability | Seizures |
| Amphetamine | Bennies | Mental alertness | Tremors |
| | Black beauties | Panic | Weight loss |
| | Speed | Paranoia | Risks of methamphetamine specifically: |
| | Truck drivers | Psychosis | Bruxism, xerostomia, and severe dental disease (“meth mouth”) |
| | Uppers | Reduced appetite | |
| Methamphetamine | Ice | Violent behavior | |
| | Crystal | | |
| | Fire | | |
| | Glass | | |
| | Meth | | |

Source: National Institute on Drug Abuse, National Institutes of Health, US Department of Health and Human Services; https://www.drugabuse.gov/sites/default/files/cadchart.pdf and https://www.drugabuse.gov/sites/default/files/rx_drugs_placemat_508c_10052011.pdf.

The symptoms and long-term health complications of illicit drug use vary (Table 1); however, irrespective of the drug used, there are important health risks associated with the practice of injection itself; namely, transmission of blood-borne viral pathogens because of needle sharing, inoculation of bacterial pathogens because of inadequate skin preparation and use of contaminated injection equipment, and vessel injury because of worn needles and poor technique during rushed and under-the-influence injections.

The risk for transmission of blood-borne viral infections is an important consequence of poor access to sterile injection equipment and skin-cleansing supplies. Hepatitis C virus infection is the most prevalent one associated with contaminated needle use. In 2014, an estimated 43.1% of persons who injected drugs and were aged 40 to 65 years in the United States were infected with hepatitis C virus.[1] Additionally, approximately 2.1% of all persons who injected drugs were estimated to be living with HIV infection.[1] Paraphernalia laws and lack of access to sterile injection equipment are recognized key contributing factors in local hepatitis C virus/HIV outbreaks.[8-10] Bacterial inoculation resulting from contaminated drug preparation equipment, inadequate injection site skin cleansing, and nonsterile needle use can lead to a range of infectious complications, from cutaneous infections (eg, cellulitis, skin abscess) to bacteremia to infections caused by

hematogenous seeding of bacteria (eg, infective endocarditis, septic arthritis, vertebral osteomyelitis, epidural abscess). Cases of injection drug use–related infective endocarditis have increased alongside increasing injection heroin use.[11] In one study of a national all-payer inpatient health care database, hospitalizations for injection drug use–related infective endocarditis as a proportion of all infective endocarditis hospitalizations increased from 7% to 12% between 2003 and 2013.[12] In general, infective endocarditis requires intravenous antibiotic therapy, can lead to serious complications (eg, congestive heart failure, septic embolism, sepsis), and can result in prolonged hospitalization and cardiac valve replacement surgery. Injection drug use–related infective endocarditis has specifically been found to result in longer lengths of stay, increased readmission for septicemia, and higher rates of cardiac surgery compared with noninjection drug use infective endocarditis.[11,12]

## HARM REDUCTION: A PUBLIC HEALTH APPROACH

Harm reduction is a public health approach that aims to reduce the harms associated with health risk behaviors, short of eliminating the behaviors themselves.[13] At its core, harm reduction is the nonpunitive provision of services and resources that minimize the negative effects of drug use and promote health and social inclusion.[14] Harm-reduction interventions can exert their influence at different levels of Frieden's health impact pyramid by addressing socioeconomic factors, changing the context to make default options healthier or safer, effectuating long-lasting protective interventions, implementing clinical interventions, and providing counseling and education.[15]

Measures to improve road safety and reduce the risk of driving are a prime example of a comprehensive harm-reduction strategy. An admittedly risky activity, driving is responsible for more than 32,000 motor vehicle crash fatalities annually.[16] Vehicle safety modifications such as 3-point seatbelts, air bags, and collapsible steering wheels have led to the manufacturing of safer vehicles and are long-lasting protective interventions developed to reduce crash-related morbidity and mortality.[17] Driver competency testing and licensing, annual vehicle inspections, and laws prohibiting driving under the influence are examples of strategies that change the context toward a safer driving society. Together, the manufacturing and distribution of vehicles with increasingly advanced safety technologies and the implementation and enforcement of policies that promote safe driving and adherence to vehicle safety standards can have a greater overall positive influence than either measure alone.[15]

A similar multipronged approach is needed to reduce the harms associated with illicit drug use. The American Society of Addiction Medicine defines addiction as "a primary, chronic disease of brain reward, motivation, memory, and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social, and spiritual manifestations."[18] Although abstinence from drugs is often touted as the solution,[19] an abstinence-only approach fails to address the neurobiologic and psychosocial underpinnings of the disease and has failed to improve health, resulting in increased morbidity and mortality.[13] Legislation, policies, procedures, programs, and other interventions with a primary focus of preventing or reducing the harms of drug use are necessarily independent of efforts toward abstinence.[20]

Existing harm-reduction interventions for illicit drug use exert their influence at various levels of Frieden's health impact pyramid (Figure 1).[15] Antidrug legislation, for example, changes the context by reducing access to drugs and prohibiting illicit drug use. The manufacturing and distribution of naloxone rescue kits is a long-lasting protective intervention against opioid overdose fatalities. Clinical interventions, specifically for opioids, include first-responder naloxone rescue kit training programs, end-user naloxone kit distribution to persons with opioid use disorder, fentanyl test strips, and medication-assisted treatment.

