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From the CDC: The Prevention for States program: Preventing opioid overdose through evidence-based intervention and innovation☆

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Abstract

Introduction: Since 1999, overdose deaths involving opioids have substantially increased. In 2016, 42,249 opioid-related deaths occurred—a 27.7% increase from the previous year (Hedegaard et al., 2017). As the nation's public health agency, the Centers for Disease Control and Prevention (CDC) has been actively involved in efforts to prevent opioid misuse, opioid use disorder, and opioid overdose since 2014. One of CDC's three principal opioid overdose prevention programs, the Prevention for States (PfS) program, began funding 16 state partners in August 2015 and then expanded to fund a total of 29 states in March 2016. The PfS program aims to prevent opioid morbidity and mortality by implementing evidence-based strategies such as enhancing and maximizing prescription drug monitoring programs (PDMPs) and implementing community or health systems interventions.

Methods: In this article, we will describe the origins of the PfS program, provide an overview of program strategies, and locate PfS strategies in the larger landscape of nation-wide opioid overdose prevention efforts advanced by other partners and stakeholders. To describe the implementation of PfS, we offer an iterative model of using information to inform strategy selection, implementation, and evaluation. This model is a product of our observations of program implementation over time and has emerged, post hoc, as a helpful framework for organizing our insights and reflections on the work.

Results: For each step of the model, we provide examples of how CDC has supported funded state partners in these efforts. Lastly, we describe innovative facets of the program and implications for both ongoing and future programs.

Practical applications: Opioid overdose morbidity and mortality continues to increase across the United States. Adoption of the strategies and the program implementation paradigm described

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in this article when implementing prevention activities could improve the ability of public health programs to reverse this trend.

Keywords

Opioids; Overdose; PDMP; Communities; Health systems

1. Introduction

More than 63,600 individuals died of a drug overdose in 2016. To put this statistic into context, this is more than the number of Americans who died during the duration of the Vietnam War (58,200) and of HIV/AIDS-related causes during the peak of that epidemic (50,628) (Police Executive Research Forum, The Unprecedented Opioid Epidemic, 2017). Two-thirds of these overdose deaths (42,249) involved an opioid (including prescription opioids, heroin, and fentanyl)—more than any year on record (Hedegaard, Warner, & Miniño, 2017). In response to this epidemic, the Centers for Disease Control and Prevention (CDC) has implemented a number of programs to combat these increases and protect the health of the American public: (a) the Prevention for States program, which will be the focus of this paper; (b) the Data-Driven Prevention Initiative, which focuses on strategic planning and data access; and (c) the Enhanced Surveillance of Opioid Overdose in States program, which focuses on improving timeliness of overdose data. A hallmark of CDC's efforts in opioid overdose prevention is the leveraging of efforts to build systems, capacity, and science that will support and enhance future prevention efforts, as well as avert morbidity and mortality from opioid overdose in the shorter-term.

1.1. Laying the groundwork

CDC's state funding for program implementation with an explicit focus on preventing opioid overdose morbidity and mortality started in 2014, with the funding of the Prescription Drug Overdose: Boost for State Prevention (BOOST) program. Research had indicated that prescription opioids, and the high volume of prescribing for them, were driving the increases in opioid overdoses (Centers for Disease Control and Prevention. Prescription Painkiller Overdoses in the US. CDC Vital Signs November 1, 2011 [cited, 2018c). As a result, this initiative equipped five state health departments—Kentucky, Oklahoma, Tennessee, Utah, and West Virginia—with resources and scientific assistance to prevent prescription drug overdoses. Funding was provided to advance four key areas: maximizing the use of prescription drug monitoring programs (PDMPs); improving public insurance mechanisms (e.g., Medicaid, workers' compensation, and private insurance) to protect patients; evaluating policies to identify prevention that works; and incubating innovative response strategies.

1.2. Prevention for states program

The current *Prevention for States (PfS)* program, described in detail below, was originally created to scale up and expand upon the BOOST program. In addition to building on the programmatic insights of BOOST, PfS was also designed to incorporate the best available evidence with respect to system-level interventions to reduce opioid overdose.

A 2014 systematic review by Haegerich and colleagues (Haegerich et al., 2014) found significant knowledge gaps in terms of evidence-based interventions, but did identify the following as potentially promising strategies: PDMPs; insurer-focused strategies; pain clinic legislation; clinical guidelines; and naloxone distribution programs. This evidence review directly assisted in identifying programmatic priorities for the PfS program.

