**HARM REDUCTION INTERVENTIONS TO REDUCE THE BURDEN OF OPIOID OVERDOSE: A COMPREHENSIVE LITERATURE REVIEW OF NALOXONE DISTRIBUTION PROGRAMS AND SAFE INJECTION FACILITIES**

by

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Submitted to the Graduate Faculty of

Behavioral and Community Health Sciences

Graduate School of Public Health in partial fulfillment

of the requirements for the degree of

Master of Public Health

University of Pittsburgh

2016

UNIVERSITY OF PITTSBURGH

GRADUATE SCHOOL OF PUBLIC HEALTH

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**ABSTRACT**

The opioid overdose epidemic is one of the most significant public health problems that the United States has seen in decades. Fatal drug overdoses are the number one leading cause of injury death in the United States. As communities struggle to combat increased mortality, public health officials, along with federal, state, and local agencies, are beginning to explore harm reduction interventions aimed at preventing opioid overdose deaths. A literature review was conducted to explore the effectiveness of two distinct harm reduction strategies: naloxone distribution programs and safe injection facilities. Access to naloxone can be effective in reducing opioid overdose, especially when implemented on a large scale. Expanding legislation to include immunity and Good Samaritan statutes will serve to increase the effectiveness of naloxone distribution as a strategy to reduce the number of opioid overdoses. Additionally, safe injection facilities can serve to reduce opioid overdoses, as well as improve the health of people who use opioids. This essay holds public health significance by reporting on two unique strategies that, when implemented, can improve the health of millions of Americans.

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preface

I would like to thank my readers for their valuable input throughout this process.

This essay would not have come to fruition had it not been for my experiences at Prevention Point Pittsburgh, which has proven to be an essential highlight of my graduate school career.

To the staff at Prevention Point Pittsburgh: I would like thank you for inspiring me to advocate for people who are too often hidden in the shadows. Your organization has provided me the opportunity to connect with people who have truly made a difference in my life, including all of you. I will forever be indebted to you all for affording me the privilege of working with you and making a difference for all of those that we serve.

Laken C. Ethun

April 4, 2016

# Introduction

The opioid overdose epidemic in the United States is a multi-faceted and complicated public health problem that has commanded the attention of local, national, and federal agencies. The Centers for Disease Control and Prevention (CDC) have reported that drug overdoses are now the leading cause of injury-related deaths (Nelson, Juurlink, & Perrone, 2015; Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015). The steady rise in overdose deaths can largely be attributed to increases in opioid use, abuse, and subsequent dependency and addiction (Nelson et al., 2015). The trend in opioid use and abuse can be traced back to the early 1990’s, which physicians began prescribing opioid painkillers (i.e. Morphine, OxyContin, Percocet) to individuals who suffered from chronic and acute pain, as a mechanism to increase patient satisfaction and address the under treatment of pain (Brady et al., 2014; Dart et al., 2015; Gugelmann & Perrone, 2011). However, pharmaceutical companies and physicians failed to inform patients that long-term use of these medications could lead to dependency and addiction (Nelson et al., 2015).

The number of prescriptions for opioid painkillers and the rise in the non-medical use of these medications began to alert state and federal entities that a problem may be developing, which served as grounds for the implementation of intervention such as prescription drug monitoring programs and pharmaceutical opioid reformulations (Brady et al., 2014; Cicero & Ellis, 2015; Haffajee, Jena, & Weiner, 2015; Paulozzi, Kilbourne, & Desai, 2011). As prescriptions drug monitoring programs became more widely implemented, the number of opioid prescriptions began to decrease, which helped to slow the rise in fatal overdoses attributed to prescription opioids (Dart et al., 2015). However, the sudden decrease in the supply of prescription opioids did not help to curve demand. In fact, many individuals who were dependent on prescription opioids and could no longer get them turned to a cheaper and more powerful option in the form of illegal heroin.

Heroin abuse has been steadily increasing since the early 2000’s, as have the rates of fatal heroin-related overdoses. There has been some research that suggests that the rise in heroin abuse, and overdoses, is directly correlated with the decrease in opioid prescribing, however this link is anything but clear and concrete (Cicero, Ellis, & Harney, 2015; Compton, Jones, & Baldwin, 2016; Dart et al., 2015; Jones, Logan, Gladden, & Bohm, 2015; Nelson et al., 2015). The continued rise in heroin overdoses has summoned local, state, and national organizations into action in an effort to tackle the complex and unique nature of this public health problem. As communities across the country grapple with the ramifications of this issue, new policies and ideas are being explored on every level, local, state, and federal, that are beginning to address drug abuse and addiction as public health problems.

The United States has historically treated drug use and addiction as criminal justice issues, as opposed to public health problems. However, as opioid abuse and overdoses continue to tear through communities, new approaches that break away from the old precedent are being examined as legitimate options to combat the current crisis. One of the most publicized approaches has been the increased availability of naloxone, which is a medication that can be used to reverse opioid overdoses ("Community-based opioid overdose prevention programs providing naloxone —united states, 2010," 2012; Compton, Volkow, Throckmorton, & Lurie, 2013; Directors, 2013; Kim, Irwin, & Khoshnood, 2009; *Naloxone Overdose Prevention Laws*, 2016; Walley et al., 2013). The distribution of naloxone is one of many harm reduction strategies that can be employed to combat morbidity and mortality associated with illicit opioid use. Harm reduction strategies for illicit drug use in the United States have generally been met with opposition, largely on the basis of unproven assumptions, including the claim that harm reduction strategies increase drug using and delay individuals from entering treatment (Reid, 2002; Ritter & Cameron, 2006).

Harm reduction strategies for injection drug use have commonly been implemented on a community level, especially in areas that have high rates of injection drug use. However, as morbidity and mortality associated with opioid addiction continue to increase, it may be necessary to explore harm reduction strategies on a more macro level. Doing so will take cooperation and innovation from various entities, including community public health and harm reduction organizations and federal governmental entities. As a shift begins to happen in how to address issues of drug use and addiction, local, state, and national policies may have to do the same.

The purpose of this essay is to explore the current public health issue of opioid overdoses, including those attributed to prescription opioids and heroin, and how two specific harm reduction strategies can be used to combat the rising number of fatalities. Naloxone distribution programs will be evaluated for their ability to reduce fatal opioid overdoses and recommendations will be made on how to increase the effectiveness of these programs. Safe injection facilities will also be explored as a possible harm reduction strategy to reduce opioid overdose deaths. The effectiveness of this intervention will also be evaluated, as well as barriers and facilitators to establishing safe injection facilities in the United States.