Clinical interventions for opioid use disorder and fatal opioid overdose have been extensively described and studied in the emergency medicine literature.[21-28] In contrast, there is a paucity of information available in the medical literature on harm-reduction interventions for the practice of injecting drugs; specifically, for the complications that occur irrespective of the specific drug injected. Following is a review of the 2 major counseling and education interventions currently available for improving the safety of drug injection and reducing morbidity and mortality related to injection drug use, syringe services programs and supervised injection facilities. Individual syringe services programs or supervised injection facilities have low population effect and high individual effort because they provide high-touch, one-on-one interventions that depend on accessing of their services and are limited to those persons who do so. As a broader network of syringe services programs/supervised injection facilities, however, these programs compose a critical intervention with the collective potential for high population influence, depending on more persons who inject drugs knowing

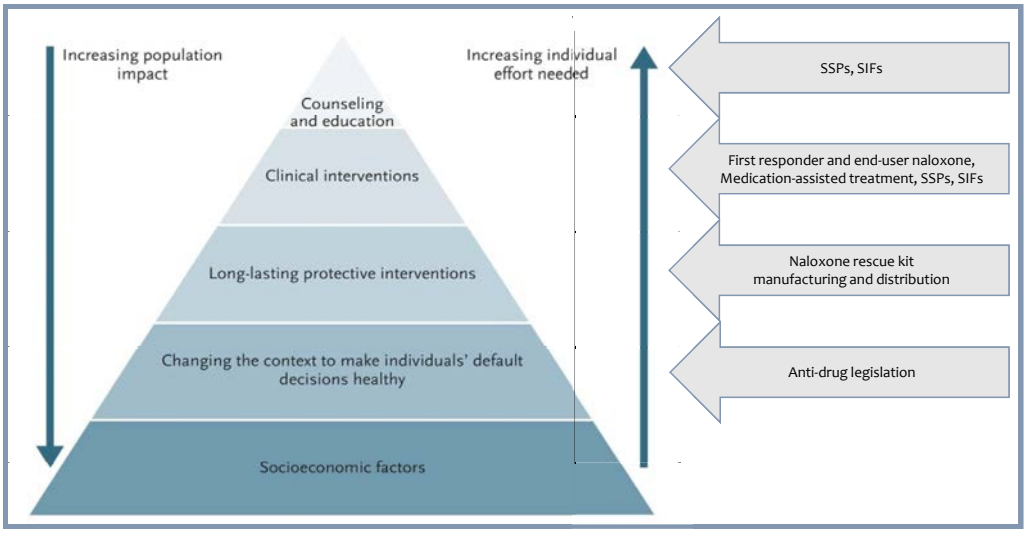


**Figure 1.** Adapted from Frieden TR. *Am J Public Health*, 2010. Health impact pyramid for injection drug use. *SSP*, Syringe services program; *SIF*, supervised injection facility.

about and accessing their services. Emergency physicians, nurses, and other ED-affiliated health paraprofessionals (eg, addiction specialists, peer recovery coaches, social workers, community health workers, health promotion advocates) can provide harm-reduction program information and referrals to their patients with injection drug use needs who decline substance use disorder treatment referral. Injection drug use–related ED visits offer opportunities to destigmatize injection drug use, provide nonjudgmental quality care to persons who inject drugs, and reduce injection drug use–related morbidity and mortality.

## SYRINGE SERVICES PROGRAMS

Syringe services programs are community based and provide sterile needles, syringes, and other injection equipment at no cost, as well as other services that benefit the broader community and persons who inject drugs. The Centers for Disease Control and Prevention (CDC) and US Department of Health and Human Services consider syringe services programs—also known as needle exchange programs, syringe access programs, and needle-syringe programs—an effective component in the prevention of HIV and other blood-borne infections.[29]

### History and Characteristics of Syringe Servises Programs

The World Health Organization has long recognized the utility of syringe services programs in decreasing the risk of infectious disease transmission among persons who inject drugs.[30] The first syringe services program can be traced to a pharmacist in Edinburgh, Scotland, who dispensed sterile injecting equipment during a hepatitis B and C virus outbreak from 1982 until 1984 when stopped by authorities.[31] The first official syringe services program was opened in 1983 in Amsterdam, the Netherlands, also in response to a hepatitis B virus outbreak.[32] The global HIV and AIDS epidemic of the 1980s helped fuel the establishment of syringe services programs across the world. In the United States, the first syringe services program opened in 1987 in New Haven, CT, although it was largely an underground operation because drug paraphernalia possession was illegal.[33] The first legal US program began in 1988 in Tacoma, WA, and in 1990, Hawaii established the first state-approved syringe services program.[33]