The purpose of *PfS* is to provide state health departments with resources and support needed to advance interventions to prevent opioid overdose morbidity and mortality. Specifically, funded state partners are tasked with supporting the following complementary key prevention strategies within their states: enhancing and maximizing PDMPs; and implementing community and/or insurer/health systems interventions. Within these key prevention strategies, state partners are allowed flexibility in the selection of major activities (examples are offered in Table 1) and in the operationalization of these activities to be most appropriate for their context.

Additionally, state partners can choose to evaluate an opioid-related law, policy, or regulation to better understand what works to prevent opioid overdoses and/or to respond to new and emerging opportunities and crises through “Rapid Response Projects”—both policy evaluation and rapid response projects are described in more detail later in this article. Overall, PfS is designed to impact contributing factors driving the epidemic, such as high opioid prescribing, to ultimately improve health outcomes associated with the opioid overdose epidemic. While opioid prescribing was the initial focus of PfS prevention strategies, the changing nature of the epidemic demanded that states have latitude in implementing strategies designed to prevent misuse of illicit opioids as well.

1.3. Alignment with national context

In recent years, key partners and stakeholder groups have voiced their support for specific prevention strategies within their own strategic visioning documents. Some of these reports are aimed at particular stakeholders (i.e. governors; Murphy et al., 2016), while others focus on specific elements within a broader strategy (i.e. PDMPs; Pew Charitable Trusts, PDMPs: Evidence-based practices to opitimize prescriber use, 2016). We examined four of these reports (Alexander, Frattaroli, & Gielen, 2017; Murphy et al., 2016; Pew Charitable Trusts, PDMPs: Evidence-based practices to opitimize prescriber use, 2016; President’s Comission on Combating Drug Addiction and the Opioid Crisis, Final Report of the President’s Comission on Combating Drug Addiction and the Opioid Crisis, 2017) to gauge how PfS-promoted strategies and activities aligned with their recommendations. Table 2 demonstrates that among the reports examined, there was consensus that the priority areas promoted by PfS—PDMPs, insurer and health systems, policy evaluation—are all critical to ending the opioid epidemic. This consensus supports our initial strategic approach, and we are also engaged in rigorous evaluation efforts of our programmatic work to ensure that there is evidence of effectiveness of these various strategies.

In addition to the activities in Table 2, these reports also detailed other necessary measures in which other CDC programs are engaged, such as improving the timeliness of mortality and morbidity data, as well as developing strategic plans.

2. Methods

As funded states implemented their PfS programs, a pattern of activities and connections between implemented activities emerged. Over the course of program implementation, CDC conceptualized these patterns and connections into an observed program implementation paradigm, presented in Fig. 1. The components of this iterative model are: (a) download: meaning, to collect and aggregate available data from both traditional and non-traditional sources; (b) digest: to parse data into interpretable and actionable measures; (c) develop: to engage necessary stakeholders and create strategic plans based on the data; (d) do: to implement activities while balancing both fidelity and adaptability; and (e) determine: to gauge the impact of activities using evaluation and other empirical methodologies.

3. Results

To concretely illustrate this paradigm, a description of how each step of Fig. 1 has been interpreted and implemented will now be presented, along with an example from a funded state partner. Though each example is included in within a single component, many of these activities span more than a single step in the Fig. 1 model. Likewise, though a single state's work is used as an illustrative example, many PfS funded states may be engaged in similar activities.

3.1. Download

The first step for PfS funded states partners to reduce the burden of the opioid overdose epidemic is to obtain reliable data. This process of collecting and aggregating available data is an example of the download step, as depicted in Fig. 1.

3.1.1. Indicators—A set of primary opioid overdose indicators including measures of mortality, morbidity, and prescribing were required to be submitted to CDC as part of PfS funding. In addition to these required indicators, other program-specific outcome measures were suggested. To complete the required indicator set for their state, funded partners must obtain access to various data, such as vital statistics and death records, hospitalization billing, and PDMP data. In addition to identifying data sources, funded states must connect and coordinate with other state government and non-governmental partners to secure the memoranda of understanding and data sharing agreements necessary to obtain access to relevant data sets. As we will discuss later in this paper, these indicators, and the findings that originate from them, form an important cornerstone of the PfS program.

