



A scoping review of post opioid-overdose interventions

Sarah M. Bagley^{a,b,c,*}, Samantha F. Schoenberger^a, Katherine M. Waye^a, Alexander Y. Walley^{a,c}

^a Clinical Addiction Research and Education Unit, Section of General Internal Medicine, Department of Medicine, Boston University School of Medicine/Boston Medical Center, Boston, MA 02118, United States of America

^b Division of General Pediatrics, Department of Pediatrics, Boston University School of Medicine/Boston Medical Center, Boston, MA 02118, United States of America

^c Grayken Center for Addiction, Boston Medical Center, Boston, MA 02118, United States of America



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ABSTRACT

Introduction: Nonfatal opioid overdose is a significant risk factor for subsequent fatal overdose. The time after a nonfatal overdose may provide a critical engagement opportunity to both reduce subsequent overdose risk and link individuals to treatment. Post-overdose interventions have emerged in affected communities throughout the United States (US). The objective of this scoping review is to identify US-based post-overdose intervention models (1) described in peer-reviewed literature and (2) implemented in public health and community settings.

Methods: Using the adapted PRISMA Checklist for Scoping Reviews, we searched PubMed, PsychInfo, Academic OneFile, and federal and state databases for peer-reviewed and gray literature descriptions of post-overdose programs. We developed search strings with a reference librarian. We included studies or programs with at least the following information available: name of program, description of key components, intervention team, and intervention timing.

Results: We identified a total of 27 programs, 3 from the peer-reviewed literature and 24 from the gray literature. 9 programs operated out of the ED, while 18 programs provided post-overdose support in other ways: through home or overdose location visits, mobile means, or as law enforcement diversion. Commonly, they include partnerships among public safety and community service providers.

Conclusions: Programs are emerging throughout the US to care for individuals after a nonfatal opioid overdose. There is variability in the timing, components, and follow-up in these programs and little is known about their effectiveness. Future work should focus on evaluation and testing of post-overdose programs so that best practices for care can be implemented.

1. Introduction

Opioid-related deaths continue to increase in the U.S. and now surpass motor vehicle accidents as a leading cause of injury-related death (*Preventable Deaths: Odds of Dying*, 2017). For the last three years, decreases in life expectancy in the United States have been attributed, in part, to increasing opioid-related deaths (Ho and Hendi, 2018). Key responses to this public health crisis have been to increase access to medication treatment (buprenorphine, methadone, and naltrexone) and increase availability of naloxone, the antidote to an opioid overdose (*CDC's Response to the Opioid Overdose Epidemic*, 2019; Division (DCD) DC, 2018). Additional promising strategies include identifying high-risk settings (like emergency departments) and individuals (those prescribed high doses of opioids for chronic pain) to facilitate linkage to appropriate services (Division (DCD) DC, 2018; Vivolo-Kantor et al., 2018).

Individuals who survive an overdose are a particularly high-risk group. Prior overdose significantly increases risk for repeat nonfatal and fatal overdose (Olsson et al., 2018; Caudarella et al., 2016; Coffin et al., 2007; Stoové et al., 2009; Gjersing and Bretteville-Jensen, 2015). From a public health perspective, the time after a nonfatal overdose provides an opportunity to identify high-risk individuals and engage them in treatment and harm reduction to reduce their future overdose risk. The standard of care after an opioid overdose would include the following steps: call 911, begin rescue breathing or chest compressions if indicated, administer naloxone (the overdose recovery drug), and stay with the individual until help arrives. There is however significant variation in what actually happens. In some cases, an individual will receive naloxone “in the field” by a bystander or emergency responder. Although overdose education includes calling 911, that step is not always followed. In the cases that emergency personnel respond to an overdose, individuals are transported to a hospital (if willing) where

* Corresponding author at: Boston Medical Center, Crosstown 2, 801 Mass Ave, Boston, MA 02118, United States of America.

E-mail address: sarah.bagley@bmc.org (S.M. Bagley).

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they may receive additional naloxone if needed. Hospitals vary in terms of protocols for post-overdose care like that of time monitored in the emergency department, what services are offered in the ED or after, and whether a patient is admitted for inpatient monitoring. However, survivors do not usually seek treatment or overdose risk reduction services immediately after an overdose for a variety of reasons. A randomized controlled trial among emergency department (ED) patients with opioid use disorder (OUD) found patients who initiated buprenorphine/naloxone within the ED, relative to those who received an appointment for a non-ED provide had better engagement in addiction treatment and reduced opioid use. However, only 8.8% of the study participants were overdose survivors (D'Onofrio et al., 2015). For some individuals, shame and stigma may be significant barriers to entering treatment (Paquette et al., 2018; Luoma et al., 2007; Wakeman, 2019). For others, they may not be interested in medical care and referral to substance use treatment (Pollini et al., 2006; Vilke et al., 2003; Wampler et al., 2011; DiClemente et al., 2004). Fundamental to the compulsiveness of opioid use disorder is to treat one's withdrawal and cope with social stigma by using opioids (Braun-Gabelman, 2016). The challenge faced by post-overdose programs is to engage high-risk individuals at a time when they are particularly vulnerable and driven to relapse and continue opioid use. Despite the potential importance of intervening during this critical post-overdose window, there are no established standards of care for individuals (or support for their families or loved ones) post-overdose. Communities are developing and implementing programs to leverage this opportunity, but there is a gap in understanding the variety of programs and their effectiveness.

Formica et al. reported the emergence of post-overdose programs that involved police and fire departments in Massachusetts. They conducted a statewide survey of police and fire departments in 2016 and documented 20 community-based, collaborative, post-overdose programs that connected overdose survivors and their personal networks with support services or addiction treatment services (Formica et al., 2018). Each of these programs was affiliated with a police or fire department and all reported that their program targeted individuals who had recently experienced an overdose. Half of them reported that they also tried to engage with the social network of the overdose survivor. Almost all of the programs (18/20) identified the increase in fatal and nonfatal overdose cases, substance-related crime, and/or opioid-related emergency service calls a reason they emerged.

In the current study, we conducted a scoping review to understand how broadly post-overdose intervention programs are emerging nationwide in diverse settings. A scoping review maps out the literature, similar to a systematic review, but is most useful as an approach when the scientific evidence is emerging and a systematic review would otherwise be limited (Peters et al., 2015; Munn et al., 2018; Tricco et al., 2018). The objective of this scoping review is to identify post-overdose intervention models (1) described in the peer-reviewed literature and (2) implemented in public health and community settings. The results of this review will help to identify knowledge gaps and provide guidance on necessary next steps to further refine, implement, and evaluate post-overdose programs.

2. Methods

2.1. Design

We conducted a scoping review using the PRISMA checklist for Scoping Reviews (Tricco et al., 2018) (Appendix A).

2.2. Eligibility criteria

We confined our search to articles published from 1999-January 2019. Articles had to specifically describe a specific post-overdose program. We defined a post-overdose program as one that targets an individual who has recently experienced an overdose. We also included

programs that provided post-overdose services to families or friends of the overdose survivor. We did not include articles that were reviews or descriptions of multiple programs. For peer-reviewed manuscripts, we included articles if at least the following variables were described: 1) name of the program, 2) description of key components, 3) intervention delivery (i.e. location, intervention team), 4) timing of intervention, 5) follow-up procedures, and 6) outcomes. For the articles from the gray literature we included articles that included the 1) name of the program, 2) description of key components, 3) intervention delivery, and 4) timing of intervention. We did not require follow-up procedures or outcomes for inclusion of the gray literature search, because we wanted to maximize the number of programs that we could identify recognizing that community-based programs may not have the resources to report follow-up or outcomes. Consistent with the Cochrane Review definition, we defined gray literature as literature not published in books or journals (Higgins and Green, 2011). These are programs that may be described on websites or in newspapers but not published in peer-reviewed journals.