A variety of syringe services program models may simultaneously exist in a community, and the programs may work together to provide services.[34] Most often, syringe services programs are individual specialized ones that either stand alone or are embedded in other medical or social service programs. Not infrequently, retail pharmacies apply for and receive authorization to operate as syringe services programs and provide sterile syringes without prescriptions. Pharmacy programs may offer over-the-counter sale of syringes or accept claim vouchers provided by social service agencies. Voucher programs eliminate the purchasing cost of syringes for the client. Benefits of pharmacy programs include longer hours, mainstream locations, and availability of other services and products.

Staff discomfort and reluctance to provide the service can limit the effectiveness of pharmacy-based syringe access.[35] Other potential limiting factors include the lack of syringe disposal services and minimum or maximum syringe limits per transaction.[34,36]

There are 3 syringe transaction models: needs-based/negotiated distribution, strict one-for-one exchange, and one-for-one plus exchange. In the needs-based/negotiated distribution model, the program does not set a limit on the number of syringes a participant can receive regardless of the number of syringes they return. Strict one-for-one exchange programs provide participants with the exact number of syringes they return. These programs may use a voucher system so that, should a participant not want as many syringes as returned, the voucher can be used later to obtain additional syringes. The one-for-one plus exchange programs provide a predetermined number of extra syringes in addition to the ones provided as a one-to-one exchange. There are strengths and limitations to each syringe transaction model; however, the strict one-for-one model may be the most limiting.[37,38]

Additionally, programs can be fixed site or mobile. Fixed-site programs are located in a building or a specific location, including clinical settings, and work best when located in areas with large populations of persons who inject drugs. Benefits of fixed-site programs include predictable hours, integration of other services, computer-based systems support, space for privacy, shelter from weather, and on-site storage. Mobile programs go into the community on foot, bicycle, or motorized vehicle to provide services. Mobile units may roam the city or stop at specific locations at specified times. They may be independent or serve as the outreach street program of a fixed-site program. Benefits of mobile programs include ability to deliver services directly where people use drugs, flexibility of relocation to places of concern, informality, and ease of access.[37,38]

Some programs incorporate secondary or peer-delivery syringe distribution into their services. In this model, the syringe services program supplies syringes to persons who inject drugs to distribute to their peer networks and offers them syringe disposal options.[34,38] This model often provides commissioned peers a stipend for their services and works best in expansive geographic jurisdictions as part of a fixed-site program.[34]

All syringe services programs must provide needle disposal services and comply with all federal, state, and local regulations for medical waste. Programs are required to have policies and procedures for handling infectious waste and staff must be supervised for adherence.[34] Staff members and volunteers are provided with hepatitis B virus immunization, personal protective equipment, access to hand-washing stations, hand sanitizer, and proper cleaning supplies (eg, bleach). Rather than risk needlesticks by handling, staff are trained to estimate the number of returned needles and syringes by observation or by weight. Procedure protocols for accidental blood exposures are required.[34]

Most of the current data on syringe services programs come from a 2013 survey of syringe services program directors.[39] Researchers found that the West and Northeast had the highest number of syringe services programs, whereas the South had the lowest. Of the programs surveyed, 69% were urban, 20% rural, and 9% suburban. Rural syringe services programs exchanged fewer syringes than urban and suburban programs, and program budgets depended on the number of syringes exchanged. Mean annual budgets were $26,023 for rural, $116,902 for suburban, and $184,738 for urban syringe services programs. The majority of syringe services program clients were men. Whites composed the majority of participants across programs; however, urban syringe services programs reported considerably higher percentages of black and Hispanic participants. According to the survey, common services offered included HIV counseling and testing, hepatitis B and C virus testing, sexually transmitted infection screening, referral to infectious diseases treatment services, pregnancy testing, mobile needle exchange, secondary exchange, naloxone distribution, and referral to medication-assisted treatment programs.[39] Other possible services are listed in Table 2.