3.2. Digest

As the epidemic has continued to escalate, state partners have faced increasing interest in the opioid-related data they are "downloading." Funded states have adopted a variety of tools to parse their opioid-overdose data into interpretable and actionable measures (the "download" step of Fig. 1). This paradigm demonstrates how funded partners have adopted an iterative model of leveraging information to implement the most appropriate actions to bring about change with respect to opioid overdose.

3.2.1. Data dashboards—To share these data widely, many states have developed data dashboards, which can be defined as web-based interfaces for aggregating and displaying data. Often, these data can be customized based on user preferences, such as geographic region or time period. These dashboards are a means of packaging and disseminating opioid data into more interpretable trends. As dashboards have evolved, state partners have expanded their understanding of what constitutes "opioid-related data." States have also incorporated data from some of the non-traditional sources (e.g., naloxone usage) described above to give a more comprehensive understanding of opioid overdose with a state or community. Partners use dashboards to streamline their responses to data inquiries, to provide more rapidly updated data to decision-makers, and to target higher-burden communities for prevention efforts. These dashboards are also appealing and useful to a broad base of users, such as local health departments, public safety, media, community/harm reduction coalitions, and the general public.

For example, Virginia has created an opioid data dashboard[1] that provides yearly summary information and data visualizations of many of the measures described above, including: overdose deaths, overdose Emergency Department (ED) visits, naloxone administrations, reported hepatitis C (HCV) counts and rates, diagnosed HIV and counts and rates, overdose mortality, and neonatal abstinence syndrome (NAS) discharge rates.

As part of their PfS work, Tennessee launched a series of communication tools, including a Prescription Drug Overdose (PDO) website that contains annual data briefs for each of Tennessee's 95 counties, annual mortality reports and drug overdose fact sheets, a catalog of PowerPoint slide sets, and the Tennessee Drug Overdose Dashboard. The Tennessee Drug Overdose Dashboard[2] is an interactive tool that contains state, regional, and county level data on fatal overdose metrics, non-fatal outpatient and inpatient overdose metrics, as well as various drug prescribing indicators for opioids for pain and benzodiazepines. All communication tools are based on the philosophy of reuniting communities with their own data and use the tagline "*Numbers count. Every number is a story. Every story is a person*."

3.2.2. Overdose fatality review boards—As another innovative "digest" approach, an increasing number of PfS state partners are implementing overdose fatality reviews focusing on overdose deaths. Historically, these reviews have been a powerful tool to identify emerging risk factors when examining such events as unexpected child, maternal, and domestic violence-related deaths. Reviews can function as case control studies, wherein comprehensive and wide-ranging data related to deceased individuals can be candidly discussed and compared to deaths from other conditions. They are timely and essential tools to identify points of intervention and systems communications that can be enacted to prevent the next overdose. Aside from providing rich and actionable risk information, fatality reviews can be an opportunity to engage and promote cooperation between various stakeholder groups.

[1] http://www.vdh.virginia.gov/data/opioid-overdose/
[2] https://www.tn.gov/health/health-program-areas/pdo/pdo/data-dashboard.html

In Maryland, Overdose Fatality Review teams[3] comprise multi-agency/multi-disciplinary members that conduct confidential case reviews of overdose deaths with the goal of preventing future deaths. Teams identify missed opportunities for prevention and gaps in the system and areas for increased collaboration among agencies and stakeholders at the local level. As a result of this work, a series of detailed recommendations to provide state and local health departments with innovative strategies to address the opioid overdose epidemic was recently published (Haas et al., 2018).

Relatedly, New Mexico is implementing a novel pilot project utilizing notifiable condition reporting of drug overdoses to focus interventions toward those at greatest need at the local level. The New Mexico Department of Health facilitates monthly meetings with each hospital reviewing all non-fatal overdoses, with the emphasis on opioid-related cases. For those with a non-fatal overdose, PDMP data may be reviewed for opportunities for interventions with prescribers; access to naloxone may be confirmed through collaboration with harm reduction counselors and community case managers; or referral for medical assisted treatment may be made.

3.3. Develop

Once data have been downloaded and digested, it is imperative that they are used to inform prevention activity selection and implementation. Many PfS funded state partners are utilizing coalitions to engage necessary stakeholders and create strategic plans—that is, to complete the “develop” step.