# Background of opioid overdose and harm reduction approaches

## Current Trends in Opioid Abuse and Overdose

The United States is currently in the midst of one of the most harrowing drug epidemics in history. Drug overdoses now claim the lives of more Americans than motor vehicle accidents and firearms. According to the Center’s for Disease Control and Prevention (CDC), drug overdoses, primarily attributed to prescription opioids (e.g. hydrocodone, oxycodone, and morphine) and heroin, took the lives of 47,055 individuals in 2014 (Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015). The CDC reports that drug overdoses involving opioids have increased 200% since 2000 and contributed to 61% of overdose deaths in 2014 (Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015).

### 2.1.1 The Prescription Opioid Problem

Access to prescription opioid medication has helped hundreds of thousands of Americans who suffer from debilitating and chronic pain. Hawk, Vaca, and D'Onofrio (2015) report that over 200 million prescriptions for opioid pain relievers were written in 2013, up from 76 million in 1991. The increase in dispensing can be attributed to new guidelines regarding the treatment of pain as the fifth vital sign, concerns regarding patient satisfaction, and increased marketing by pharmaceutical companies (Hawk et al., 2015). However, long-term use of these medications can lead to tolerance, dependence and addiction, and feelings of withdrawal, which often perpetuate continued use (Nelson et al., 2015). Furthermore, the ease of obtaining these medications has led to an increase in the number of individuals who are initiating non-medical use of these highly addictive medications.

Non-medical use is defined as taking a prescription that belongs to someone or else, or taking a prescription in a way contrary to what was directed by a physician (Hawk et al., 2015; Nelson et al., 2015). An estimated 29 million individuals initiated non-medical use of prescription opioids between 2002 and 2012 (Bagalman, 2014; Nelson et al., 2015). Nelson et al. (2015) suggests that there are two types of individuals who initiate non-medical use of opioids: those who are interested in the euphoric effects of these medications and those who have, through chronic opioid use, developed a dependence and are trying to avoid withdrawal symptoms. As more individuals initiate non-medical use of these drugs, there has been an increase in mortality associated with prescription opioid overdose.

The increase in overdose deaths began to climb within the past fifteen years. Since 2000, overdose deaths involving opioids, including prescription opioids and heroin, have increased to 6.0 deaths per 100,000 persons (Calcaterra, Glanz, & Binswanger, 2013; Hawk et al., 2015; Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015). The continued increase in these numbers has caught the attention of federal, state, and local officials, who have now begun to explore policies and interventions aimed at reducing the non-medical use of prescription opioids. The most common intervention suggested by national and federal organizations has been the establishment of prescription drug monitoring programs (PDMP), which aim to reduce diversion of prescription opioids, as well as alert physicians and pharmacists to patients who may be at risk of a substance use disorder (Green et al., 2015). Additionally, a reformulated extended-release form of oxycodone was released in 2010, with the intention of utilizing an abuse deterrent formulation to reduce the potential for abuse.

The establishment of PDMPs in most states has shown to be an effective tool in reducing the rates opioid prescribing, as well as overdose death rates associated with prescription opioids. According to Dart et al. (2015), the number of opioid prescriptions began to decrease slightly between 2011 and 2013, with a subsequent reduction in the number of overdose deaths from 6.0 per 100,000 to 5.6 per 100,000 (Hawk et al., 2015). However, as Green et al. (2015) reports in her article, many PDMP websites (62%) did not address or even explicitly mention overdose reduction as a goal of the program, which could be an indication that many PDMP’s are not specifically concerned with reducing prescription opioid overdose, as much as they are with reducing diversion and non-medical use and abuse of these medications. In addition to implementing statewide PDMPs, the pharmaceutical company responsible for the creation of oxycodone took steps to reduce the abuse, and potential overdose risks, associated with oxycodone.

The introduction of the reformulated oxycodone (OxyContin**®)** tablet was in response to the increase in non-medical use and abuse of the traditional, extended-release tablet. The reformulated oxycodone was equipped with chemical properties that made it more difficult to abuse the drug through crushing and subsequently snorting or injecting the tablet (Cicero & Ellis, 2015; Sessler et al., 2014). Following the introduction of the reformulated oxycodone, Cicero and Ellis (2015) reported a significant reduction in the number of individuals who reported abusing the medication in the past month. However, some participants admitted to continuing injection of the medication, despite the supposed abuse deterrent formula; participants admitted to researching how to “get around” the new formulation in order to make it injectable (Cicero & Ellis, 2015). Although there are reports of individuals continuing to abuse the reformulated oxycodone, reports have indicated that deaths associated with this particular opioid medication have decreased (Cicero & Ellis, 2015; Sessler et al., 2014). According to Sessler et al. (2014) deaths decreased 82% from one year before reformulation to three years post-reformulation. According to these analyses, reformulated oxycodone has been effective in decreasing deaths related to this specific opioid. However, as with PDMPs, the decrease in overdose deaths resulting from the reformulation spurred the unintended consequence of increased heroin abuse and overdose mortality.

### 2.1.2 Increase in Heroin Abuse and Subsequent Overdose Deaths

As the nation turns a corner in regards to decreasing rates of prescription opioid overdose, another problem has emerged that is threatening the lives of Americans. The last five years has seen an increase in the number of Americans who are abusing heroin and experiencing mortality due to heroin overdose. According to the CDC, heroin overdose death rates increased 26% between 2013 and 2014 (Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015). Furthermore, the death rates have more than tripled since 2010, from 1.0 per 100,000 persons to 3.4 per 100,000 persons. It is unclear why this sharp of an increase has occurred, but it can be speculated that the rise in heroin abuse and overdoses is largely related to the epidemic of prescription opioid abuse and overdose.

The influx, and subsequent decline, in availability of prescription opioids may have been influential in transitioning the abuse and overdose burden from prescription opioids to heroin. Research has shown that as prescription opioid abuse and overdose deaths decreased, rates of abuse and overdose deaths involving heroin increased (Compton et al., 2016; Dart et al., 2015; Dasgupta et al., 2014; Nelson et al., 2015). Dart et al. (2015) reported that overdose deaths involving prescription opioids began to increase in 2002, with a noticeable decline beginning in 2009. In comparison, the rates of heroin overdose were stagnant from 2002 to 2010, with consistent increases beginning in 2010. Furthermore, the majority of individuals who report using heroin admit to abusing prescription opioids prior to their initiation to heroin (Dart et al., 2015; Hawk et al., 2015).

The link between declining prescription opioid overdose and the increase in heroin overdose is not entirely clear. While some research seems to suggest that there is an inverse relationship between the decrease in prescription opioid abuse and overdose and heroin overdose, other research suggests the opposite. Jones et al. (2015) reported that a decrease in prescription opioid abuse was not necessarily indicative of an increase in heroin abuse and overdose. Specifically, 28 states reported that increases in heroin overdose deaths were associated with increases in prescription opioid overdose deaths. Additionally, between 2013 and 2014, the age adjusted death rates for natural and semi-synthetic opioids (e.g. morphine, oxycodone, hydrocodone) and synthetic opioids (e.g. fentanyl) increased 9% and 80%, respectively (Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015). These reports are enough evidence to conclude that the link between prescription opioid overdose and heroin overdose are, at best, conflicting.