## Impact on Health

The greatest benefit of syringe services programs is the prevention of infectious disease transmission. In fact, the majority of syringe services programs were established in response to outbreaks. A global study in 1997 found that among 81 cities worldwide, HIV infection increased by 5.9% per year in 52 cities without syringe services programs and decreased by 5.8% per year in 29 cities with them.[40] Subsequent studies in the United States also found substantial reductions in HIV infections.[15,40,41] Indeed, the estimated incidence of HIV among persons who inject drugs decreased by approximately 80% from 1990 to 2006.[42] The Joint United Nations Programme on HIV/AIDS supports the use of syringe services programs and recommends distribution of 200 sterile syringes per injector per year to achieve a high level of coverage.[43]

Studies evaluating syringe services programs as a reduction strategy for hepatitis C virus transmission are of varying quality and design, and have demonstrated

**Table 2.** Range of services potentially provided by syringe services programs.

| Supply Dispensary | Client Service | Management/Referrals |
|---|---|---|
| Provision of sterile needles and other injection supplies (purchased with nonfederal funds) | Safe syringe disposal | Referral and linkage to HIV, viral hepatitis, STI, and TB prevention and treatment |
| Sterile water | HIV, viral hepatitis, STI, and TB screening | HIV pre-exposure prophylaxis (PrEP) |
| Alcohol pads/cotton balls | Pregnancy testing | HIV postexposure prophylaxis (nPEP) |
| Tourniquets | Wound care services | Referral and linkage to hepatitis A and B virus vaccination |
| Provision of drug preparation equipment (purchased with nonfederal funds) | Education and counseling | Referral and linkage to long-term substance use disorder treatment programs |
| Sterile water | Education on safe injection techniques | Referral to medical care, mental health services, and other support services |
| Cookers | Overdose prevention strategies counseling | Referral to obstetric care |
| Provision of naloxone | Education on proper naloxone rescue kit use | Referral to other community social service agencies |
| Provision of supplies for wound care | Substance use disorder counseling | |
| Provision of condoms and other forms of barrier protection | | |
| Provision of food items | | |

*HIV*, Human immunodeficiency virus; *STI*, sexually transmitted infection; *TB*, tuberculosis.

heterogenous, contradictory results.[39,42,44-47] A large Cochrane review and meta-analysis found that syringe services programs are associated with a 56% hepatitis C virus acquisition reduction in Europe, whereas an analysis of studies from North America failed to show a similar effect. The authors concluded that heterogeneity in study populations, study design, syringe services program restrictions, syringe services program exposure measurement, study limitations, and inconsistent study outcomes in North America probably accounted for the lack of effect.[48] Similar conclusions have been previously reached.[49]

## Individual and Community Benefits

Some studies have shown higher rates of participation and retention in substance use treatment programs among persons who inject drugs with syringe services programs compared with those not using the programs.[32] Additionally, syringe services programs facilitate access to the many other services that may be offered through these programs (Table 2).

Finally, syringe services programs provide a means of proper needle disposal to protect participants and staff from accidental needlestick injuries. In addition to on-site sharps containers, participants may be provided with portable ones. Such disposal programs can also reduce the number of syringes in the community, helping to protect the public. A study of the public safety influence of syringe services programs found 44 syringes per 1,000 census blocks in San Francisco compared with 371 syringes per 1,000 census blocks in Miami, a city with no syringe services program.[50] Unsafe public syringe disposal was 34 times more likely in the absence of syringe services programs.

## Barriers to Implementation and Effectiveness

Although syringe services programs can be implemented at a moderate cost, depending on the range of services offered, program costs and financial sustainability can be problematic. For almost 2 decades, federal funds could not be used to support syringe services programs, until 2015, when new legislation allowed the use of federal funds to purchase sterile syringes and needles "if the relevant State or local health department, in consultation with the CDC, determines that state or local jurisdiction, as applicable, is experiencing, or is at risk for, a significant increase in hepatitis infections or an HIV outbreak due to injection drug use, and such program is operating in accordance with State and local law."[51] It is unknown how many programs currently receive federal funding, and most programs rely heavily on state and local funding, both of which are notoriously unstable sources of financial support subject to drastic swings in budget priorities. Moreover, CDC and US Department of Health and Human Services guidelines,[51,52] as well as federal, state, and local regulatory demands, may place unyielding burdens on programs trying to become established. Finally, regarding accessibility, syringe services programs are more frequently located in urban and suburban areas even though the rural areas may have significant or equal need. In cases in which a rural program does exist, the actual physical location of the program may be a barrier to access because of lack of vehicle or public transportation options. Thus, funding sources and geographic location

continue to pose serious obstacles to both the implementation and effectiveness of syringe services programs.

Other barriers to syringe services program implementation include institutional and community opposition caused by a general public perception of substance use as a moral failing rather than a medical illness.[53,54] Institutional opposition includes drug paraphernalia laws and state or local laws that ban over-the-counter sales of needles. Community opposition often originates from stigmatizing perceptions of persons who inject drugs and fear of crime and a negative effect on local businesses. Disproportionate levels of drug law enforcement activity (eg, stops, confiscations, arrests) targeting persons who inject drugs at or near legal syringe services programs also limit their effectiveness.[55,56] Opposition to syringe services programs usually involves a combination of different players, and the contribution of each can change over time.