3.3.1. Coalitions—Coalitions can take various forms, but for the purposes of this work, they can be described as groups of diverse stakeholders working together to reduce opioid morbidity, mortality, and associated harms. Within the PfS program, funded partners can support or start opioid-focused coalitions to mobilize combined resources, expertise, and experience to bring about the more comprehensive and robust action. As a product of these coalitions, PfS funded partners can strive to create comprehensive, culturally relevant, and community-specific plans for activity implementation and assessment.

Using these coalition models, California provides technical assistance and funding to support coalition activities. Across the state, there is wide variability in how coalitions are defined and operated, which allows for tailoring the activities and scope of each coalition to accommodate the context and needs of the area that the coalitions served. PfS funds are being used to support coalition work that focuses on the following: safe prescribing practices, building local community capacity, access to medication assisted treatment, increasing naloxone distribution, public education, and ensuring all strategies are data informed.

The Kentucky Drug Overdose Prevention Program, a funded PfS state partner, is supporting county drug overdose prevention coalitions through presentations and individual technical assistance. With an emphasis on six high priority counties, drug overdose prevention trainings are provided on the following topics, with the overarching goal being to collaborate

[3] https://bha.health.maryland.gov/OVERDOSE_PREVENTION/Pages/OFR-.aspx

and engage local health departments in the drug overdose prevention planning process: (a) Prevention Coalitions Basics; (b) Community Action Planning; (c) Implementing Evidence-Based Programs; (d) Community Needs & Resource Assessments; (e) Gap Analysis; and (f) Sustainability Training, as well as other areas as identified.

3.4. Do

Now that strategic plans have been completed and prevention activities selected, PfS-funded partners must complete the "do" step of Fig. 1—that is, implement activities while balancing both fidelity and adaptability. Within the PfS program, a priority area is reducing opioid prescribing and encouraging evidence-based pain management through health systems interventions. To further illustrate how funded state partners are working within this priority area, we will now present three example interventions.

3.4.1. Health systems interventions—The first example is integration of PDMP data into electronic health records. PfS-funded partners are working to streamline PDMP access into existing clinical workflows, thereby increasing the use of PDMP data to inform clinical decision making.

Using PfS funds, Ohio is supporting local health departments and their work with providers to integrate the Ohio Automated Rx Reporting System (OARRS) directly into electronic medical records and pharmacy dispensing systems across the state, which would allow for rapid data access for prescribes and pharmacists. As of April 2017, more than 1700 pharmacists and 12,000 prescribers have integrated access to OARRS.

Prior to PfS funding, Illinois' PDMP was only integrating data with three facilities. Since August 2018, the PDMP has integrated data with at least 700 sites across 101 facilities. Automated PDMP data requests increased from 6204 in March 2015 to over 4.9 million requests in August 2018.

Academic detailing, the second example, is the process where evidence-based information about clinical care is presented to clinicians to bring about change in their behaviors and improve health outcomes. These focus on behavior change, as well as the one-on-one nature of academic detailing, are important distinctions between academic detailing and tradition forms of education and outreach. PfS-funded partners are implementing academic detailing programs to decrease opioid prescribing, increase referrals to treatment, and increase co-prescribing of naloxone as appropriate.

In Wisconsin, academic detailing is being carried out in multiple health systems within a single urban county using evidence-based guidelines, including CDC and state-specific opioid prescribing guidelines. Two of these systems have focused their academic detailing on co-prescribing naloxone within primary care and with staff in pain clinic for individuals on long-term opioids above 50 MME. One health system focused on state-specific guideline education, including tapering opioids, and another health system focused on non-opioid dental pain management in an urgent care setting. Currently, all four health systems focus academic detailing on screening, referral, and provision of medication assisted treatment in primary care. Academic detailing also takes place within health systems serving rural areas

in the state, focusing on opioid tapering, non-opioid treatment of pain, decreasing concurrent prescribing of opioids and benzodiazepines, and pre-operative pain education.

The third example is implementation of prescribing guidelines. Many PfS-funded partners have adopted the *CDC Guideline for Prescribing Opioids for Chronic Pain* (Dowell, Haegerich, & Chou, 2016) while other funded states use guidelines that were developed by other groups (e.g., licensing boards, state health departments). Opioid prescribing guidelines can provide recommendations for clinicians regarding: (a) when to initiate or continue opioids; (b) opioid selection, dosage, duration, follow-up, and discontinuation; and (c) assessing risk and addressing harms of opioid use. As part of PfS, funded partners are encouraging uptake of guidelines and educational initiatives focused on enhancing clinical implementation of guideline recommendations.