Overdose deaths associated with heroin have presented a challenging problem for national, state, and local officials. The implementation of statewide PDMP’s and the reformulation of oxycodone have shown to slow the rates of prescription opioid overdose deaths, however the continued rise in heroin related deaths have confirmed that this epidemic is far from over. As death rates continue to rise throughout the United States, it has become evident that traditional policies and interventions may not be sufficient enough to reverse the current trend. Efforts to reduce the rates of opioid abuse and overdose are beginning to focus on public health interventions, including harm reduction, and less on prohibitionist and criminal justice approaches.

## Harm Reduction and opioid overdose prevention

Harm reduction is a public health framework that is focused on reducing harms that are associated with using substances, including alcohol, tobacco, and illicit drugs (MacMaster, 2004; Reid, 2002; Ritter & Cameron, 2006). Harm reduction principles have been adopted into drug policies in countries throughout the world, including The Netherlands, Switzerland, The United Kingdom, Canada, and Australia (MacMaster, 2004; Ritter & Cameron, 2006). According to MacMaster (2004), there exist five assumptions that help to promote harm reduction strategies for illicit drug use:

1. Despite best prevention and treatment efforts, substance use and abuse is, and will continue to be, an inevitable part of our society. Therefore, realistic interventions should be in place that aims to reduce the harms of substance use.
2. Abstinence may be the only concrete way of reducing drug related harms, however, abstinence may not be possible for all users. Given this, relevant services should be available to users who are not ready to practice and maintain abstinence.
3. Harms from using illicit substances inherently exist. However, many of the most serious consequences of drug use (i.e. HIV/AIDS and Hepatitis C infections, fatal drug overdoses, and so on) can be prevented without insisting that users adhere to complete abstinence.
4. In order to minimize the harms associated with substance use, it is important to create services that are user-friendly and relevant to the individual person and their situation.
5. In order to affect the most change, substance use must be understood from a more ecological, public health perspective rather than solely an individual act.

Harm reduction has generally been overlooked as an effective policy within the United States due to current drug laws and policies, which often focus on criminal justice and prohibitionist solutions, as well as the assumption that harm reduction condones drug use (Beletsky, Davis, Anderson, & Burris, 2008; Malkin, Elliott, & McRae, 2003). However, as the number of fatal opioid overdoses continues to increase, many states and cities are beginning to explore harm reduction, mainly the provision of naloxone, as potential strategies to combat the rising number of fatalities, as well as protect the health and well being of people who abuse opioids.

### 2.2.1 Naloxone and Community Based Opioid Overdose Prevention Programs

 In the United States, emergency personnel have been using naloxone for decades to reverse the effects of opioid overdoses. Opioids bind to receptors in the brain that produce feelings of euphoria, which leads to the feeling of “high” that is often described (Compton et al., 2016; Hawk et al., 2015). However, when too much of an opioid is taken either through swallowing, snorting, or injecting, it can lead to respiratory depression, which decreases oxygen flow to the body and the brain, which can lead to brain damage and death (Hawk et al., 2015; Straus, Ghitza, & Tai, 2013). Respiratory depression resulting in an overdose generally takes between one to three hours and can be reversed using a naloxone (Hawk et al., 2015).

Naloxone is an opioid antagonist that works by binding to opioid receptors in the brain, which displaces existing opioids from those receptors and prohibits additional opioids from attaching, thus reversing the overdose and restoring respiratory function (Hawk et al., 2015; Kim et al., 2009; Straus et al., 2013). It is important to note that naloxone is short acting, generally staying in the body between 30 and 90 minutes (Hawk et al., 2015). Once naloxone is expelled, individuals can slip back into an overdose, especially if they have used opioids that are slow-release and have a longer duration (Hawk et al., 2015; Straus et al., 2013). Naloxone is only effective if there are opioids present within the body, meaning that it cannot be used to reverse overdoses caused by other substances such as cocaine, benzodiazepines, or alcohol, and there is no potential for abuse. In the United States, naloxone is only available via a prescription, however many community based programs have been distributing naloxone to at-risk populations for decades.

Community based opioid overdose prevention programs have been operating in areas where there is a high concentration of people who use opioids, specifically people who use intravenously. These prevention programs have historically been established in conjunction with syringe exchange programs (SEP’s). SEP are a harm reduction strategy that is used to prevent the spread of HIV, Hepatitis C, and other infectious diseases among people who inject drugs, as well as preserve the overall health of drug users (Ritter & Cameron, 2006). SEP are typically established in urban areas and provide services including: provision of sterile injecting equipment (e.g. sterile syringes, alcohol swabs, bleach), testing for various sexually transmitted infections and the distribution of condoms and other safe sex information, and access to treatment and other social services. As prescription drug and heroin abuse becomes more widespread, SEP are being explored as an effective strategy to reduce the spread of infectious diseases and prevent overdose deaths with education and the provision of naloxone.

Community based opioid overdose prevention programs were established to educate and provide naloxone to people who use opioids, since they are the most at-risk for an experiencing and witnessing an overdose. Research has shown that these programs are effective in educating individuals about the risk factors for overdose and the proper response techniques, including the administration of naloxone (Hawk et al., 2015; Kim et al., 2009). As the rate of overdose deaths continues to increase throughout the United States, policymakers are beginning to explore increasing access to naloxone for individuals who are likely to witness an overdose, specifically friends and family members of people who use opioids. In addition, although SEP have been effective in providing education and naloxone to individuals, many of these programs are located in urban areas, thereby only reaching a small percentage of people who use opioids. Expanding access to naloxone is expected to increase the amount of individuals who are using the medication to reverse an opioid overdose.

Syringe exchange programs and the distribution of naloxone are two harm reduction strategies that are beginning to gain momentum within the United States. However, given that these programs have been in operation for decades, it is safe to say that the United States has been slow to embrace the use of harm reduction strategies, especially for illicit drug use. As the United States continues to develop strategies to combat mortality associated with opioid overdose, it is advantageous to look at all possible harm reduction strategies, including the establishment of safe injection facilities.