Organized local support is crucial and often directly responsible for syringe services program establishment. According to one study, higher proportions of men who have sex with men, the presence of the AIDS Coalition to Unleash Power, and a higher percentage of college-educated residents are independent predictors of syringe services program presence.[54] At the center of the first 2 predictors is a high level of concern for HIV prevention, whereas political or civic engagement and receptivity to scientific evidence explain the predictive value of college-educated residents.

## SUPERVISED INJECTION FACILITIES

According to CDC data, nationwide deaths owing to drug overdose reached a record 70,237 in 2017 and approximately two thirds of these were associated with opioids.[2] Supervised injection facilities—also known as safe injection sites, medically supervised safer injection facilities, drug consumption rooms, safe consumption sites, supervised consumption spaces, and overdose prevention sites—are a harm-reduction strategy that aims to reduce the risk of unintentional lethal overdose associated with illicit injection drug use. Although the main goal of supervised injection facilities is to reduce drug overdose fatalities, they provide many of the other harm-reducing services also available through syringe services programs (Table 2).

### History and Characteristics of Supervised Injection Facilities

Supervised injection in drug consumption rooms was first implemented as a harm-reduction strategy in the mid-1980s in Berne, Switzerland.[57] In North America, the first of these facilities, InSite, opened in 2003 in Vancouver, Canada.[57] Today, approximately 100 supervised injection sites have been established across 66 cities in Europe, Canada, and Australia.[57,58] Despite the evidence, no legally operating supervised injection facilities are currently in existence in the United States, although at least one unsanctioned supervised injection facility at an undisclosed US site has been in operation since 2014.[59,60] In recent years, various municipalities across the country, including Boston, Denver, New York City, Philadelphia, San Francisco, and Seattle,[61] have convened multidisciplinary task forces to conduct detailed analyses of the evidence base and determine the potential benefits, challenges, and feasibility of establishing supervised injection facilities in their jurisdictions.[58]

Supervised injection facilities are legally sanctioned safer injection facilities in which licensed health personnel can supervise drug injection. More than simply an indoor venue for drug use, these facilities provide a safe and hygienic space in which persons who inject drugs can access sterile injection supplies, inject under medical monitoring, receive overdose prevention education and safer injection technique instruction, undergo emergency overdose rescue when indicated, and obtain referrals to other health and social service programs, including infectious disease and substance use treatment referrals.[62-64]

### Impact on Health

Research studies from InSite demonstrate that supervised injection facility use reduces fatal overdoses. One study published in 2011 found a 35% decrease in drug overdose mortality within a 500-m radius of InSite after supervised injection facility opening.[65] Under various mathematic models, this reduction in lethal overdoses corresponded to as many as 51 deaths averted during the 4-year study period.[66]

In addition to reduced overdose mortality among persons who inject drugs, supervised injection facilities have been associated with reductions in high-risk injection drug use practices such as injection in public spaces, rushed injection, injection without alcohol-based skin preparation, injection with shared or found needles, and unsafe disposal of injection equipment.[67-69] Although research on the direct effect of supervised injection facilities on HIV and hepatitis C virus transmission rates is lacking, the available evidence shows that persons who inject drugs engage in safer injection practices after using a supervised injection facility,[70] leading to a reduction in cutaneous and other injection drug use–related bacterial infections and, potentially, viral transmission.[71,72]

### Individual and Community Benefits

Supervised injection facilities are particularly beneficial to highly marginalized members of society. A survey study among persons who inject drugs in Ottawa, Canada, found that individuals most likely to access supervised injection facility services were those who injected in public spaces, required assistance to inject (a known risk factor for soft tissue infections, vessel injury, and transmission of viral pathogens), had tested positive for hepatitis C virus, had experienced accidental overdoses in the previous year, and identified as sex-diverse and sexually diverse individuals.[68,73] Survey studies in 3 major US cities found that willingness to use supervised injection facilities among adult persons who inject drugs is correlated with daily injection drug use, homelessness, unintentional overdoses, use of opioids, concerns about fentanyl-adulterated drugs, and public or semipublic injection drug use,[74,75] although potential barriers to supervised injection facility use include concerns about arrest, privacy, and safety while in supervised injection facilities.[75] The majority of persons who inject drugs surveyed across all 4 cities reported a willingness to use a supervised injection facility.[73-75] Indeed, the research suggests that by mitigating some of the environmental risks fueled by socioeconomic marginalization, supervised injection facilities benefit the most at-risk persons who inject drugs and, thus, society at large by reducing injection drug use–related morbidity and mortality.