We also did not include articles that noted a “need for development of post-overdose interventions” or called for funding applications for such interventions. We consulted with a research librarian at the Boston University Alumni Medical Library in the development of the search approach and search terms.

2.3. Information sources

We searched the following databases for peer-reviewed literature: PubMed, PsychInfo, and Academic OneFile. Academic OneFile is a database containing both peer reviewed journals as well as articles from the lay and gray literature. In addition, we searched the following federal websites: Centers for Disease Control and Prevention, National Institute on Drug Abuse, The Agency for Health Care Research and Quality, Substance Abuse and Mental Health Services Administration, and Health Resources and Services Administration. We used Advanced Google Searching to identify articles on state government websites (“.gov”) and “.org” domains.

2.4. Search

The following search terms were utilized and modified if necessary for the search: post overdose, after an overdose, following an overdose, overdose outreach, post-opioid overdose. See Appendix B for a complete list of search terms organized by database.

2.5. Selection of evidence

For PubMed, PsychInfo, and Academic OneFile, we reviewed the title, abstract, and key words for each entry and determined if the item described a post-overdose program. The full text of each article was stored in Zotero reference management software, and key variable data extracted. For Advanced Google Searching of “.gov” and “.org” domains, we reviewed the title and summary lines under each entry for relevancy. Material that met inclusion criteria was stored in Zotero, and key variable data extracted. As indicated above, in cases that we discovered multiple articles describing the same program, we collected all data possible, but the findings were considered as one unique program. We reviewed the references of articles to find additional articles that met our inclusion criteria. If the titled in a reference list seemed relevant to our objectives, we reviewed the reference and deemed inclusion based on our criteria. We sought further clarification for gray literature programs through a follow-up google search if the search material did not provide the criteria for inclusion.

2.6. Program characteristics collected and qualitative synthesis of results

We collected the following program characteristics: research study

or program in the community, target population, location of the program (i.e. emergency department), who delivered the intervention and that person's training if available, collaborations (i.e., health department, police department), timing of the intervention after the overdose, components of the intervention (i.e., naloxone training, referral to substance use treatment), follow-up, outcomes, funding, and notes regarding challenges or successes. In order to summarize the components of the programs, we created a table with the following variables: name of program/location, intervention team, timing of intervention, components of intervention, collaborations, intervention follow-up, and funding. After we started to review programs, we recognized that it would be possible to categorize the programs based on location: emergency department-based, emergency department and home-based, home and/or overdose venue-based, mobile/not site-specific outreach, and diversion programs. We did not include outcomes in the table because the objective of this review is to describe the existing models, but for the three programs identified in the peer-reviewed literature the summary of outcomes is provided in the text of the results.

3. Results

The electronic databases (PubMed, PsychInfo and Academic OneFile) yielded 3633 articles, with 61 fulfilling the inclusion criteria (Fig. 1). The federal website search (State .gov, NIDA, AHRQ, CDC, HRSA, SAMHSA, .gov advanced google search) yielded 507 articles, with 86 meeting inclusion criteria (Fig. 2). The Advanced “.org” search generated 129 articles, with 32 meeting inclusion criteria (Fig. 3). From the articles that met inclusion criteria, we identified and described 27 unique post-overdose programs for qualitative synthesis. Twenty-four were identified in the gray literature and three in the peer-reviewed literature.

The programs were organized into five categories based on timing, setting, and collaborations – emergency department-based, emergency department and home-based, home and/or overdose venue-based, mobile/not site-specific outreach, and diversion programs (Table 1). Many of the programs were based exclusively in the emergency department (ED) (9/27). Individuals were either approached while still in the ED for a non-fatal overdose or within one week after discharge. Several programs operated both in the ED and home setting (3/27). Other post-overdose programs were based in the community (10/27), where follow-up occurred in the homes or venues where the overdose took place. These programs often relied on collaboration between fire departments, law enforcement, emergency medical services, and public health departments to generate lists of individuals or households that required follow-up after an overdose. These lists were commonly compiled through emergency medical service or law enforcement

records of overdose response. These follow-up teams typically consisted of a police/fire/sheriff's officer and health clinician or harm reduction specialist. Follow up usually occurred between 2 and 7 days after the non-fatal overdose and often included support and referrals for friends and family. Additionally, there were 4 programs that were “mobile” or non-site-specific. Survivors were met by the intervention team in the ED, at home, or someplace else in the community. Finally, one program we identified adopted a jail “diversion” model, with law enforcement officers offering quick connections into treatment. Programs that responded to individuals in their place of residence were more likely to report specific outreach to or training of family members (Ciolino, 2018a; Vestal, 2017a). Regardless of the intervention setting, the post-overdose program activities typically offered the individual referral to treatment or other social services, overdose prevention education, provision of naloxone, and peer recovery consultation. Three programs incorporated immediate initiation of medication for opioid use disorder in the emergency department while two programs discussed collaborations with faith-based groups in their outreach approach.

There were three programs identified in the peer reviewed literature: AnchorED, Lifespan Opioid Overdose Prevention program (LOOP), and Tailored Telephone Interview delivered by Peers to Prevent Recurring opioid overdoses (TTI-PPR) (Samuels et al., 2018; Samuels, 2014; Winhusen et al., 2016). AnchorED was established in 2014 in Rhode Island and provides on-call peer recovery specialists for patients with an opioid overdose or other substance use related problem in all Rhode Island EDs. From July 2016 to June 2017, AnchorED made 1392 contacts. Of those, 87% agreed to see a peer recovery specialist, 89% received naloxone training, and 51% agreed to a service referral. The Lifespan Opioid Overdose Prevention (LOOP) program in Rhode Island provides opioid overdose patients with naloxone, patient education on the use of naloxone, and ED consultation with a peer recovery coach from AnchorED. Samuels et al. reviewed charts in the six months after LOOP was implemented in two Lifespan Hospital EDs. The primary outcomes of interest were initiation of medication treatment for opioid use disorder, repeat ED visit for overdose, and all-cause mortality one year after index overdose. During the study period, 151 charts of unique patients were reviewed. Of those, 40% received usual care, 17% received naloxone, and 43% received naloxone in addition to consultation with a peer recovery specialist. Twenty-nine percent initiated medication for opioid use disorder in the year following the ED visit, 20% were treated for a repeat opioid overdose in the following year, and 7% died within a year. The details of the Tailored Telephone Interview delivered by Peers to Prevent Recurring opioid overdoses (TTI-PPR) program are in Table 1. This program identified survivors of nonfatal opioid overdose treated in an ED and provided up to three follow up phone calls. The objective of the intervention was to

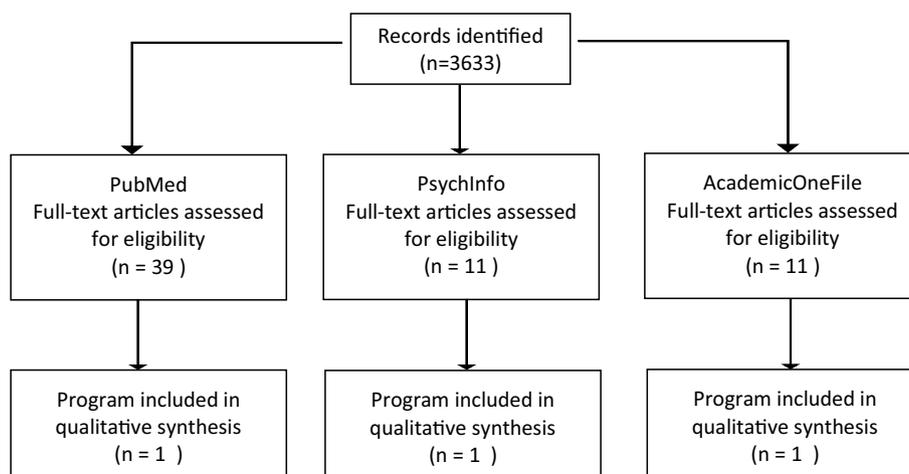


Fig. 1. Database search (PubMed, PsychInfo, AcademicOneFile).