### 2.2.2 Safe Injection Facilities for People who use Drugs

 Safe injection facilities (SIFs) have been established throughout Europe in an effort to reduce the harms associated with illicit drug use. Unlike the United States, countries throughout Europe have embraced harm reduction as a tenant of their drug policies, which contributed to the establishment of these facilities. SIFs, or drug consumption rooms, were established in order to address the problem of public drug use, as well as the unhygienic conditions that many individuals encountered while using drugs (D. Hedrich, 2004; Hedrich, 2010). Furthermore, these consumption rooms aim to reduce morbidity and mortality of illicit drug use, while attempting to connect vulnerable populations with social services (Hedrich, 2010). Currently, there exist 90 SIF in the Netherlands, Germany, Switzerland, Luxembourg, Spain, Norway, Australia, and Canada (Hedrich, 2010).

The history of SIFs can be traced back to the 1970’s in the Netherlands and Switzerland, where there exist reports of tolerated drug use within addiction counseling centers and youth centers (D. Hedrich, 2004). However, the official establishment of SIF began occurring in the 1980’s, specifically in cities where consequences of drug use continued despite the availability of harm reduction programs (e.g. needle exchange programs and outreach) and treatment resources, including opiate substitution therapy (D. Hedrich, 2004). Motivation to establish SIF varies between countries, however many SIF seem to fall into three distinct categories, which are explained in a report published by (D. Hedrich, 2004):

**1. Integrated Facilities** are the most commonly established facilities. In this model, SIF are integrated into a larger network of services, usually set up for people who use drugs or the homeless population. The room used for drug consumption is typically set up as a separate area, available to only a certain subset of clients. Furthermore, additional services are available on the premise and it is not uncommon to find that many different groups or populations are served.

1. **Specialized Facilities** are not as common as integrated facilities and serve only individuals who wish to use a SIF. These particular facilities are established in close proximity to areas where drug dealing and consuming exist. These facilities typically provide onsite needle exchange programs, supervised consumption, and wound care. Unlike integrated facilities, if individuals want to access additional social services, a referral is made as these services on not available onsite.
2. **Informal Facilities** are the least common models of SIF. Current and/or former drug users usually run these facilities, which are tolerated by the police. Currently, the Netherlands is the only country that has a network of informal facilities, which are usually limited to individuals who smoke/inhale drugs, rather than inject.

According to D. Hedrich (2004), the establishment of SIFs generally aim to meet various public order and safety objectives (Table 1**)**. The prioritization of these objectives varies from country to country, but a commonality exists that intends to reduce the harms associated with drug use, especially among vulnerable populations, and increase access to services for groups who would otherwise not have the means to facilitate access. Furthermore, SIFs also intend to reduce public nuisance that may be caused by open air drug selling and consumption (D. Hedrich, 2004; Hedrich, 2010). Although countries prioritize the objective and operation of SIFs differently, there are commonalities among the rules. For example, drugs are not allowed to be bought and/or sold on the premises and all drugs that are consumed must be brought in by the individual and consumed only by that individual (D. Hedrich, 2004; Hedrich, 2010). In addition, staff members are prohibited from assisting anyone in the consumption of drugs, but may offer education and advice on how to safely consume drugs (D. Hedrich, 2004). Aside from these basic rules, the specific drug policies and statutes of the country regulate the day-to-day operations of the consumption room.

 In addressing the feasibility of establishing SIF within the United States it is important to understand that, unlike European countries such as the Netherlands and Switzerland, America has not adopted harm reduction as a tenant of current drug policy. However, the increase in opioid related overdose deaths has sparked a discussion among policymakers about harm reduction interventions, specifically syringe exchange programs and naloxone distribution. The United States is certainly at a crossroads, especially as the consequences of opioid use continue to be felt throughout the country.

Table 1: SIF objectives and associated descriptions

|  |  |
| --- | --- |
| Objectives of Safe Injection Facilities | Description of Objectives |
| Reach as much of the intended target population as possible.  | Generally this population will be high-risk drug users (i.e. chronically homeless, long-term users, sex workers, injection drug users). The SIF should be organized and run in a way that attracts the target population. Examples of this include: location that is accessible, services that will be utilized by the target population, and a safe environment that will encourage the use of the SIF.  |
| Establishment of a safe and hygienic environment that lowers risk to the target population.  | SIFs should ensure that locations are safe and hygienic. This includes the provision of safe injection equipment (i.e. syringes, cookers, alcohol swaps) and trained staff who will intervene in an emergency situation.  |
| Reduce morbidity and mortality associated with drug use. | The provision of safe injection equipment will serve to reduce the contraction and transmission of infectious disease. Furthermore, clients at the SIF will be exposed to risk reduction education, as well as social services. Lastly, trained staff will be able to intervene during emergencies, including overdoses, which serves to reduce mortality.  |
| Preserve and promote the health of SIF clients. | The SIF should aim to increase access to basic services that will increase the health and wellbeing of clients, including health care and social services. Furthermore, the SIF should facilitate drug treatment services, should clients request those services.  |
| Reduce public drug use and associated problems.  | SIF are expected to reduce public drug use by providing a safe space for individuals to consume drugs. Additionally, these establishments aim to reduce other issues associated with public drug use, including discarded syringes.  |
| Prevent increased crime around the SIF.  | The SIF should aim to reduce crime associated with drug use around the SIF. The buying and selling of drugs is strictly prohibited inside the SIF.  |

# Methods

In order to explore the effectiveness of harm reduction programs, specifically naloxone distribution and safe injection facilities, on reducing the burden of opioid overdose deaths, a comprehensive literature review was conducted. The literature review process was split into four distinct phases:

1. Understanding the problem of opioid abuse and overdose in the United States;
2. Understanding harm reduction as a philosophy and policy for drug use;
3. Understanding the effectiveness of naloxone as a harm reduction strategy for reducing opioid overdose and assessing barriers and facilitators to this intervention; and
4. Understanding safe injection facilities as a harm reduction strategy and the barriers and facilitators to implementing this intervention in the United States

Articles that were located during the literature search and deemed relevant to the purpose of this essay were exported to *Thomson Reuters EndNote X7*, which was used to manage citations and PDF files.

**Opioid Overdose in the United States**

In order to achieve a broad picture of the opioid overdose problem in the United States, a literature search was conducted using the PubMed database, as well using Google to conduct a targeted search of government websites. Specifically for PubMed, the search terms **“United States AND opioid overdose”**, **“ "heroin" use AND prescription opioid abuse”**, and **“opioid overdose”** were used. In order to present the most accurate and current overdose death data, the most recent CDC death rates from 2014 were included; these specific statistics were generally included in *Morbidity and Mortality Weekly Reports*. Articles that did not focus on prescription opioid abuse were excluded. The overall purpose of this search was to gain concrete epidemiological data about the current opioid overdose problem; if no such data was highlighted or discussed, the article was not included for use in this paper.

A separate search was conducted using PubMed in order to explore the relationship between prescription opioid overdose and heroin use and overdose. The terms used in that search were **"prescription drug monitoring programs" AND heroin use.** This search yielded results related to the effects of prescription drug monitoring programs and the potential link to heroin use. Articles that were included specifically mentioned the effect of prescription drug monitoring programs on prescription opioid abuse, as well as articles that mentioned the potential transition to heroin use.