In addition, supervised injection facilities serve as effective gateways to detoxification services, addiction treatment, and long-term counseling. At InSite in Vancouver, weekly supervised injection facility attendance (adjusted hazard ratio=1.72 [95% CI 1.25 to 2.38]) and contact with its addiction counselor (adjusted hazard ratio=1.98 [95% CI 1.26 to 3.10]) were associated with more rapid entry into a detoxification program.[76] InSite clients were 33% more likely to initiate treatment with regular supervised injection facility exposure and 54% with supervised injection facility addiction counselor contact.[77]

Arguments often invoked in opposition to the establishment of a supervised injection facility are related to the perceived harms and inconveniences that illegal drug injection poses to the public. These may include concerns that supervised injection facilities will increase the number of persons who use injection drugs or the rate of drug-related crimes in areas near the facility. Current research, however, does not support these assertions. In fact, the preponderance of the evidence suggests that supervised injection facilities can be beneficial to the communities in which they operate. One study found that there was no increase in the rates of assault and robbery or drug trafficking after the opening of a supervised injection facility, and that vehicle thefts and vehicle break-in rates declined.[78]

Moreover, multiple studies, including a systematic review, have failed to substantiate concerns that supervised injection facilities lead to increased drug use. On the contrary, research demonstrates that they lead to a reduction in injection drug use in public spaces (eg, bus stations, beaches, parks); a reduction in the improper and hazardous disposal of needles, syringes, and other drug-injecting equipment; and a reduction in the rates of violence against women, who are frequently at risk for coercion and exploitation around their use of injection drugs.[67,69,70,79] Sex-specific risks for HIV related to the physical and social environments in which women inject may also be reduced by offering a legal and safe place to inject.[80]

### Barriers to Implementation

Partially spurred by the rapidly increasing opioid epidemic among the white non-Hispanic demographic of the US population, harm-reduction policy in the United States has advanced markedly in recent years.[58] The scientific research on supervised injection facilities is rigorous and the evidence overwhelmingly supports this clinical intervention as a harm-reduction strategy. Nonetheless, implementing the use of supervised injection facilities remains a political challenge.[58] Supervised injection facility opposition in the United States focuses on fears that such facilities encourage injection drug use (by making the practice easier, safer, and more acceptable), attract more persons who inject drugs to the area, and fuel drug-related crime.[67] At the center of the political resistance to supervised injection facilities and other harm-reduction strategies is the ideology that abstinence-based treatment is the solution to substance use,[19] whereas supervised injection facilities promote "a culture of toleration" and "build a permissive society."[81] Harm reduction, however, accounts for the considerable body of evidence that behavior change involving substance use is a stepwise, nonlinear process (principle of incrementalism) in which recurrent use is not a treatment failure, but rather a natural and expected occurrence in recovery that should be anticipated as part of the course (Figure 2).[19,82,83]

## ROLE OF EMERGENCY MEDICINE IN INJECTION DRUG USE HARM REDUCTION

As the de facto health care safety net and a major access point for underserved populations with social, economic, and behavioral health risks,[84] EDs are a major component