In Oregon, an Opioid Prescribing Guidelines Task Force was established with the aim of establishing guidelines for the state. This task force endorsed the CDC Guideline as the foundation for opioid prescribing in Oregon in November 2016, as well as state-specific additions to the CDC Guideline. Oregon is currently developing a clinical implementation toolkit and use of a peer educator model within health systems in high-burden regions to expand upon existing opioid overdose prevention efforts.

In June 2016, New York made it mandatory for prescribers to complete three hours of coursework on pain management, including the prescribing of opioids. In implementing this requirement, the state has developed and is providing a free online training curriculum, which is aligned, where relevant, with the clinical recommendations contained in the CDC Guideline. New York will pursue strategies to inform providers of the newly implemented requirement, and will continue to conduct outreach to all prescribers in the state reminding them of the requirement.

3.5. Determine

As implementation of activities aimed at averting opioid overdose proceeds, it is important to gauge the impact of these efforts, such as policy implementation and impact, using evaluation (as described in the “determine” step of Fig. 1).

3.5.1. Policy evaluation—Within the context of PfS, we adopt the definition that *policy* is “a law, regulation, or procedure, administrative action, incentive or voluntary practice of governments and other institutions” (Centers for Disease Control and Prevention. CDC Policy Process. January 18, 2018b). Policies can be enacted by *legislation* or by *regulation* at local, state, or federal level (e.g., PDMP mandated registration and/or use) or at the *organizational* level (e.g., implementation of opioid prescribing guidelines within a health system). As an optional program activity, PfS-funded partners can choose to engage in policy evaluation to understand the implementation and impact of such policies, which allows for more informed decision-making.

In Rhode Island, a new model of screening and protocoled treatment with MAT (including methadone, buprenorphine, or naltrexone) launched at the Rhode Island Department of Corrections, a unified prison/jail, was launched in July 2016. PfS funds were used to

evaluate the impact of this policy and a 60.5% reduction in overdose among the recently incarcerated was found (Green et al., 2018). These results are being used to inform adoption of similar programs in other PfS-funded states and across the country.

3.6. Innovations

Another key component of the observed paradigm in Fig. 1 is innovation. Innovative components have been integrated into PfS, both with respect to how the CDC interacts with state partners and how state partners can use their funding for rapidly deployable initiatives. We will now present two innovative elements of technical assistance provided by CDC to funded state partners, the state support team model and peer-to-peer support. We will also describe a novel aspect of the PfS funding that encourages partner-driven innovation based on funded state needs.

3.6.1. Technical assistance

3.6.1.1. State support teams.: The PfS program was designed and has been implemented to underscore the importance of collaboration between CDC and funded state partners. An example of this is the state support model, in which each state has regular access to programmatic, scientific, and evaluation-specific CDC staff support for technical assistance and to support implementation of PfS activities. Funded state partners can obtain this support via various mechanisms, such as in-person site visits, in-person annual meetings, regularly scheduled phone calls, ad hoc phone calls, and email. The focus of this technical assistance also varies, and includes program planning, activity selection and design, evaluation, and award oversight and management. Collectively, CDC staff, including state support teams, assess and build capacity of funded state partners to successfully implement robust programs.

3.6.1.2. Communities of practice.: Funded state partners themselves are valuable resources and have vast knowledge bases with respect to their programs and to the landscape of opioid overdose prevention. In addition to more routine forms of peer-to-peer learning, such as in-person meetings and ad hoc connections via state support teams, and the PfS program facilitates communities of practice. Within the context of the PfS program, CDC defines a community of practice as a group of state partners coming together to share successes and discuss challenges related to PfS program strategies and activities. Examples of topics undertaken by existing communities of practice include linking datasets, delivering provider education, and evaluating policy. PfS communities of practice primarily connect virtually via conference calls and a CDC-maintained website that allows for discussion and resource sharing.

3.6.1.3. Opioid overdose indicator support toolkit.: As described previously in this paper, CDC provided a set of opioid overdose indicators to PfS-funded state partners. These opioid overdose indicators can be used for surveillance, reporting, evaluation, and communication purposes. To assist funded state partners in carrying out the required analyses to obtain these indicators, CDC also developed accompanying guidance (Centers for Disease Control and Prevention, 2018a). This toolkit provides detailed guidance for building and reporting on opioid-related indicators specific to measures of mortality,

morbidity, and state-based PDMP data. Relevant statistical program code is provided to funded state partners via the CDC-maintained website mentioned above, and this website is also used to problem solve state-specific indicator challenges.