 **Harm Reduction**

This particular search was conducted using the University of Pittsburgh’s online catalog, PittCat+, which provides access to a broad range of publications and journals, and PubMed database. The terms used for this search includes: **"opioid overdose"[All Fields] AND "harm reduction"[All Fields], United States AND "harm reduction", United States AND "harm reduction" AND "injection drug use", United States AND "harm reduction**" **AND "drug policy".** These terms were specifically used to gather information on harm reduction as a philosophy, harm reduction interventions within the United States and how it fits with current drug policies, and how harm reduction can be used to address opioid abuse and overdose. Articles were excluded that highlighted harm reduction interventions for alcohol and/or tobacco use. Furthermore, articles were excluded if they were exclusively reporting on syringe exchange programs, which are beyond the scope of this review.

**Naloxone Distribution**

The search for naloxone research focused on two databases, the Congressional Law Database, which was used to gather information regarding the legal issues associated with harm reduction and naloxone, and PubMed, which was used to gather existing information about the effectiveness of naloxone distribution programs. The search terms that were used to search the Congressional Law Database were as follows: **“naloxone”** and **"harm reduction" AND "substance abuse".**  The terms used for the PubMed search included: **"opioid overdose"[All Fields] AND "naloxone"[All Fields].** Articles were excluded if they were duplicates of any prior articles. It should be noted that this portion of the search yielded similar results to searches for harm reduction and opioid overdose.

**Safe Injection Facilities**

The search for information regarding SIFs focused on using the Congressional Law Database, which provided information regarding the legality of these particular establishments in the United States. PubMed and PittCat+ were used to gather articles that intended to report on effectiveness. The search terms used in the Congressional Law Database were **"safe injection facilities" OR "supervised injection facilities"**; the terms used in PubMed included: **"safe injection sites" OR "safe injection facilities" OR "supervised injection facilities" OR "supervised injection sites"**; the terms used in PittCat+ included: **"safe injection sites"** and **"safe injection sites" OR "safe injection facilities" OR "supervised injection facilities" OR "supervised injection sites".**  Articles were included if they were English language and discussed existing safe injection facilities in Europe, Australia, and Canada.

# DISCUSSION

The current epidemic of opioid related morbidity and mortality is a complex problem that cannot be solved using a single strategy. Extensive exploration into alternative methods, including harm reduction strategies, is warranted and even encouraged. Naloxone distribution programs and safe injection facilities are among two harm reduction strategies that have the potential to impact the increase of mortality due to opioid overdose.

## Effectiveness of Naloxone Distribution Programs

The distribution of naloxone to people who use opioids has been occurring since the 1990’s, mainly in urban areas and through local syringe exchange programs ("Community-based opioid overdose prevention programs providing naloxone —united states, 2010," 2012; Hawk et al., 2015). A survey conducted in 2014 identified 140 local organizations in 30 states and the District of Columbia that provided naloxone rescue kits (Wheeler, Jones, Gilbert, & Davidson, 2015). These programs have been essential in reducing morbidity and mortality associated with opioid and other illicit drug use. The most recent research from 2014 suggests that over 150,000 naloxone kits have been distributed to drug users and laypersons (e.g. people likely to witness an opioid overdose), resulting in over 26,000 overdose reversals (Wheeler et al., 2015).

A critical aspect of establishing these particular programs is addressing the components necessary to effectively educate participants so they can retain knowledge and respond appropriately in an opioid overdose situation. Given that many naloxone distribution programs were developed as part of syringe exchanges, training sessions were typically shorter to accommodate the clients, with emphasis given to recognizing the signs and symptoms of an overdose, appropriate response techniques, and how to administer naloxone (Behar, Santos, Wheeler, Rowe, & Coffin, 2015; Doe-Simkins et al., 2014). However, as the increase in opioid overdoses gained national attention, more organizations and entities have started implementing longer training sessions, which may not be necessary (Behar et al., 2015). Behar et al. (2015) recently published a report that examined the amount of overdose education needed to ensure that opioid users can properly identify an overdose and respond appropriately. The results showed that opioid users in San Francisco benefited from a standard five to ten minute educational session about opioid overdose and naloxone administration. Furthermore, it was also reported that first-time naloxone recipients and naloxone refill recipients have a high baseline knowledge about opioid overdose and proper response techniques (Behar et al., 2015). Additionally, individuals who returned to refill their naloxone reported the ability to retain the knowledge they gained from the brief educational session (Behar et al., 2015).

Formal training sessions are an important component to educating people who use opioids about overdose and naloxone administration, however social networks of drug users also seem to play an important role. Doe-Simkins et al. (2014) reported that users in Massachusetts who attended opioid overdose and naloxone administration training sessions were influential in educating friends and family members how to recognize and respond to an overdose and how to administer naloxone. Furthermore, this particular study found no significant differences in responses to an opioid overdose from those who had been formally trained and those who had not been trained (i.e. they had not attended a formal opioid overdose educational session); both the trained and untrained individuals were able to identify an overdose and respond appropriately, using techniques such as rescue breathing and the administration of naloxone (Doe-Simkins et al., 2014). Research has shown that once an individual is trained to recognize the signs and symptoms of an overdose, proper response techniques are employed, including the administration of naloxone.

Naloxone has been instrumental in saving the lives of over 26,000 people since 1996, although these efforts have been slow to impact the overall mortality rate within the United States. However, research has been conducted that has examined the effects of naloxone on reducing overdose deaths within communities. A study conducted by Bennett, Bell, Tomedi, Hulsey, and Kral (2011) looked specifically at injection drug users in Pittsburgh, Pennsylvania, who came to a local syringe exchange program to refill naloxone prescriptions. The study initially recruited 426 participants, 70% of whom who had witnessed at least one overdose during their lifetime. A total of 141 individuals returned to the syringe exchange site to refill naloxone prescriptions; 89 of these individuals reported that, collectively, they had administered naloxone in a total of 249 overdose situations with a 96% success rate for reversing an overdose (Bennett et al., 2011). Additionally, Doe-Simkins et al. (2014) reported that 373 trained and untrained participants in an overdose education program with naloxone distribution in Massachusetts reported using naloxone to reverse an overdose in almost 600 situations. Lastly, another Massachusetts study looked at areas that had established opioid overdose prevention and naloxone distribution programs and compared them with areas that had not established these programs (Walley et al., 2013). Areas that implemented programs had lower rates of overdose death rates when compared with areas that had not implemented opioid overdose and naloxone distribution programs (Walley et al., 2013).