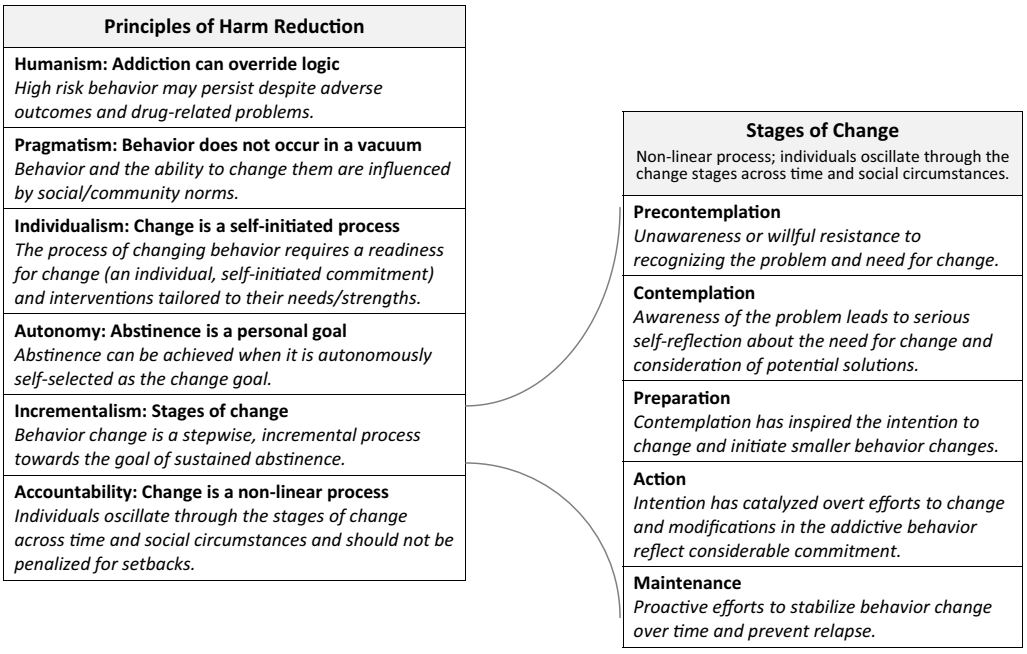


**Figure 2.** Principles of harm reduction and stages of change.

of public health. Emergency physicians are at the forefront of ensuring that all segments of the population have access to the standard of care, including individuals unable to access care in other clinical settings, such as those experiencing homelessness, incarceration, mental illness, and drug addiction. Highlighting the unique opportunity for EDs to lead in injection drug use harm reduction, a study examining the potential uptake of supervised injection facilities in 3 US cities found that an average of 81% of adult persons who inject drugs who were surveyed in each city had accessed medical care through a local ED in the preceding 6 months.[75]

By its very nature, the practice of emergency medicine involves a strong component of public health practice and patient advocacy. Emergency physicians master harm-reducing discussions through daily educational interventions, with patients inquiring about how to prevent their next respiratory infection or reduce their risk of stroke. In other cases, harm reduction originates squarely with emergency physicians when they ask about risk behaviors and exposures such as helmet use, tobacco smoke, and violence. Although injection drug use is no less a risk behavior with potentially negative health outcomes, harm-reducing discussions in the ED can be limited. At least as it pertains to opioid use disorder, Samuels et al[85] found that despite a moderate perceived clinical responsibility and overall willingness to refer patients to syringe services programs, emergency physicians lacked confidence in their ability to provide brief counseling and referral to treatment programs, and only 4.5% surveyed reported doing so. Other factors contributing to low levels of emergency physician engagement in opioid use disorder harm reduction included low self-efficacy derived from working with patients with addiction, knowledge gaps about addiction, time constraints, and poor institutional support.[85] Despite their favorable evidence-based profile,[49,86] ED referrals to syringe services programs are further restricted by the financial, regulatory, and legal challenges that limit program implementation and contribute to gaps in geographic coverage.

As a critical health care access point, the ED can improve the overall care and health of persons who inject drugs by incorporating evidence-based harm-reduction practices into clinical care. In addition to opioid use disorder interventions already expanding across US EDs (eg, naloxone distribution, fentanyl test strips, buprenorphine induction, outpatient treatment referrals),[21-28] injection drug use harm-reduction strategies may complement established opioid use disorder harm-reduction practices while benefiting patients with nonopioid injection drug use.

## Injection Drug Use Education and Referrals to Syringe Services Programs

Despite the extensive evidence in favor of increased access to sterile injection equipment, referrals to syringe services programs as part of a broader, comprehensive

approach to prevention and treatment of injection drug use–related health complications have not yet been incorporated as standard ED practice. Similar to condom use for pregnancy and sexually transmitted infection prevention, use of syringe services programs to prevent blood-borne infections and medical complications related to unsafe injection is recommended for persons who inject drugs and should be encouraged in the ED.[87,88] Indeed, a 2017 National Institute on Drug Abuse convening of addiction, emergency medicine, and quality measurement experts produced a quality improvement framework for the ED treatment of opioid use disorder that specifically included syringe services program referrals as a process measure.[89] Correspondingly, the American College of Emergency Physicians (ACEP) passed "Council Resolution 52: Support for Harm Reduction and Syringe Services Programs" in 2017, which resolved that ACEP endorse syringe services programs for individuals who use injection drugs, promote the access of such programs to people who inject drugs, and invest in educating its members on harm-reduction techniques and the importance of EDs to partner with local syringe services programs to advance the care of people who inject drugs.[90]

Knowledge of the resources available within the community is critical to the continued engagement of persons who inject drugs in harm reduction between ED visits. As of 2015, there were greater than 225 syringe services programs in 36 states, the District of Columbia, Puerto Rico, and the Indian Nations.[91] Currently, the North American Syringe Exchange Network tracks syringe services programs and maintains an online program directory (https://nasen.org/map/).[91] State health department Web sites often contain similar information. When referring persons who inject drugs to local resources, emergency physicians, nurses, and other ED-affiliated health paraprofessionals (eg, addiction specialists, peer recovery coaches, social workers, community health workers, health promotion advocates) are encouraged to use these databases to identify local programs.

