Review of Literature on Community Opioid Overdose Prevention Programs

We performed a literature search for articles published between 1946 and July, 15th 2016 that focused on evaluating the effectiveness of various community-level interventions with the goal to reduce opioid and heroin-related overdose deaths (see appendix for search terms). The articles were reviewed and then categorized by the type of intervention. The benefits and disadvantages for each intervention are also detailed below.

Intervention 1: Naloxone Distribution

Intervention	Dispensing location	Benefits	Disadvantages/Barriers
Naloxone Distribution	Co-prescription with opioids	Opioid-related ED visits decreased in spite of no net change in opioid dosage.[1] Enhance patient understanding of risks of opioids, promoting safer use behaviors, and preventing mortality.[2]	Lack of consensus about who should be prescribed naloxone.[1,2] Not standard practice therefore certain providers may not follow recommendations for prescribing.[1]
	Pharmacy-based Naloxone	Pharmacies are widely accessible, especially in rural and underserved areas.[3,4] Expands the reach of naloxone to individuals beyond those currently served by community-based and harm reduction organizations.[5]	There is a lack of training, inadequate knowledge of state laws, and inability to identify people who should receive naloxone.[3] Financial and reimbursement issues.[6] Different dispensing policies between pharmacists.[7]
	Health Service / Drug treatment	Take home naloxone programs can be implemented in clinic and drug treatment settings using existing resources.[8] There was increased uptake at a primary health care facility to high risk individuals compared to a drug treatment center.[8] On-site staff: May improve therapeutic relationship with patients, consistent access to patients, and increased staff overdose expertise.[9] Outside staff: low burden on staff and fosters relationships between different agencies.[9]	Services delivered at a drug and alcohol treatment facility had decreased uptake due to the perception that naloxone use indicated continued drug use.[8] Treatment programs are sometimes not supportive of pharmacological interventions.[10] On-site staff: patients may not disclose substance use and overdose rescue reports.[9] Refills can be limited.[9] Outside staff: subject to staff agency availability.[9]

Intervention	Dispensing location	Benefits	Disadvantages/Barriers
Naloxone Distribution	Family Members	Family member's ability to recognize an overdose and comfort assisting increased. There was also an increase in patient and family member satisfaction.[10] Uptake may be enhanced in a family support group setting.[11] Participants had a greater sense of security and confidence and higher degree of involvement.[11] Improvement in knowledge and positive attitudes surrounding overdose management.[12]	No notable disadvantages or barriers were identified in these studies.
	Prisons	Link of substance use and mortality within short time periods after release from prison.[13]	Confusion amongst prisoners about the message as substance abuse treatment focuses on abstinence.[13] Concern for unintended consequences of having a kit in their presence when released – fear of police/probation violation.[13]
	Hospital Based	High-frequency of opioid-related ED.[14] Reaches a high-risk population of opioid users.[14] Clinical settings such as hospitals are potential venues for education programs, and suggest that injection drug users at the highest risk for dying from an opioid overdose do access care from hospitals with some frequency.[15]	Not every overdose will be taken to the hospital.[15]
	Needle Exchange Program	Minimal funding is needed to implement a distribution program at an existing needle exchange site.[16,17] Participants can successfully recognize and administer naloxone to reverse potentially fatal overdoses.[17] Several users returned for multiple refills.[18] Informal networking for overdose prevention programs.[18] Program staff supports distribution of naloxone and training.[19]	Flexibility is essential to adapt training and distribution based on the patient population at each needle exchange program.[19]

Overarching Conclusion Regarding Naloxone Distribution: It has been well established that overdose education and naloxone distribution can decrease overdose mortality in a community.[20] The World Health Organization has called for increased access to naloxone for community members likely to witness an overdose in the prehospital setting.[21] There are multiple avenues by which to distribute naloxone within the community, each with its own advantages and disadvantages.