The results of the above studies were consistent with the results reported in a recent systematic review of opioid overdose prevention and naloxone distribution programs (Clark, Wilder, & Winstanley, 2014). This review reported that areas in Massachusetts and Chicago with high levels of enrollment in an overdose prevention program observed lower rates of overdose deaths (Clark et al., 2014; Haegerich, Paulozzi, Manns, & Jones, 2014). These research reports seem to suggest that naloxone distribution, in combination with opioid overdose education, is effective in educating individuals on reversing an opioid overdose and can be influential in reducing the number of overdose death (Clark et al., 2014).

Naloxone distribution programs, in addition to being effective in providing individuals with the knowledge they need to act in an overdose situation, are cost-effective. Coffin and Sullivan (2013) developed a cost-effective analysis and specifically looked at the cost-effectiveness, quality adjusted life years (QALYs), and incremental cost per QALY gained associated with the distribution of naloxone. According to article, naloxone rescue kits containing intramuscular naloxone, which is the most common form of naloxone distributed to people who use opioids, typically costs fifteen dollars, while intranasal naloxone rescue kits cost thirty dollars (Coffin & Sullivan, 2013). The article reported that for every 164 overdose kits distributed, one overdose death would be prevented (i.e. number needed to treat is 164), although this number increased when looking specifically at individuals younger than aged 26. Furthermore, it was reported that naloxone distribution was cost-effective when incremental costs were compared to QALY gained, coming in at less than $50,000 per QALY gained, which was the baseline used to measure cost-effectiveness (Coffin & Sullivan, 2013).

## Recommendations for Improving Naloxone Distribution Programs

Opioid overdose education and naloxone distribution programs appear to be a cost-effective tool to increase knowledge about opioid overdose prevention, increase access to naloxone, and reduce opioid overdose mortality. However, not all communities burdened by opioid overdose have access to community based opioid overdose prevention and naloxone distribution programs ("Community-based opioid overdose prevention programs providing naloxone —united states, 2010," 2012). According to *Law Atlas*, 42 states currently have naloxone access laws, including the states with the highest rates of opioid overdose deaths (*Naloxone Overdose Prevention Laws*, 2016; Rose A. Rudd; Noah Aleshire; Jon E. Zibbell; R. Matthew Gladden, 2015). Although access to naloxone is a critical component to reducing opioid overdose deaths, states should also explore immunity and Good Samaritan laws, as well as standing order prescriptions.

Immunity laws are important statutes that states should consider when exploring options to increasing access to naloxone. These laws protect individuals who prescribe, dispense, or distribute naloxone from criminal sanctions (Bagalman, 2014; *Naloxone Overdose Prevention Laws*, 2016). Currently, 30 states have laws that protect prescribers from criminal sanctions, which can help lessen anxiety in physicians who may be apprehensive to prescribe naloxone for fear of liability should the naloxone be used outside of a medical setting (C. Davis, Webb, & Burris, 2013; *Naloxone Overdose Prevention Laws*, 2016; Straus et al., 2013). In addition to provider immunity laws, states should also explore the possibility of implementing Good Samaritan statutes.

Good Samaritan statutes provide some criminal immunity for bystanders who intervene in an overdose situation and victims of overdose, even if illicit drugs, or drug paraphernalia, are discovered at the scene of an overdose (Bagalman, 2014; Directors, 2013; Straus et al., 2013). Fear of law enforcement involvement and subsequent arrest is one of the primary reasons that witnesses do not call for help during an overdose situation (C. Davis et al., 2013; Doyon, Aks, & Schaeffer, 2014). According to *Law Atlas*, 36 states and Washington, D.C. currently have Good Samaritan laws (*Naloxone Overdose Prevention Laws*, 2016). In addition to implementing Good Samaritan laws, states may wish explore authorizing standing order prescriptions of naloxone, which will serve to increase access.

Standing order prescriptions can serve as an option for states that wish to increase access to naloxone, especially to individuals who may not live in proximity to a syringe exchange or other community organization who provides opioid overdose education and naloxone distribution. A standing order prescription is an order that is written by a prescriber that can be dispensed to a patient without having to be examined by a physician beforehand (Bagalman, 2014; Directors, 2013). Standing orders are common in medical practice and allow pharmacies to give vaccinations, for example (C. S. Davis & Carr, 2015). Standing orders may increase access to naloxone by allowing individuals who may witness an overdose to obtain naloxone (C. Davis et al., 2013; C. S. Davis & Carr, 2015). Additionally, standing orders can be used to get naloxone into the hands of the most vulnerable individuals, including syringe exchange participants and those just released from drug treatment or incarceration (C. S. Davis & Carr, 2015). Currently, 33 states authorize the distribution of naloxone via standing order.

In addition to the policies described above, opioid overdose prevention programs and naloxone distribution should be expanded to drug treatment centers and local jails. Release from drug treatment centers and incarceration pose additional risks to individuals because a decrease in tolerance, coupled with a return to a previous social environment, increases the chances that an individual will experience, and potentially die, from an overdose (I. A. Binswanger, Blatchford, Mueller, & Stern, 2013; I. A. Binswanger et al., 2012; Ingrid A. Binswanger et al., 2007; Krinsky, Lathrop, Brown, & Nolte, 2009; Lott & Rhodes, 2016). As recently as 2011, countries in Europe began distributing naloxone to individuals prior to release from jail. Scotland recently published an evaluation of their national naloxone program and reported that since distributing naloxone to individuals prior to release, overdose death rates have fallen an estimated 36% in the first four weeks following release (Bird, McAuley, Perry, & Hunter, 2015). Introducing overdose prevention education and naloxone distribution into drug treatment centers will likely be greeted with opposition since many treatment programs are focused on complete abstinence from drugs (Lott & Rhodes, 2016). However, many individuals experience relapse following drug treatment, which puts them at an increased risk for an overdose. It is recommended that residential and outpatient treatment programs explore the option of introducing overdose prevention education and naloxone distribution, which ensures that the most vulnerable individuals have access to this life-saving medication (Lott & Rhodes, 2016).

Naloxone distribution programs have the potential to reduce opioid overdose deaths on a broad level, as evidenced by their effect in local areas that have employed opioid overdose education and naloxone distribution programs. In order to improve access, states should consider implementing naloxone access laws and standing orders. Furthermore, criminal immunity statutes should be implemented so that prescribers are not discouraged from dispensing naloxone; Good Samaritan statutes with immunity from criminal arrest, charge, and/or prosecution should also be implemented to encourage those witnessing an overdose to call emergency services for help. Lastly, naloxone distribution should be explored for correctional facilities and drug treatment centers, which will ensure that naloxone is in the hands of those most at risk for experiencing an overdose.