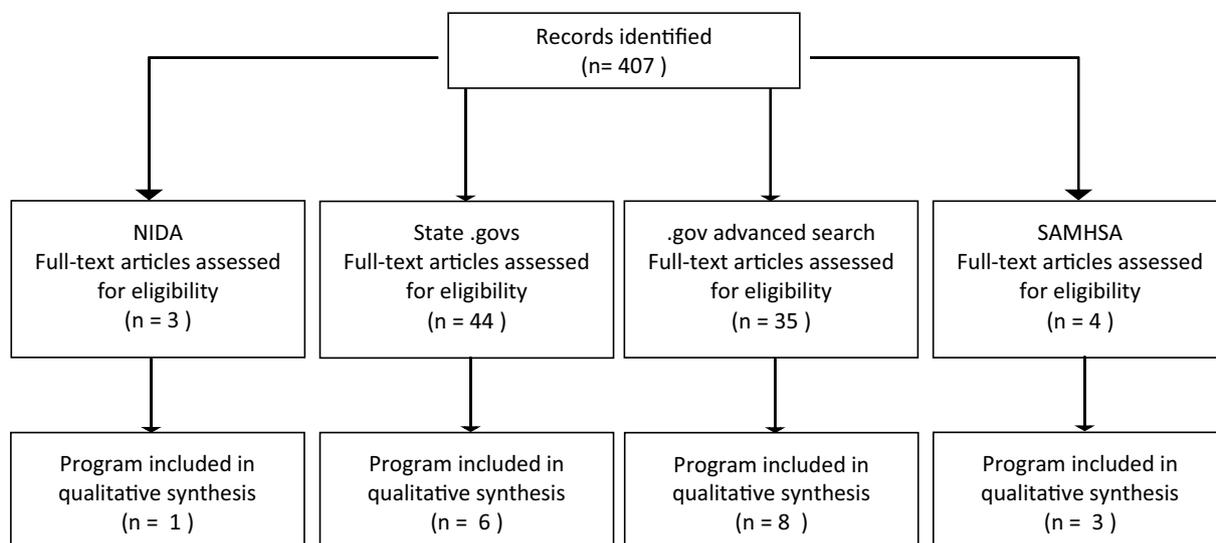


Fig. 2. Federal website search (State .gov, NIDA, AHRQ, CDC, HRSA, SAMHSA, .gov advanced google search)*.

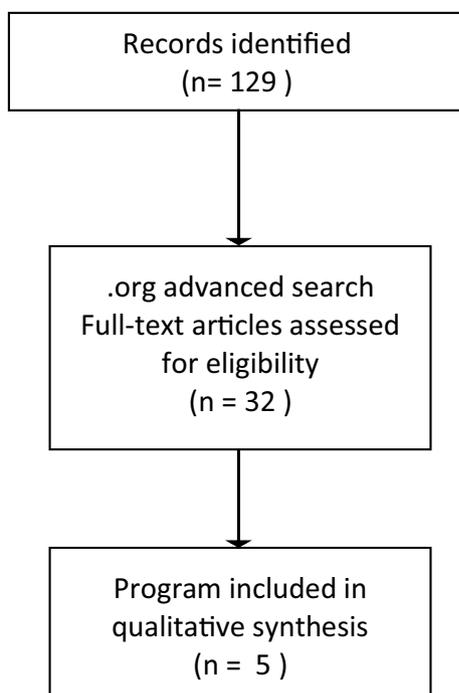


Fig. 3. Advanced .org search.

encourage survivors to initiate treatment with medication and increase opioid overdose knowledge. The intervention team was able to reach eight of the 141 individuals treated for overdose in the eight months prior. Based on the small number of participants recruited, it was not possible to draw conclusions although they noted that among the participants, all rated the intervention as very helpful and opioid overdose knowledge increased. No difference was detected in interest in medication treatment among the eight who participated.

4. Discussion

In this scoping review of post-overdose programs, we found that 27 programs have been either tested or implemented across the United States. The majority of the programs were identified through the gray literature. Three of the programs have been reported in the peer-reviewed literature. These programs are examples of public health

innovation in the U.S. at the local level, where front-line personnel address emerging health challenges by developing programs that defy traditional silos and, at times, contravene formal and informal norms in search of pragmatic solutions. These programs represent inventive tertiary prevention approaches with an unproven promise to reduce opioid-related mortality by engaging overdose survivors, the single highest risk population of all people who use opioids.

As expected, naloxone training and distribution and linkage to addiction treatment were core features of most of the programs. Immediate initiation of medication for opioid use disorders in the emergency department was explicitly mentioned in three of the programs. In addition, many programs were peer-based. Peer support or peer navigation models have been found to be effective in HIV (Cabral et al., 2018; Cunningham et al., 2018; Roland et al., 2017) care and other chronic illnesses (Sledge et al., 2011; Broadhead et al., 2002; Grebely et al., 2010; Norman et al., 2008; Purcell et al., 2007). In qualitative studies with participants who have experienced overdose, individuals reported greater comfort talking with a peer and felt that the peer had more credibility based on shared experience (Bardwell et al., 2018). Although controlled trials of peer specialists or recovery coaches and their relationship to substance use and overdose outcomes have yet to be completed, there is accumulating evidence that including peers has positive effects on engagement (Bassuk et al., 2016) and retention (Tracy et al., 2012) in care. Although recovery coaches or peer specialists were commonly used, there is significant variation in the background and training of these individuals. Some states have moved towards reimbursement for peer models and have specific certification requirements. However, progress for reimbursement and standardization of training varies by state and it is therefore difficult to compare these programs. Bardwell et al. in British Columbia, Canada (Bardwell et al., 2018) conducted a qualitative study of peers who developed a peer witness injection program in response to the growing number of fatal overdoses. They found a shared sense of collective responsibility that arose among shelter residents. As more peer-based programs are implemented, the role of collective responsibility should be further explored vis-a-vis overdose risk reduction and treatment engagement. After we had completed our search for this paper (in January 2019), Powell et al., published the results of a qualitative study of participants in the Opioid Overdose Recovery Program (OORP) in New Jersey (Powell et al., 2019). Their findings were consistent with prior studies of using peers (their lived experience helped build trust with the survivors) but they also identified other barriers such as lack of ways to communicate for follow-up, survivors with no IDs, lack of insurance,

Table 1
Post-overdose outreach programs identified in the peer reviewed and gray literature, 2019.