3.6.2. Rapid response projects—The PfS program recognizes that the opioid overdose epidemic, and our understanding of it, are both constantly evolving. To that end, the PfS program's rapid response component allows states to shift resources from previously planned activities to small, innovative projects in response to emerging public health threats. With this mechanism, funded state partners can re-allocate a fixed percentage of their total funding amount with limited administrative burden. Funded states may initiate a rapid response component to focus on specific populations, data access or analysis, or rapid evaluation.

In West Virginia, the rapid response mechanism was used to plan and carry out a state-wide naloxone distribution program. Funds for the purchase of the naloxone itself came from a Substance Abuse and Mental Health Services Administration grant. From February to July 2017, 8250 two-dose naloxone rescue kits were delivered to existing and new programs in 38 of WV's 55 counties. West Virginia's non-EMS first responders (law enforcement and fire service) and community-based naloxone "take-home" programs (e.g., harm reduction programs, health departments and related organizations whose patients or clients may be at high risk for overdose) were targeted to widen the availability of naloxone in support of the Access to Opioid Antagonists Act (WV Code Chapter 16, Article 46). The project created 60 new naloxone programs, including 19 non-EMS first response agencies (fire and police departments), 36 take-home programs (health departments, day report centers, and treatment and recovery programs), and 5 on-site programs.

4. Conclusions & practical applications

The focus of PfS on data-informed decision making, as depicted in Fig. 1, facilitates the balance of evidence-based practice and innovation necessary for funded state partners to have the greatest impact on opioid overdose morbidity and mortality. Given the shifting nature of the epidemic, future programmatic endeavors to avert opioid overdose morbidity and mortality will need to rapidly course-correct and innovate as additional information becomes available. For instance, at the inception of the PfS program, the primary emphasis was on prescription opioids. However, given the available data, PfS state support teams housed within the CDC have worked with funded state partners to identify programmatic activities that have a broader base of impact for opioid users more generally, including individuals who use illicit drugs. Continued focus on prevention in terms of both illicit and prescription drug-related overdose will be necessary to curb this epidemic. Though much of the focus has been on national trends, the demographics of opioid overdose vary across different communities. Ongoing and future programs will need to translate and tailor state-level work into a suite of community interventions implemented based on specific community context. To this end, federal, state, and local opioid overdose prevention programs will need to engage both communities and individuals at risk of overdose to inform program planning, implementation, and innovation. Finally, as the prevention community develops a better understanding of opioid initiation and dependence, prevention

efforts will need to move upstream in this causal pathway to address adverse childhood events and to build resiliency.

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Biographies

Amber Robinson is the Science Coordinator for the Centers for Disease Control and Prevention's Prevention for States and Data-Driven Prevention Initiative. In this role, she is responsible for prioritizing PfS/DDPI scientific inquiry and building the evidence base for strategies related to these programs. She holds her MPH from Emory University and her PhD from the Johns Hopkins Bloomberg School of Public Health, both in global health. Dr. Robinson specializes in epidemiology, with a focus on understanding and preventing violence and injuries. Her interests include etiologic research, qualitative methods, and implementation science.

Aleta Christensen is a Behavioral Scientist in the Division for Unintentional Injury Prevention at CDC's National Center for Injury Prevention and Control. Ms. Christensen's work at CDC directly supports recipients of the PfS and DDPI funding. She is also leading pilot work to support city- and county-level opioid overdose prevention, with a special emphasis on understanding and enhancing state and local integration. Ms. Christensen has a Master's in Public Health from the School of Public Health at Georgia State University. Her research interests include effective models for healthcare delivery among vulnerable populations and in high-burden areas, and academic detailing.

Sarah Bacon is the Program Director for Prevention for States and the Data-Driven Prevention Initiative. She is a practice-oriented prevention scientist committed to using data and science to make communities safer. Sarah began her time at CDC in 2010 in the Division of Violence Prevention, where she was the lead scientist for the National Centers of Excellence in Youth Violence Prevention. Sarah holds a PhD in criminology, and prior to joining CDC she spent four years on the faculty of the College of Criminology and Criminal Justice at Florida State University.