## Effectiveness of Safe Injection Facilities

The establishment of safe injection facilities (SIF) in the United States is a relatively new idea to individuals who are not familiar with the harm reduction movement. SIFs have been commonplace in European countries for decades, especially in areas that experienced high rates of public drug use and the transmission of infectious diseases associated with drug use (e.g. HIV and Hepatitis C) (Davies, 2007; D. Hedrich, 2004; Hedrich, 2010; Potier, Laprévote, Dubois-Arber, Cottencin, & Rolland, 2014). SIFs provide individuals with a safe and hygienic space to consume drugs, which help to reduce the spread of disease, as well as provide responsive and appropriate care in the event of an overdose. Additionally, SIFs serve as important referral services to detoxification and drug treatment services, and other social and medical services that may not be accessible to the target, high-risk drug using population (Broadhead, Kerr, Grund, & Altice, 2002; Hedrich, 2010; Wood, Tyndall, Zhang, et al., 2006).

A critical component of SIFs are the trained staff members who are available to assist individuals in the event of an overdose. Prompt attention to an opioid overdose situation decreases the chances of an individual experiencing injury or death, which is why a fatal opioid overdose has not been documented at a SIF (Boyd, 2013; D. Hedrich, 2004; Hedrich, 2010; Marshall, Milloy, Wood, Montaner, & Kerr, 2011; Potier et al., 2014; Reid, 2002). Evaluations performed at existing SIFs in Germany and Canada have shown a decrease in the number of overdose deaths (D. Hedrich, 2004; Marshall et al., 2011; Wood, Tyndall, Montaner, & Kerr, 2006). It is important to note that difficulty exists in trying to link overdose death reduction solely to the existence of a SIF; for example, a reduction in overdose deaths in Australia following the introduction of a SIF was due in part to a shortage of heroin, combined with the effects of the SIF (D. Hedrich, 2004).

Germany conducted an evaluation of SIFs that were established in four cities, from 1990 to 2001. These four cities established SIFs between 1994 and 1999, when there was a country-wide push for harm reduction as a response to the increasing issue of drug use and overdose (D. Hedrich, 2004). All four cities reported statistically significant reductions in overdose mortality following the implementation of the SIFs, with some cities reporting statistically significant results within the first six months (D. Hedrich, 2004). Additionally, it is postulated that these sites help prevent ten overdose deaths per year in Germany (Hedrich, 2010).

Canada is the most recent country to introduce a SIF in the high-risk area of downtown eastside Vancouver, where public injecting, high rates of overdose, and infectious disease transmission were common in the neighborhood (Boyd, 2013). Furthermore, many individuals experienced chronic homelessness and various mental and physical health issues that were ignored due to lack of access to health care services (Boyd, 2013; Marshall et al., 2011). INSITE was established in 2003, with the goal of reducing public injecting and disorder related to public drug dealing and buying, decreasing overdose related mortality and the transmission of disease, and increasing access to essential health services. Marshall et al. (2011) published an evaluation of INSITE and reported a 35% reduction in overdose deaths, from 2003-2005, within close proximity (500 meters) of INSITE, compared to the 9.6% citywide reduction in fatal overdoses.

Overdose death rate reductions are just a small piece of what a SIF aims to accomplish. In addition to reducing public injecting, SIFs provide a safe and hygienic space for people who use drugs to consume pre-obtained substances (D. Hedrich, 2004). These spaces provide individuals with new and sterile injecting equipment, reducing the amount reused and shared syringes, which helps to reduce the spread of infectious diseases (Hedrich, 2010; Potier et al., 2014; Semaan et al., 2011; Wood, Tyndall, Montaner, et al., 2006). Additionally, these spaces are often integrated into pre-existing harm reduction entities (e.g. syringe exchange programs) which provide individuals access to social services, mental and physical health care, and referrals to drug treatment services (D. Hedrich, 2004). For example, SIFs increase the chances that an individual will enter into detoxification and treatment services, in part due to increased access provided by the SIF (D. Hedrich, 2004; Hedrich, 2010; Potier et al., 2014; Wood, Tyndall, Zhang, et al., 2006).

Safe injection facilities have the capacity to expand harm reduction services to the most vulnerable people who use drugs. Increasing access to safe and hygienic equipment serves to reduce the transmission of infectious diseases, which improves the health of the users themselves, while also protecting the broader public’s health. Furthermore, staffing a SIF with individuals who can properly respond to an overdose situation lessens the chance of a fatal overdose, while also preventing injury associated with an opioid overdose. Lastly, increasing access to essential services, including mental and physical health care, improves the health of people who use drugs, while also providing them with the option to enter detoxification and/or drug treatment services. SIFs provide an opportunity for the United States to address the opioid overdose epidemic, as well as drug use, from a unique perspective that can more fully impact the lives and health of people who use drugs.

## Recommendations for Safe Injection Facilities in the United States

Safe injection facilities have the potential to address the opioid overdose epidemic in a way that existing programs cannot. Syringe exchanges and naloxone distribution programs have provided people who use opioids with access to sterile equipment and a mechanism to reverse an overdose, respectively. However, there is still reluctance to contact emergency personnel in the event of an overdose, which increases the chances of mortality, especially if naloxone is not available. SIFs work to provide the benefits of a syringe exchange program (e.g. sterile injection equipment and access to social services) with trained staff members who can intervene in an overdose situation (Beletsky et al., 2008). The United States has a unique opportunity to explore SIFs as an option to combat opioid overdose, while also improving the health of people who use opioids, although it may require a shift in the way individuals think about drug use and people who use drugs.

The introduction of SIF in the United States will require cooperation from multiple entities, including state and local governments, law enforcement agencies, and public health officials and organizations. According to Beletsky et al. (2008), there is currently no law that expressly prohibits the establishment of a SIF. However, organizations would have to take into account how federal, state, and local governments will react to inevitable drug possession and the using of illegal substances on the premises (Beletsky et al., 2008). In countries that have established SIFs, it was commonplace for local and national governments to endorse harm reduction as a tenant of drug policy (Boyd, 2013; D. Hedrich, 2004). For example, when Canada was looking to establish INSITE, the Mayor of Vancouver endorsed harm reduction as a pillar of the city’s drug policy, along with prevention, treatment, and enforcement (Boyd, 2013). However, the United States has trended its drug policy towards complete abstinence from a substance, which, in the past, has made harm reduction strategies slow to catch on (MacMaster, 2004).

The adoption of harm reduction policies in the United States such as syringe exchanges and overdose prevention education and naloxone distribution, have ushered in new discussions surrounding the potentiality of SIFs. Beletsky et al. (2008) notes that knowingly permitting the possession and consumption of illegal drugs will be the largest barrier standing in the way of implementing a SIF. State legislators have the authority to implement SIFs, which would be the optimal route to take because it eliminate any questions regarding the legality of this establishment (Beletsky et al., 2008). Furthermore, this route will work to better ensure the cooperation of law enforcement officials, which is a crucial component of SIF implementation. However, if state legislation is not practical for SIF implementation, local governments may have the authority to establish this type of program for the health of their citizens, although it may be the most vulnerable to state and federal challenges (Beletsky et al., 2008).