Although a review of the evidence for ED-based screening, brief intervention, and referral to treatment for illicit drugs [92,93] is beyond the scope of the present review, harm-reduction education and referral are particularly important for persons who inject drugs who decline such treatment altogether or engage in such ED-based treatment, but ultimately decline referral and transfer to substance use treatment programs. Specifically, in addition to prescribing or dispensing naloxone reversal kits to opioid-injecting patients, EDs could develop and distribute nondescript "harm-reduction kits" to all patients who inject drugs, regardless of drug type used. Kits could contain general educational information about injection drug use–specific health complications (eg, vessel injury, cutaneous infections, bacteremia, injection drug use–related infective endocarditis), detailed instruction on safe injection practices, and a description of the services offered at syringe services programs to help prevent and treat these complications. Additional material could include a list of local syringe services programs with updated locations, information about syringe disposal sites, and contact information for local and regional substance use treatment programs and infectious disease and HIV clinics. Finally, EDs could consider the provision of injection supplies (eg, sterile tuberculin needles, sterile mixing water, alcohol swabs, tourniquets), as well as fentanyl test strips, as part of these harm-reduction kits. An ED-affiliated health paraprofessional could be enlisted to review the kit information, provide in-person education on safe injection practices, facilitate real-time referrals, and answer any remaining questions related to harm-reductions strategies.

For patients who decline the harm-reduction kit, EDs with electronic health record systems could use smart phrases that would directly include an abbreviated version of educational materials and list of syringe services programs in the electronically generated discharge paperwork. One example of such a smart phrase, "injection drug use," offered by ACEP can be accessed at https://www.acep.org/patient-care/smart-phrases/injection-drug-use/ and adapted to include state-specific resources.[94]

EDs with resources to dedicate can invest in the development of a protocol for harm-reduction referrals. Such a predetermined plan of action could alleviate the potentially time-prohibitive challenges of a busy ED. Timely and efficient linkages to syringe services programs can be facilitated by a low-threshold, streamlined system of referral in which syringe services program partnerships are established in advance and a mutually convenient mechanism for sending and receiving referrals is agreed on. Streamlined referral systems can be difficult to institute in EDs without designated "champion" personnel (eg, addiction specialist, peer recovery coach, social worker, community health worker, health promotion advocate) to forge community partnerships and negotiate stepwise "warm-handoff" referral algorithms.

### Policy Advocacy for Supervised Injection Facilities

Referrals to syringe services programs are not always geographically feasible and referrals to supervised

injection facilities are essentially nonexistent. In the case of supervised injection facilities, which are not currently legally sanctioned in the United States, and in geographic locations with limited or no access to syringe services programs, emergency physicians can advocate on behalf of persons who inject drugs for implementation of evidence-based harm-reduction policies and interventions proven to reduce the morbidity and mortality associated with injection drug use. Emergency physicians can lead and effect change by providing legislative testimony on the health influence of injection drug use and the evidence base for supervised injection facilities. Likewise, emergency physicians who have studied or witnessed the positive effect of sanctioned or unsanctioned supervised injection facilities in their patients and communities can offer compelling human-interest stories in support of supervised injection facility expansion. Particularly now, when the momentum to tackle addiction as a medical condition outside of the criminal justice system is strong, emergency physicians have the opportunity to frame the narrative and offer nonjudgmental perspectives and solutions.[61] The American Medical Association[95] and American Public Health Association[96] have released strong position statements in support of supervised injection facilities, and ACEP has passed "Council Resolution 31" of 2017, which resolved that ACEP join their partner organization, the American Medical Association, in supporting the development of pilot facilities in which people who use intravenous drugs can inject self-provided drugs under medical supervision and endorsing supervision injection facilities as an effective public health intervention in areas and communities heavily affected by intravenous drug use.[97]

### ED-Based Research

Ongoing research is critical to establishing the effectiveness of harm-reduction practices in the ED. As an example, the distribution of fentanyl test strips is one strategy worthy of continued investigation. Studies indicate that the ability of persons who inject drugs to detect the presence of fentanyl in their drug supply with fentanyl test strips leads to potentially lifesaving drug use behavior changes, including performing a "test" dose injection, using smaller amounts, using a "buddy system" for injection, having naloxone at hand, and even discarding their supply.[98,99] Although this strategy appears promising, further investigation is needed to understand whether such behavior changes translate into overdose deaths averted and whether fentanyl test strips distribution is feasible and effective in the ED.

## CONCLUSION

Harm reduction is a public health strategy that aims to reduce the harms associated with a risk behavior short of eliminating the behavior itself. It neither condones injection drug use nor ignores its harmful consequences. Naloxone distribution, syringe services programs, and supervised injection facilities are evidence-based strategies proven to mitigate the harmful effects of injection drug use. As primary clinicians of acute care, EDs play a prominent role in the care of patients presenting with the complications of injection drug use. Striving to improve substance use care, EDs have led in innovative research and engaged in policy advocacy efforts to secure and advance nonjudgmental alternatives to abstinence. Finally, a standardized ED strategy for incorporating injection drug use education into clinical practice and facilitating referrals through community partnerships is needed to create streamlined and minimally disruptive mechanisms for engagement in syringe services programs and reduction of injection drug use–related morbidity and mortality.

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