Intervention 2: Medication-Assisted Interventions

Intervention	Specific Treatment	Benefits	Disadvantages/Barriers
Medication Assisted Therapy for Opioid Abuse	Naltrexone	Naltrexone has no abuse or diversion potential, no risk of physical dependence, does not require regulatory permission to prescribe, and has efficacy in patients across a range of demographic and severity characteristics.[22] There is some evidence that persons with opioid use disorder who receive naltrexone have similar or lower cost and less substance related inpatient utilization than patients treated with other therapies.[22,23] Naltrexone has been shown to have lower rates of relapse than other forms of treatment among various populations[24-26] with sustained-release naltrexone implants found to be more effective than oral[25].	Naltrexone requires a 7-10 day period of opioid abstinence prior to administration.[22] Sustained-release naltrexone implants can cause site irritation and wound infections.[25] Extended patient follow-up may be required to allow positive changes in opioid use.[23] Naltrexone implant therapy has been associated with an increase in non-opioid drug-related morbidity[23].
	Methadone Maintenance	Proven effective in terms of treatment retention, reduced heroin use and criminal activities, and improved general health and social outcomes.[23] Methadone treatment is associated with significantly greater reductions in heroin use than outpatient counseling or methadone detoxification programs.[27,28] Methadone treatment is strongly related to decreased mortality from natural causes and from overdoses.[29]	No significant change or long-term benefit in reducing drug-related hospital morbidity.[23] Newly discharged patients are at a higher risk of overdose death than those individuals who remain in treatment.[27,30] Methadone treatment has been associated with elevated risk for non-opioid drug overdose in some populations.[23]
	Buprenorphine	Buprenorphine is a partial agonist at the mu-opioid receptor decreasing its toxicity in overdose or misuse.[31] Buprenorphine is a viable treatment option for office based opioid substitution therapy.[32,33]	Common barriers to treatment were negative attitudes toward use of agonist pharmacotherapy, payment environment, and physician prescribing capacity.[34,35]

Overarching Conclusion Regarding Medication Assisted Therapy: Opioid substitution therapy can increase quality of life among participants over time and that improvement in quality of life is one of the most important variables to a reduction in drug use.[36] Most opioid related fatalities are not associated with maintenance therapies.[37] Naltrexone treatment has been found to be effective in preventing relapse and reducing opioid-related hospital morbidity in those who are opioid dependent.[23,24] Methadone and buprenorphine are effective treatment options, however methadone treated patients are at risk for overdose and there is limited physician buprenorphine prescribing capacity.[30,34,35]

Intervention 3: Provider Prescribing Regulations

Intervention	Benefits	Disadvantages/Barriers
Prescription Drug Monitoring Program	Data can identify patients and communities at increased risk of overdose.[38] The PDMP can provide clinicians and public health agencies with the occasion to intervene.[38] Provides timely, population-based metrics by demographic characteristics and state to inform prescribing practices.[39-41] Both a legislative intervention and the introduction of a prescription monitoring program can lead to significant reductions in the prevalence of potentially inappropriate prescribing of monitored drugs.[40,41]	Provider education and studies on how to evaluate and respond to PDMP data are needed.[38] Varying clinician willingness to regularly access and utilize.[38] PDMPs are unable to identify many important sources of diversion.[40] Further improvements are needed to improve accuracy, accessibility and interpretability of the data.[40] More regulations on prescribing and limiting the availability of prescription opioids may result in an increase in heroin deaths.[40]

Overarching Conclusion Regarding Provider Prescribing Regulations: This type of initiative is popular for its ability to easily supply medical providers with prescription histories of patients in order to determine potential medication abuse or diversion.[40] Although increasing PDMP use can decrease the number of opioid prescriptions written, the impact of PDMPs on reducing the misuse of prescription drugs is dependent on the people utilizing the system as well as the quality of the PDMP system.[41]

Intervention 4: Overdose Prevention Education and Training of Users and/or Layperson Bystanders

Intervention	Benefits	Disadvantages/Barriers
Overdose Prevention Education/ Training	Overdose prevention and response training programs are associated with improvements in knowledge and overdose response behavior among users.[12,42] Injection drug users are generally responsive to health promotion programs[29] and want to help their peers.[43] Can improve confidence of family members who care for a user, including the unintended result of a support collective.[11] Education of users can be brief in order to increase recognition and management of an overdose since they tend to have an advanced knowledge base before any training.[44] Demand for training among family members can be high.[16] Trained laypersons have high rates of successfully reviving a user during an overdose.[18,45] Potential for secondary training - knowledge to be passed from participants to their social networks.[46]	Due to the rapid changes that take place in the illicit drug market, programs need to be flexible to effectively impact behavior change.[47] Naloxone administration is often self-reported and not all overdoses are likely to be documented. Trainees who received naloxone may not keep it on their person or in the place near where they or the user takes the drug.[48] Some families and users not involved in education and training programs can feel stigmatized and isolated.[11] Users can't use naloxone on themselves so they need someone with them who is trained on overdose prevention.[49] Since demand can be high, capacity may have to be expanded which means an increase in resources.[16] Trainees who administer naloxone to an overdosing user who is then revived may not feel the need to call paramedics, particularly to avoid having law enforcement respond to the scene.[18,45] Some neighborhoods may not want to have training programs to avoid the image of being associated with drug users.[18] Some participants in naloxone trainings can be afraid to use it and can continue utilizing inappropriate rousing methods on a user who has overdosed.[43]