An area of concern that is likely to arise when exploring the introduction of a SIF is the current federal drug law, which states do not have the authorization to nullify. The federal statute known as the Controlled Substances Act can be interpreted to prohibit a SIF, particularly the section that forbids the possession of drugs, which clients would be in violation of, and the section that makes it illegal for an entity to knowingly allow the possession and consumption of illegal drugs (Beletsky et al., 2008). Arguments can be made that the federal government may be overstepping its boundaries by interfering with a SIF, however it would be hard to predict how this would play out in the Supreme Court (Beletsky et al., 2008). Overall, the legal road to implementing a SIF would likely be a rocky one, albeit not impossible.

The political climate and legal environment are just two things that need to be considered when exploring the option of a SIF. Research needs to be conducted that addresses the intended target population and potential locations (D. Hedrich, 2004). The involvement of community stakeholders is critical when looking to establish a SIF, especially since the idea of these entities is still controversial and misunderstood (Strike, Watson, Kolla, Penn, & Bayoumi, 2015). Existing SIFs have aimed to target vulnerable users including those who experience homeless and are more likely to inject publically, individuals who have been injecting for long periods of time, and those who have infectious diseases (D. Hedrich, 2004; Semaan et al., 2011; Wood, Tyndall, Montaner, et al., 2006). The location should inevitably be an area that is accessible to the target population, which increases the chances of utilization, thus improving outcomes (D. Hedrich, 2004; Hedrich, 2010; Marshall et al., 2011). Public health officials will undoubtedly play a large role in researching the feasibility of these programs and should actively work with local communities and governmental agencies to further address the benefits that can be achieved through a SIF.

# conclusion

The epidemic of fatal opioid overdoses is one of the most significant public health problems in the United States. The treatment of pain as the fifth vital sign contributed to the increase in the number of prescription opioids being dispensed, without proper acknowledgment of the dangers (e.g. tolerance, dependence, withdrawal symptoms, and addiction) associated with chronic use of these medications (Brady et al., 2014; Dart et al., 2015; Nelson et al., 2015). The steady increase in overdose deaths associated with these medications has caught the attention of federal, state, and local authorities, which have been influential in the establishment of prescription drug monitoring programs and other systematic interventions aimed at reducing diversion and abuse of prescription opioids. However, as prescription opioids became harder to obtain and abuse, individuals began turning to heroin, which is cheaper and produces analgesic effects similar to, and greater than, prescription opioid medications (Compton et al., 2016; Dasgupta et al., 2014; Jones et al., 2015). During the years when overdose deaths attributed to prescription opioids declined, the rate of heroin overdose deaths began to rise.

The increase in fatal opioid overdoses, specifically heroin, has drawn attention to harm reduction strategies as potential interventions to reduce overdose deaths. Harm reduction is a framework that aims to reduce morbidity and mortality associated with drug using behaviors, while understanding that abstinence from drugs may not be desirable or attainable for some individuals (MacMaster, 2004; Reid, 2002). Harm reduction strategies have typically been used to reduce the spread of HIV, Hepatitis C, and other infectious diseases among individuals who inject drugs through the provision of sterile injection equipment and safe sex tools. Furthermore, the provision of naloxone has become a popular intervention among medical professionals and people who use opioids to reduce the number of fatal overdoses.

Recently, the provision of naloxone has become one of the most talked about strategies to reduce the number of opioid related overdose deaths. The provision of naloxone can be an effective tool in reducing the amount of overdose deaths, especially when put into the hands of people who use drugs (Behar et al., 2015; "Community-based opioid overdose prevention programs providing naloxone —united states, 2010," 2012; Gaston, Best, Manning, & Day, 2009). However, many states do not take into account additional policies that can be used in conjunction with distributing naloxone. For example, policies that grant immunity to physicians who prescribe naloxone to an individual who is at high risk for experiencing or witnessing an overdose will help to reduce overdose deaths among individuals who are prescribed long-term opioids(C. Davis et al., 2013). Additionally, “Good Samaritan” statutes, which protect individuals from drug possession prosecution, may increase the probability that someone will call emergency personnel in the event of an overdose. Expanding legislation to include immunity and Good Samaritan statues will serve to increase the effectiveness of naloxone distribution as a strategy to reduce the number of opioid overdose deaths.

Naloxone distribution, combined with complementary policies, can be an effective harm reduction strategy to reduce the number of opioid overdoses. Furthermore, SIFs can provide a unique opportunity to address the opioid overdose problem, while also reducing the spread of infectious disease, reducing public injecting, and decreasing injection drug related waste (i.e. syringes) (D. Hedrich, 2004; Hedrich, 2010). SIFs have been active in various European countries for decades and have been a successful harm reduction strategy to addressing morbidity and mortality associated with drug use (D. Hedrich, 2004; Hedrich, 2010; Potier et al., 2014). While overdoses do occur at SIFs, the likelihood of an individual dying from an overdose is lessened due to the presence of staff members who are trained to intervene in an overdose situation. Although it is unclear whether or not the presence of SIFs reduces overall drug overdose mortality rates, they have been shown to reduce overdose death rates in the immediate vicinity of the SIF, without increasing public disorder or crime (D. Hedrich, 2004; Marshall et al., 2011; Wood, Tyndall, Montaner, et al., 2006)

In the United States, the establishment of SIFs could be helpful in locations where public drug use and overdose deaths are especially burdensome. However, the federal, state, and local governments may need to rethink current approaches to drug policy prior to authorizing the opening of any SIF. Countries that have established SIFs have generally embraced harm reduction as a tenet of national drug policy, which is something the United States has not formally done (Boyd, 2013). The United States has largely embraced a criminal justice approach to substance abuse, although the recent crisis has shifted focus away from the criminalization of drug use to a more harm reduction based approach, as evidenced by the expansion of naloxone distribution programs throughout the country. However, the establishment and operation of SIF would likely be met with sharp opposition from groups and individuals who oppose harm reduction policies towards drug use, especially the opening of an entity that provides a safe and hygienic space for individuals to consume drugs (Kulesza, Teachman, Werntz, Gasser, & Lindgren, 2015; Strike et al., 2015). Advocates of harm reduction will largely be responsible for conducting and presenting research on the risks and benefits of opening a SIF, as well as how this particular service fits the scope of current drug policy in the United States. Overall, the creation of SIFs should not be ruled out as a potentially effective harm reduction strategy to reduce fatal opioid overdoses in the United States.

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