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Emergency department-based Peer to peer Project (CABQ, n.d.; Congressional New Mexico Delegation, 2017) Albuquerque, NM	Certified peer specialist	Post-overdose in the hospital	Peer specialists offer support in the hospital Crisis outreach and support team connect family members and survivors of a non-fatal overdose with treatment information and listings of community-based peer engagement specialists Distribution of take-home naloxone and overdose prevention education and overdose prevention with peer recovery Specialists for addiction treatment and recovery navigation after an emergency department visit	University of New Mexico Hospital Emergency Department City Police Department Crisis outreach and support team Bernalillo County Opioid Accountability Initiative RI Department of Health's Overdose Prevention and Response Coalition Lifespan Health System Anchor Recovery Program Health System	Not specified	US Department of Justice 3-year grant
Lifespan Opioid Overdose Prevention (LOOP) Program (Samuels et al., 2018) Providence, Rhode Island	Hospital staff and clinicians Peer Recovery Specialists from AnchorED	Post-overdose in the hospital	Local Emergency Medical Services agency administers naloxone and automated alert notifies POINT team members to meet overdose patients in the emergency department Outreach workers: in the emergency department evaluate readiness for change, conduct brief intervention and assessment of high-risk behaviors, offer motivational interviewing-informed harm reduction counseling, and treatment referrals	Indianapolis Emergency Medical Services Eskenza Emergency Department Indiana University Midtown Mental Health	Peer recovery specialists document and agree on a follow-up plan with the patient	Hospital administration covers naloxone
Project POINT (Planned Outreach, Intervention, Naloxone, and Treatment) (Project POINT, n.d.; Brucker, n.d.; Medication Treatment for Opioid Use Disorder in the Emergency Medicine Setting, n.d.; Brucker et al., n.d.) Indianapolis, IN	Emergency medical services paramedics Outreach workers (either recovery coaches or care coordinators) Certified by the Indiana Counselors' Association on Alcohol and Drug Abuse	Post-overdose in the hospital	Naloxone education and kit provision (not specified if in ED or at home follow-up) Contracts with county-wide organizations Engage overdose survivors and their families to provide non-clinical assistance, recovery supports, and appropriate referrals for assessment and substance use disorder treatment Emphasis on addressing immediate needs and recognizing that not everyone is ready for substance use disorder treatment	Indianapolis Emergency Medical Services Medical Services Department Indiana University Midtown Mental Health	Medication for opioid use disorder assessment within 1–2 business days after discharge 2-week engagement with recovery coaches every 2–3 days “until the patient is successfully engaged in recovery services.” Accompany patients to intake appointments, criminal justice, or child welfare meetings May re-engage at any point	Hybrid type I effectiveness randomized controlled trial funded by National Institute on Drug Abuse currently being conducted
Opioid Overdose Recovery Program (OORP) (Governor Christie Visits Monmouth Medical centers Recovery Coaches Program for Overdose Survivors, 2016) 20 New Jersey counties	Peer recovery specialists (at least 2 years of lived recovery experience) Patient navigators (professional experience in health services, social work)	Post-overdose in the hospital	Engage overdose survivors and their families to provide non-clinical assistance, recovery supports, and appropriate referrals for assessment and substance use disorder treatment Emphasis on addressing immediate needs and recognizing that not everyone is ready for substance use disorder treatment	New Jersey Department of Human Services' Division of Mental Health and Addiction Services (DMHAS) New Jersey Department of Children and Families (DCF) Governor's council on alcoholism and drug abuse (GCADA)	Regular follow-up and on-call support up to 8 weeks after the overdose event	DMHAS, DCF, GCADA State of NJ
EPICC (Engaging Patients in Care Coordination) (Munz, 2017; EPICC Project, n.d.; Engaging Patients in Care Coordination (EPICC), 2017) St. Louis, MO	3 Department of Mental Health-certified substance use treatment providers Recovery coaches (RC)	Post-overdose in the ED	Overall objective is to effectively link individual at a point of crisis to community-based care via RC in the hospital Dispatched through Behavioral Health Response's 24/7 call center Medication first approach: OD survivors receive buprenorphine in ED and a bridge prescription until they treatment appointment	2 healthcare systems State Department of Mental Health Recovery support service organizations	Recovery coaches follow up with patients 1 month, 3 months, and 6 months after overdose incidence	Federal/State Targeted Response to the Opioid Crisis grants through Department of Mental Health and SAMHSA

(continued on next page)

Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
IRPSI (Indiana Recovery and Peer Support Initiative) (CABQ, n.d.; Congressional New Mexico Delegation, 2017; Kóbin, n.d.) Indiana (any emergency department within the state is eligible)	Certified recovery coaches	Post-overdose in the hospital	<p>Patient paired with RC: education about community resources, naloxone education</p> <p>Admissions to Department of Mental Health-funded treatment programs</p> <p>Expedited access to individual and group therapy and psychoeducation; recovery coach-only support (engagement with recovery coaches only, no other formal services) – Expanding in FY2019 to provide services at the site of the overdose for those who refuse transport to the ED</p> <p>Recovery coaches provide emergency department screening and assessment; substance use disorder, immediate counseling and intervention (10–15 min), referral to treatment, and discussion of treatment options, link with referral Buprenorphine available for department administered in the emergency department</p> <p>Modelled on DONofrio et al., 2015 and Project POINT (Division (DCD) DC, 2018; Wakeman, 2019)</p>	<p>Emergency Departments within Indiana</p> <p>Community mental health centers</p> <p>Indiana Department of Mental Health</p> <p>IRPSI staff</p>	<p>Post-treatment care coordination: up to 12 weeks of continued care and treatment with physician and nursing staff</p>	21st Century Cures Act
ODSOS (Overdose Survivors Outreach Services) also referred to as OSOP (Overdose Survivors Outreach Program) (CABQ, n.d.; Brucker, n.d.; Page et al., 2017) Baltimore and Anne Arundel County, MD	<p>Anne Arundel county program: Nurse coordinator, Peer support specialists</p> <p>Baltimore program: Community Recovery Coaches</p>	Post-overdose in the hospital	<p>Part of overall statewide substance use response program that also includes SBRT and buprenorphine initiation in emergency department</p> <p>Anne Arundel county program: Goal to engage overdose survivors in medication treatment. Components include substance use disorder screening and referral, overdose education and provision of naloxone, peer support services</p> <p>Baltimore City program: Goal to provide education about overdose risk reduction. Components include screening by RN, brief intervention from peer recovery coach in ED, overdose education and provision of naloxone, ongoing outreach from the community recovery coach including referrals to health centers</p>	<p>Maryland and Anne Arundel County Departments of Health</p> <p>Community Health Centers</p> <p>University of Maryland Medical Center</p>	<p>Anne Arundel County program: If wanting medication treatment referred to nurse coordinator and medication treatment then peer specialist will call every 2 weeks for 12 months</p> <p>Baltimore City program: weekly case review with team (Recovery coach follow-up not specified)</p>	<p>SAMHSA and the State of Maryland Behavioral Health Administration</p>
Relay (Vestal, 2017b) New York City, NY	Wellness advocate	Post-overdose in the hospital	<p>Wellness advocates at the Department of Health notified by the Poison Control Center of a nonfatal overdose at an ED in NYC</p> <p>ED within an hour and offer harm reduction, treatment referrals, overdose education and naloxone.</p>	<p>New York City Department of Health</p> <p>Poison Control</p> <p>Emergency Departments in NYC</p>	<p>Wellness advocates complete follow-up calls or in-person visits daily or weekly for 90 days</p>	NYC Department of Health

(continued on next page)

Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Adena Health System (<i>Adena Now Sending Narcan Home with Overdose Patients</i> , 2018) Ross County, Ohio	Emergency department staff	Post-overdose in the hospital	Provide follow-up referrals to both treatment and other community resources (such as housing, food, employment) and support for friends and family. ED distribution of take-home kits of naloxone after patients have presented for overdose Educational materials (signs of opioid overdose, responding to overdose, community resources for individual and loved ones) given in the ED	Adena Regional Medical Center's Emergency Department	Not specified	Ohio Department of Health and CDC funding for naloxone distribution
Emergency department & home-based AnchorED & Anchor Recovery (<i>Waye et al., 2019; Samuels, 2014; Spotlight, 2017</i>) All Emergency Departments in Rhode Island	Peer Recovery Specialists (Individuals in recovery for two years or more, 500 h of peer recovery experiences and are certified by Rhode Island's Certification Board's Peer Recovery Specialist Exam)	Post-overdose in the hospital Within the community following a non-fatal overdose	Peer recovery specialists on-call 24/7 (provide support at the hospital within 30 min of OD presentation) Within the hospital: 30-60 min visit to provide counseling on routes to treatment, naloxone education and kit distribution, support for family members Mobile services (i.e. transport to treatment) AnchorMORE utilizes publicly available overdose death data to dispatch peer recovery specialists to communities with high rates of OD Naloxone education and kit distribution, overdose prevention information, referrals to addiction treatment or additional services (shelters, soup kitchens, etc.)	Rhode Island Department of Health Rhode Island Department of Behavioral Healthcare, Developmental Disabilities, and Hospitals The Providence Center Rhode Island's ten emergency departments Anchor Recovery Programs	After a patient is released from the ED, AnchorED Peer Recovery Specialists will usually engage with the individuals up to ten days after the ten days, Peer Recovery Specialists from AnchorMORE's street-based outreach team work with the identified ED patient if the individual agrees to contact AnchorMORE contact lasts as long as the individual desires	SAMHSA Federal Block Grant CDC State Targeted Response to the Opioid Crisis Grant Private grant from the Scattergood Foundation Start-up costs for AnchorED and AnchorMORE was initially \$250,000 for a one year pilot and \$75,000 for a 6-month pilot
Rapid Response Teams (<i>North Carolina Statewide Overdose Surveillance Reports, 2018; Post Overdose Response Programs North Carolina Harm Reduction Coalition, n.d.</i>) North Carolina	Certified peer support specialists (PSPs) (in recovery for at least 3 years, trained in specific recovery strategies and behaviors by local peer organizations or state level organizations)	24-h after overdose rescue	Overall objective is to connect patients presenting to emergency department with non-fatal overdose to ongoing treatment, recovery, and harm reduction Emergency medical services staff also identify people daily who were treated with naloxone the day prior but who did not go to the hospital Names and phone numbers shared with PSPs who contact by text PSPs accompany EMS to patients' residences to make the first in-person connection PSPs connect patients to treatment, recovery, and harm reduction supports	Wake Forest Baptist University Medical Center Atrium Health Cone Health Novant Health Presbyterian Medical Center Southeastern Regional Medical Center University of North Carolina Hospital	Text follow-up if desired	Pilot: \$1.37 million grant from North Carolina Department of Health and Human Services
Community SOS (Community Substance Overdose Support	2 trained peer mentors (completed treatment themselves)	Within 48 h post-overdose	Before the patient is discharged from the ED, Christiana Care will seek consent to send 2 trained peer	Christiana Care Health system	Not specified	Christiana Care Health System \$500,000 for 1-year pilot program (Fall 2018) (continued on next page)

Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Program) (Ciolino, 2018b) Delaware			mentors to the patient's home to discuss immediate addiction treatment options and offer naloxone training to family members Modeled after Christina Care's early intervention and referral program for general alcohol or drug hospital admissions (Vestal, 2017a)			
Home and/or overdose venue-based Santa Fe Overdose Response Team AKA Santa Fe Opioid Overdose Outreach Project SFO ³ (Castillo, 2017; FY17 Comprehensive Opioid Abuse Site-Based Program Awards Category 1: Overdose Outreach Projects, 2017) ^(p17) Santa Fe, NM	Paramedic from Santa Fe Fire Department Santa Fe Prevention Alliance employee	Within week post-overdose	Fire Department staff access patient care records to establish personal contact with overdose survivors to offer a visit from paramedic who works with the Mobile Integrated Health Office (MIHO) and an outreach worker from the Santa Fe Prevention Alliance Able to offer referral to treatment services, overdose response plans, naloxone and training, risk reduction, and engagement of families	Santa Fe Fire Department Santa Fe Prevention Alliance	Not specified	No outside funding, capacity built within organization
QRT (Quick Response Team) (Castillo, 2017; Governor's Cabinet Opiate Action Team: Ohio Mental Health and Addiction Services, 2017; Quick Response Team Workshop Videos, n.d.; MHRB Awarded \$100K Grant to Fund Heroin Response Team, 2017) Hamilton County, Summit County, Lake County, Ohio Boston Post-Overdose Response Team (PORT) (Baker-Polito Administration Awards Funding for Home Visiting Program to Support Individuals and Families Coping with Opioid Addiction, 2017; Mayor Walsh Announces Expansion of Boston Post-Overdose Response Team (PORT), 2017) Boston, Massachusetts	Fire and police department employees Addiction Services Council employee Recovery services health professional Firefighter Police officer	Within week post-overdose Post-Overdose	Fire and police departments plus addiction services council meet to review all overdose-related police reports from the previous week QRT visits survivors in their homes to offer counseling and referrals, link to detox and treatment Assistance with insurance sign-up Provision of trained counseling and support services Overdose prevention education and naloxone rescue kits Referral to recovery support services Treatment referrals	Fire Department Police Department Public Safety Treatment facilities Community organizations Bureau of Recovery Services, Boston City Public Health Commission Boston Fire Department's Employee Assistance Program (EAP) is the primary first-responder for PORT Boston Police Department AmeriCorps (Broadhead et al., 2002)	Follow-up for people interested in residential treatment with assistance in, enrollment in intensive outpatient programs until residential slot opens up Not specified	Reallocation of existing resources within organization \$150,000 recently awarded in 2018 MA Department of Public Health funds Fire Dept.
Police Department-Based Opiate Outreach Program (Wolfe, n.d.; Flynn, n.d.; Mullins, 2015) ⁴ Arlington, Massachusetts	Public health clinician Designated member of the local police department	General post-overdose	Contact with individuals listed on the police report (email, text, or phone); offer home visit Overall objective is to proactively respond by offering treatment (detox bed search, transportation), support, and education to those who overdosed and their family members Offer naloxone to individual and their family/friends/roommates,	Arlington Police Department Square Medical Group Police-Assisted Addiction Recovery Initiative (Bardwell et al., 2018) AmeriCorps (Broadhead et al., 2002)	Follow up as needed ^b	Police-Assisted Addiction Recovery Initiative