Overarching Conclusion Regarding Overdose Prevention Education and Training of users and/or Layperson Bystanders: Overdose prevention education programs for users and/or Layperson Bystanders can increase knowledge, comfort, response behavior and confidence in responding to an overdose.[12,29,42] Not only are these programs successful in reversing an overdose but they are also in high demand.[16,18,45] Estimates of use are likely underreported and overdose education with naloxone distribution is dependent on a peer being present to use them on the person who has overdosed.[48,49]

Intervention 4: Training Law Enforcement in Non-Enforcement Responses to Overdose

Intervention	Benefits	Disadvantages/Barriers
Training Law Enforcement in Non-Enforcement Responses to Overdose	Having positive experiences with law enforcement officers at the scene of an overdose (e.g., receipt of medical assistance and appropriate referrals) could help minimize fears and increase the likelihood that users will seek emergency medical assistance in the event of future overdoses.[14,15] Overdose prevention and response, which included law enforcement-administered naloxone, were viewed as components of community policing and good police-community relations.[50] Officers noted improvements in self-efficacy, changes in attitude toward drugs and overdose prevention, and became more informed about Good Samaritan laws which renders them better able to respond during a drug-involved emergency.[51] Correctional facility staff and parole officers acknowledge the need for naloxone in their communities.[52] Discussions between drug user representatives and law enforcement led to a shift in officer focus from regarding an overdose as a crime to a health concern.[53]	Participants who had been arrested for drug possession were significantly more likely to report experiencing a recent overdose.[14] Fear of police could lead to rushed injections which thereby increases the risk of overdose.[14] Users may fear calling 911 due to fear of a police response which might lead to arrest.[15] Law enforcement officers trained in overdose prevention may need to receiving continuing education for knowledge to be retained.[51]

Overarching Conclusion Regarding Training Law Enforcement in Non-Enforcement Responses to Overdose: Having positive experiences with law enforcement officers at the scene of an overdose could help minimize fears and increase the likelihood that users will seek emergency medical assistance in the event of future overdoses.[14,15] Education of law enforcement can lead to a shift in officer attitude concerning overdoses from a broken law to a public health concern.[50,53]

Intervention 5: Supervised Injection Facilities

Intervention	Benefits	Disadvantages/Barriers
Supervised Injection Facilities	Supervised injection facilities attract high attendance of many different drug users from communities and initiate referrals to counseling and other support services[29,54] as well as providing education while users are at the site.[55] Injection facilities provide an environment where users who experience opioid-related overdose received early treatment and effective care, thereby obviating the need to utilize ambulance services.[55] Injection facilities reduce public drug use and injection-related waste in the community and potentially prevent accidental overdoses and transmission of blood-borne infectious diseases.[56]	Not every injection is supervised at injection facilities.[29,54] Increasing capacity and hours of supervised injection facility can be costly.[29] Injection facilities with a fixed location could limit the amount of users with access.[56] Injection facilities have limited capacity in spite of high demand. Rules that prohibit drugs being shared among users and police presence at facility entrances could potentially reduce user's willingness to utilize injection facilities.[58]

Overarching Conclusion Regarding Other Interventions: Supervised injection facilities are an effective form of harm reduction.[54,55]

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Appendix

MESH Search Terms

1 exp Community Health Services/ or exp Community Mental Health Services/ or communit*.mp. or neighbor*.mp. or program*.mp. (1350726)
2 exp ambulatory care facilities/ or ambulat*.mp. or clinic.mp. or clinics.mp. or residential*.mp. (416100)
3 1 or 2 (1677776)
4 exp Naloxone/ or exp Buprenorphine, Naloxone Drug Combination/ (23257)
5 (naloxone* or narcan*).mp. (24919)
6 4 or 5 (30279)
7 3 and 6 (1106)
8 limit 7 to english language (1052)
9 exp *Naloxone/ or exp *Buprenorphine, Naloxone Drug Combination/ (9925)
10 (naloxone* or narcan*).ti. (5581)
11 9 or 10 (10391)
12 8 and 11 (573)