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Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Plymouth County Outreach (Cruz, 2017; Emanuel, 2017; Plymouth County Outreach to Receive Federal Grant. Wicked Local Plymouth, 2018) ^a All 27 towns in Plymouth County, MA	Plain clothed police officer Health clinician or recovery coach	12–24 h post-overdose	Vivitrol offered through local medical group Education about local meetings (Arlington ACTS [Addiction Community Training and Support] monthly community meetings) and Section 35 process At individual's place of residence; overdose survivors and their social network 27 police departments in Plymouth County share information about overdoses in a database (name, where it happened, where they were transported if they were) Police department reviews all reported overdoses and overdose death reports for the previous 24-h period, determines whether follow-up is necessary	Health community and police department partnership, every town in Plymouth County has this program Police-Assisted Addiction Recovery Initiative (Bardwell et al., 2018) AmeriCorps (Broadhead et al., 2002)	Not specified	US Department of Justice Comprehensive Addiction and Recovery Act Program
Project PORT (Post-Overdose Response Team) (To Stop Overdose Deaths, this Response Team Brings Treatment Options to your Doorstep, 2018; Honig, 2017; Ohio Department of Public Safety 2017 Annual Report, n.d.; Summer, 2018) Ross County, OH CO-OP (Lowell Community Opioid Outreach Program) (CO-OP: The City of Lowell, n.d.) Lowell, MA	Makeup differs depending on county, in general law enforcement, health, and treatment representatives make up team Police officer/Sheriff's deputy Nurse/Social worker from local addiction treatment center Addiction services counselor First responders Clinicians	Within week post-overdose 24–48 h after an overdose	Police officer, sheriff's deputy, and local addiction treatment representative review town's ODs and arrive at homes to offer treatment options, naloxone, naloxone training, and family outreach rides to treatment Personal residences, local shelters, and camp sites Follow-up with individuals who overdosed and their families and facilitates access to treatment and harm reduction services Children who are present at the time of overdose referred to Project CARE (Child Assessment and Response Evaluation) for therapeutic and support services	Local law enforcement Sheriff's Department Addiction treatment centers Lowell Fire Department Lowell Health Department Lowell House Lowell Police Department Trinity EMS (local contracted EMS provider) Local social services organization	Not specified Not specified	Not specified Not specified
Tacoma Fire Department (TFD) CARES (Community, Assistance, Referral, and Education Service) (Banta-Green and Newman, 2018) Tacoma, Washington	Fire department CARES staff	24–72 h after OD resuscitation	Survivor must opt-in to TFD CARES after overdose: provides phone number and signature Contact survivor by phone to: identify all health needs/wants, access to detox, inpatient and outpatient services, medication treatment referral, and other social services Phone number for CARES is also provided with naloxone after the fire department responds to an overdose or self-contact	Tacoma Fire Department Point Defiance AIDS Project (syringe service provider)	Program phone number is staffed and can be contacted at any time	Not specified

Not specified

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Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Quick Response Team (QRT) Huntington and Cabell County, West Virginia (<i>Announcement of Funding Availability: Quick Response Team (QRT)</i> , n.d.; Rader, n.d.; <i>Christ. Sci. Monit.</i> , 2018; Nash, 2018; Cox, n.d.)	Paramedic (Team Leader) Law enforcement professional Counselor/Recovery coach Faith-based community member	24 to 72 h after an overdose	When EMS responds to an overdose patient and incident information is sent to QRT (also receive referrals from existing clients, family, or friends) Before visiting homes: QRT calls treatment centers to assess bed count; referral data entered QRT team (paramedic, law enforcement officer, counselor/recovery coach, and faith-based community member) visit homes to provide education on treatment and offer logistical support Team offers treatment options, including PROACT (free-standing specialty clinics) for addiction specialist assessment If contact unsuccessful: QRT cards and treatment information left OR client sought out at known locations throughout the city Daily log review to identify individuals who have overdosed Officers meet with individuals to discuss local treatment options, provide resources, and transport to treatment Resources also provided to friends and family present at the scene, including information on where to acquire naloxone	Cabell County Emergency Medical Services Huntington Fire Department Huntington Police Department Prestera Center, Recovery Point or the Huntington Comprehensive Treatment Center		State Opioid Response grant U.S. Department of Justice U.S. Department of Health and Human Services
DART (Drug Addiction Recovery Team) (Northampton Massachusetts Police Department - DART Officers, n.d.) Northampton, Massachusetts	Patrol officers (volunteers, in addition to regular duties)	Within 48 h of initial law enforcement contact	Peer recovery coaches perform assessment of the overdose survivor and provide assistance with: accessing treatment resources, signing up for Medicaid, identifying and addressing barriers to treatment Provide information about basic medical and social service needs (i.e. Obtaining housing, food) Communication with family members about follow-up care Possible points of interaction with fatal OD in coordination with emergency response; within the ED following a non-fatal OD; outreach in the field post nonfatal OD 3 phone calls; first to gather information about OD risk, this was used to generate a tailored risk	Northampton Police Department Hampshire County HOPE Tapestry Health Providence Hospital Urgent Care	Non-specific follow-up ^b	\$1.7 million federal grant awarded to Hampshire HOPE
Mobile outreach/not site-specific West Virginia Peer recovery coach program (<i>Announcement of Funding Availability: Opiate Use Peer Recovery Coach</i> , n.d.; Holdren, 2018) 17 agencies across the state ^c	Peer recovery coaches (lived experience with substance use, completed BBHFF-approved training curriculum and certification) Police officers Other first responders	ED, homes, mobile	Peer recovery coaches perform assessment of the overdose survivor and provide assistance with: accessing treatment resources, signing up for Medicaid, identifying and addressing barriers to treatment Provide information about basic medical and social service needs (i.e. Obtaining housing, food) Communication with family members about follow-up care Possible points of interaction with fatal OD in coordination with emergency response; within the ED following a non-fatal OD; outreach in the field post nonfatal OD 3 phone calls; first to gather information about OD risk, this was used to generate a tailored risk	West Virginia Department of Health and Human Resources' Bureau for Behavioral Health and Health Facilities (BBHFF) Law enforcement First responders Behavioral health treatment providers Emergency department	Not specified	\$1.5 million from WV state SAMHSA, with BBHFF administration to 17 agencies state-wide Center for Disease Control and Prevention via WVU injury control center
TTIP-PRO (Tailored Telephone Intervention by peer to prevent recurring opioid-overdoses)	Peer (enrolled in medication treatment for at least 1 year, abstinent, history of overdose or	Within 8 months post-overdose (study recruitment criteria)	Peer recovery coaches perform assessment of the overdose survivor and provide assistance with: accessing treatment resources, signing up for Medicaid, identifying and addressing barriers to treatment Provide information about basic medical and social service needs (i.e. Obtaining housing, food) Communication with family members about follow-up care Possible points of interaction with fatal OD in coordination with emergency response; within the ED following a non-fatal OD; outreach in the field post nonfatal OD 3 phone calls; first to gather information about OD risk, this was used to generate a tailored risk	University of Cincinnati Emergency department	3 phone calls	Not specified

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Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
(Winhusen et al., 2016) Cincinnati, Ohio	witnessing overdose; score 90% on OOTAS and pass mock intervention; trained by masters-level professional)		intervention, second to deliver feedback and see if they were interested in treatment goals of the intervention Participants were also mailed letter with information about risk factors Entire intervention occurs on the phone			
Mason County Opioid Response (FY17 Comprehensive Opioid Abuse Site-Based Program Awards Category 1: Overdose Outreach Projects, 2017; Governor's Cabinet Opiate Action Team: Ohio Mental Health and Addiction Services, 2017; Quick Response Team Workshop Videos, n.d.; MHRB Awarded \$100K Grant to Fund Heroin Response Team, 2017; Baker-Polito Administration Awards Funding for Home Visiting Program to Support Individuals and Families Coping with Opioid Addiction, 2017; Mayor Walsh Announces Expansion of Boston Post-Overdose Response Team (PORT), 2017; Mayblum, 2017; Wolfe, n.d.; Flynn, n.d.; Mullins, 2015; PAARI, n.d.; Cruz, 2017; Emanuel, 2017; Plymouth County Outreach to Receive Federal Grant. Wicked Local Plymouth, 2018; To Stop Overdose Deaths, this Response Team Brings Treatment Options to your Doorstep, 2018; Honig, 2017; Ohio Department of Public Safety 2017 Annual Report, n.d.; Summer, 2018; CO-OP. The City of Lowell, n.d.; Bantia-Green and Newman, 2018)	Peer recovery and prevention specialist Community Health program assistant Nurse	"Time frame dependent on survivor's circumstances" ^b	Mandated reporting of overdoses means information is readily available; nurse collects as much contact and/or medical information as possible about the individual and event Initiate contact via call or text When contact is made: conversation about safety and harm reduction options, naloxone, medication for opioid use disorder, referrals to local recovery services	Mason County Community Services	Not specified	Washington State Department of Health
Mason County, Washington Clallam County Overdose Follow-up (Bantia-Green and Newman, 2018) Clallam County, Washington	Registered nurse: investigates cases after opioid overdoses	Not specified	Overdoses are a notifiable condition in Washington: determine cause of overdose, notify provider if they have one, what city they overdosed in Part of case investigation: naloxone distribution, referral to a chemical dependency professional, review PMP Publication of a quarterly "Clallam County Opioid Surveillance Dashboard" for the community	County Department of Health and Human Services	Not specified	Not specified

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Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Diversion program						
D.A.R.T. (Drug Addiction Response Team)	Law enforcement (police officers, sheriff's deputies)	General post-overdose	12 member team responds to all reported overdoses within the county (often ED, sometimes elsewhere); initially provide a toolkit to survivors	Fire Department City and Township Police Departments County Sheriff's Department	-2nd visit with individual within 48 h -DART involvement continues for at least 4 months	Community funding and capacity built within organization
Lucas and Ottawa County, Ohio (Brucker, n.d.; Medication Treatment for Opioid Use Disorder in the Emergency Medicine Settings, n.d.; Brucker et al., n.d.; Governor Christie Visits Monmouth Medical Center's Recovery Coaches Program for Overdose Survivors, 2016; Munz, 2017; EPICC Project, n.d.; Engaging Patients in Care Coordination (EPICC), 2017; State of Indiana, 2017; Kobin, n.d.; D'Onofrio et al., 2015; Alcohol Drug Abuse Wkly, 2016; Corbin and O'Neill, 2016; Page et al., 2017; Vestal, 2017b; Adena Now Sending Narcan Home with Overdose Patients, 2018; Wayne et al., 2019; Samuels, 2014; Spotlight, 2017; North Carolina Statewide Overdose Surveillance Reports, 2018; Post Overdose Response Programs North Carolina Harm Reduction Coalition, n.d.; Giolino, 2018b; Project Engage, n.d.; Castillo, 2017; FY17 Comprehensive Opioid Abuse Site-Based Program Awards Category 1: Overdose Outreach Projects, 2017; Governor's Cabinet Opiate Action Team: Ohio Mental Health and Addiction Services, 2017; Quick Response Team Workshop Videos, n.d.; MHRB Awarded \$100K Grant to Fund Heroin Response Team, 2017; Baker-Pollito Administration Awards Funding for Home Visiting Program to Support Individuals and Families Coping with Opioid Addiction, 2017; Mayor Walsh Announces Expansion of Boston Post-Overdose Response Team (PORT), 2017; Mayblum, 2017; Wolfe, n.d.; Flynn, n.d.; Mullins, 2015; PAARI, n.d.; Cruz, 2017; Emmanuel, 2017; Plymouth County Outreach to Receive Federal Grant. Wicked Local Plymouth, 2018; To Stop Overdose Deaths, this Response Team Brings Treatment Options to your Doorstep, 2018;	Definite emphasis on getting people into treatment; treatment options are offered to overdose survivors as well as others present at the scene, identify survivors as "priority patients" for prompt treatment admission Those who partake can avoid criminal charges if they complete all of the recommended requirements and pass extensive law enforcement supervision; those who fail to meet the requirements are still criminally charged Investigate suppliers of drugs Survivors are asked to provide ongoing information on drug trade	Counselor capacity built within law enforcement Faith-based collaborations				

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Table 1 (continued)

Program title	Program team and training, if specified	Timing	Key components	Collaborations	Follow-up	Funding
Honig, 2017; Ohio Department of Public Safety 2017 Annual Report, n.d.; Summer, 2018; CO-OP. The City of Lowell, n.d.; Banta-Green and Newman, 2018; Announcement of Funding Availability: Quick Response Team (QRT), n.d.; Rader, n.d.; Christ. Sci. Monit., 2018; Nash, 2018; Cox, n.d.; Northampton Massachusetts Police Department - DART Officers, n.d.; Announcement of Funding Availability: Opiate Use Peer Recovery Coach, n.d.; Holdren, 2018; Winhusen et al., 2016; About D.A.R.T. Lucas County Sheriff's Office Drug Abuse Response Team, n.d.; Ohio Attorney General Dave Yost, 2017; Rosenkrans, 2018; Stinchcomb, 2019; Limpf, 2017)						

^a Part of larger PAARI network: <https://paarius.org/>.

^b Language taken directly from program sources.

^c Grantees are as follows: Drug free mother baby in the Greenbrier Valley, FMRS health systems Inc., greenbrier day report center, Harrison County commission, Hampshire County pathways, living free Ohio Valley, Milan Puskar health right, Morgantown sober living Inc., Potomac highlands guild, Prestera, recovery point, Seneca health care, synergy health, Inc., the Lifehouse, Tug River health association, Inc., Westcare Foundation, youth advocate programs, Inc.

and lack of treatment beds for individuals with chronic medical conditions as key issues that need to be addressed.

The emergence of post-overdose intervention programs that include public-safety first responders such as emergency medical technicians, police officers and fire fighters channels existing emergency expertise into prevention efforts. Historically, the primary focus of emergency medical providers when caring for an individual overdosing has been to stabilize vital signs in the field and transport to the emergency department. The primary focus of police at the site of an overdose has been to secure the scene and investigate the overdose as a crime. With training on overdose response and naloxone rescue, along with collaborative partners, public safety professionals have been empowered as overdose responders (Davis et al., 2014a; Davis et al., 2014b). Wagner et al., found in a qualitative study of law enforcement officers who had been trained in overdose education and naloxone delivery and who had responded to an overdose, that even when attitudes did not change, officers viewed being equipped with naloxone as positive.

Post-overdose outreach among overdose survivors can be the logical next step (Wagner et al., 2010). Programs have been originated by police departments in the midst of a vacuum in the public health response to the overdose crisis. Taking on this new role expands the experience of public safety personnel, especially police, beyond what is historically expected of these personnel. While rescuing people overdosing can be very rewarding, in communities where fatal and recurrent overdoses are common, first responders may be particularly at risk for burnout or fatalism. Some post-overdose programs may respond by mandating or coercing overdose survivors into treatment (Carroll et al., 2018) which risks reducing the likelihood that people call 911 for help or engage with public safety providers for fear of being forced into treatment (Deonarine et al., 2016). This fear may be especially acute among those with criminal justice involvement or trauma related to experiences with law enforcement or the health care system, who are at particularly high risk of overdose (Beletsky et al., n.d.). A related concern with these programs that can undermine their ability to engage high risk individuals is how they handle and share information about individual overdose survivors and their social networks. In order to target these programs towards high risk individuals, the overdose survivors often need to be identified and their information may be shared. But this loss of privacy may erode trust in the outreach providers. Consideration of these unintended, downstream consequences should also be included in future evaluations of post-overdose programs.

We focused this review on individual-level post-overdose interventions. There are other potential approaches that are not based on the individual but rather focus on high-risk communities, regions, recruitment methodologies, or using surveillance. One study of people who use drugs in rural Kentucky found that network and spatial analyses may be a promising way to target overdose education and naloxone distribution (Rudolph et al., 2018). In British Columbia, Canada, peer specialists set up injecting rooms in seasonal shelters after a significant increase in fatal overdoses were reported in a specific geographic location (Bardwell et al., 2018). Rowe et al. described a community intervention in San Francisco that included alerting practitioners to increases in overdose deaths and changes in drug supply, as well as, intensifying street outreach (especially in the geographic location of where overdoses were occurring) (Rowe et al., 2018). Dietze et al. described a recruitment methodology to find people to enroll in research projects related to nonfatal overdose. In that study, either the emergency medical service personnel (Melbourne, Australia) or a research assistant (Sydney, Australia) attempted to recruit and follow-up with potential participants in the ambulance ride after a nonfatal heroin overdose (Dietze et al., 2002). The follow-up for Melbourne was 24% and 14% and in Sydney 82% and 35%. Although focused on recruitment for research, this approach could also be used to engage survivors in care post-overdose. Finally, in some states, overdose is a reportable condition. Davis et al., have suggested using public health surveillance (similar to other reportable diseases) to identify overdose survivors and

to then deploy public health teams composed of nurses, social workers, or peers to offer risk reduction, routes to treatment, and respond to survivors, families, and friends (Davis et al., 2018). Although this approach also raises concerns about privacy and how such information could potentially be used for law enforcement (Paone et al., 2018). One alternative would be to use syndromic surveillance to monitor trends including overdose clusters and then target interventions to those geographic locations (Paone et al., 2018).

Consistent with the objective of a scoping review, this work revealed a number of next step research and program development questions that warrant study. First, some key questions that emerged are related to timing of intervention: when are the optimal times to intervene and then follow-up – at the overdose scene, at the emergency department, after discharge from the ED, or a combination of all? Another key question is what is the optimal composition of the intervention team? And for teams with peer involvement, what should their background and training be? Another important consideration is the role, if any, of mandated treatment, sanctions and incentives. Knowing that this is an already vulnerable and stigmatized population, how best do we leverage and protect individual overdose and other health information in these interventions? For those interested in starting medication for opioid use disorder, how best should it be offered and delivered? Moving forward, understanding how (and if) these programs should be tailored to special populations such as adolescents and emerging adults, women, criminal-justice involved, individuals with recurrent overdoses, friends, and family will also be critical. Finally, in order to optimize existing resources, an understanding of the respective roles for individually-focused and environmental interventions and when/where to deploy them is needed.

4.1. Limitations

One important limitation to this study is that we were not able to compare outcomes across the different programs. Programs have emerged from communities responding to the opioid crisis without a priori evaluation or research resources. Furthermore, program outcomes, when measured, were not standardized. We have been able to summarize what is available in the peer-reviewed and gray literature, but it is not possible to draw conclusions about the quality or replicability of post-overdose programs. Additionally, there is no doubt that programs exist not found in our search. We attempted to minimize this by using several search strings and consulting with a research librarian, however, it is still possible that programs use different language when describing what they do and the population they serve and some programs likely exist and have not yet been described in the gray literature. Because of these limitations, we chose to conduct a scoping review. Neither a systematic review with a more specific or detailed research question or a meta-analysis where we calculated pooled effect sizes across these interventions would have been appropriate in this early stage of post-overdose intervention emergence.

5. Conclusions

The United States continues to experience rising rates of opioid overdose deaths. Nonfatal opioid overdose remains the most significant risk factor for subsequent fatal overdose and provides an identifiable opportunity for intervention. The programs identified in this review have emerged to address the critical issue of rising deaths. Communities have not waited for definitive evidence-based practice to guide their response to the opioid epidemic but have rather used rational approaches based on face validity. Future research and program development should focus on rigorous evaluation to assess the effectiveness to reduce overdose and engage survivors in harm reduction and substance use disorder treatment.

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Declaration of competing interest

Dr. Bagley has received consulting fees from the Center for the

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Appendix A. PRISMA Checklist

Checklist items	Status
Title: Identify as scoping review	Completed
Abstract	Completed
Introduction	
Rationale	Completed
Objectives	Completed
Methods	
a. Protocol and registration	NA
b. Eligibility criteria with rationale	Completed
c. Information Sources: all databases including the dates of the last search	Completed (add date)
d. Search: present full electronic search for at least one database	
e. Selection of evidence: how we chose	
f. Data charting process: explain the form that we created (and if we changed it during the process)	Completed
g. Data items: all variables that we collect	
h. Critical appraisal of individual sources of evidence	
i. Summary measures	Completed
j. Synthesis of results: describe methods of summarizing	
k. Risk of bias:	Completed
l. Additional analyses: NA	
	Completed
	Completed
	NA
	Completed
	NA
	NA
Results	
a. Selection of sources- use flow diagram	Completed
b. Characteristics of the evidence	Completed
c. Critical appraisal if done	
d. Results of individual sources	Completed
e. Synthesis of results	Completed
f. Risk of bias	
g. Additional analyses	Completed
	NA
	NA
Discussion	
a. Summary	Completed
b. Limitations	Completed
c. Conclusions	Completed

Appendix B. Terms used in search

Database name	Search term(s)
PubMed	("Drug users"[mesh] OR "opioid-related disorders"[mesh] OR "analgesics, opioid"[mesh] OR "people who use drugs"[tiab] OR "PWID"[tiab] OR "addict"[tiab] OR "injection drug use"[tiab] OR "substance abuse"[tiab] OR "opioid addiction"[tiab] OR "drug user"[tiab] OR "substance user"[tiab] OR "PWUD"[tiab]) AND ("Community-institutional relations"[mesh] OR "health services"[mesh] OR "motivational interviewing"[mesh] OR "naloxone"[mesh] OR "health facilities"[mesh] OR "patient care"[mesh] OR "outcome and process assessment (health care)"[mesh] OR "health education"[mesh] OR "intervention"[tiab] OR "outreach"[tiab] OR "response"[tiab] OR "prevention"[tiab] OR "education"[tiab] OR "community"[tiab] OR "naloxone"[tiab] OR "emergency

department"[tiab] OR "emergency"[tiab] OR "peer recovery"[tiab])
 AND
 ("Drug overdose"[mesh] OR "overdose"[tiab] OR "post-overdose"[tw] OR "after overdose"[tiab] OR "post opioid overdose"[tw] OR "poisoning"[tiab])
 (DE "opiates" OR DE "buprenorphine" OR DE "codeine" OR DE "endogenous opiates" OR DE "fentanyl" OR DE "heroin" OR DE "morphine" OR DE
 "Papaverine" OR DE "drug addiction" OR DE "heroin addiction" OR DE "drug abuse" OR DE "drug dependency") AND (DE "community services" OR DE
 "public health services" OR DE "outreach programs" OR DE "health care services" OR DE "motivational interviewing" OR DE "treatment facilities" OR DE
 "treatment outcomes" OR DE "health education" OR DE "drug education" OR DE "health promotion" OR DE "drug abuse prevention" OR DE "drug
 education" OR DE "drug rehabilitation" OR DE "peer relations" OR DE "naloxone" OR DE "emergency services") AND (DE "drug overdoses")
 (((("post overdose" OR "after an overdose" OR "following an overdose" OR "overdose outreach" Or "post-opioid overdose") And ("intervention" Or "outreach"
 Or "response" Or "community"))))
 AHRQ, CDC, NIDA, H-
 RSA
 Gray literature (.gov,
 .org) "Post overdose" OR "after an overdose" OR "following an overdose" OR "overdose outreach" OR "post-opioid overdose" site:

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