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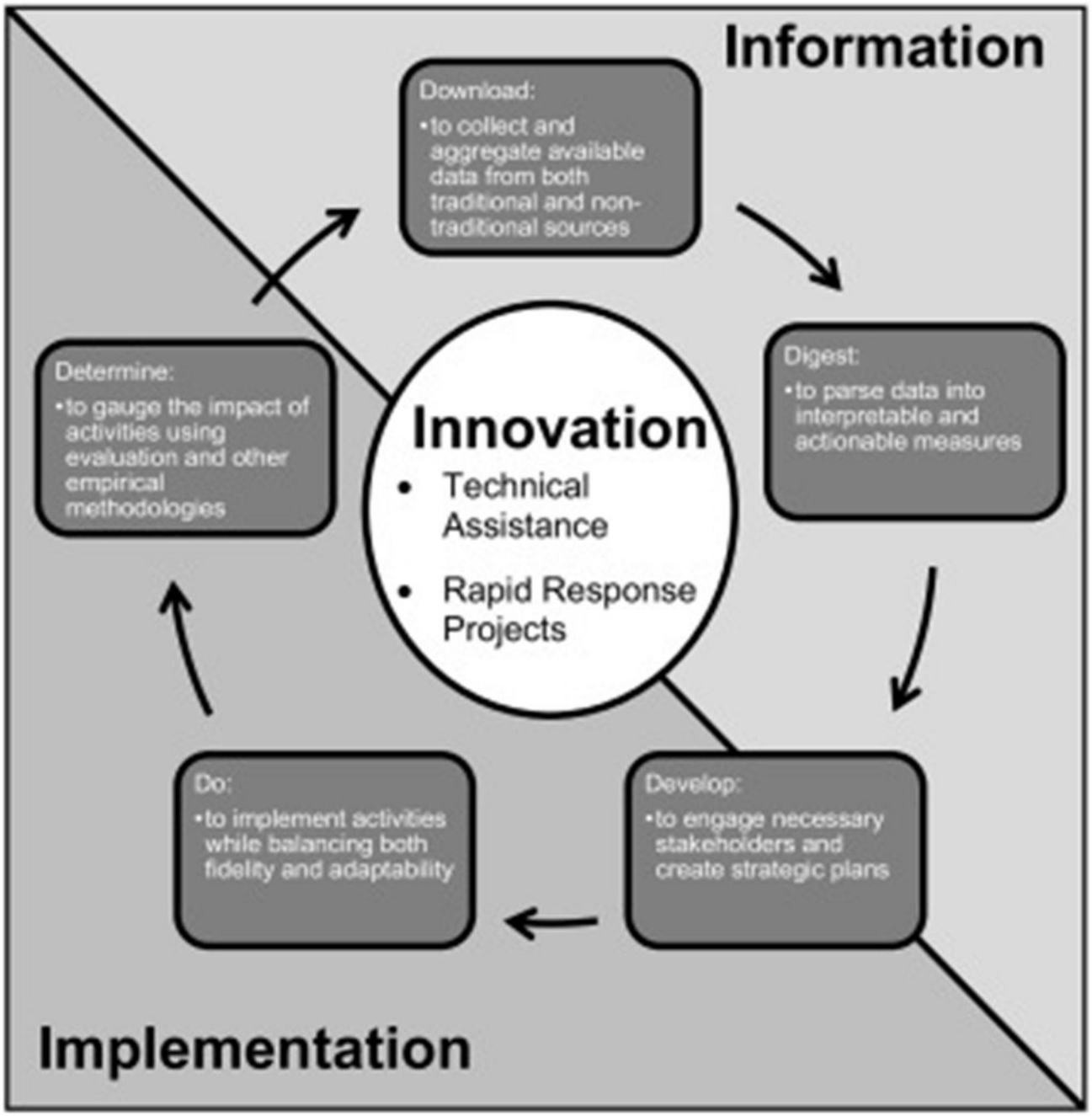

Fig. 1.
Observed program implementation paradigm.

Table 1

PfS required major activities.

Major activities to enhance and maximize PDMPs	Major activities to implement community or insurer/health systems interventions
Move toward universal registration and use	Provide technical assistance to high-burden communities
Move toward a real-time PDMP (i.e., reduce data collection interval)	Implement opioid prescribing guidelines for insurers and/or health systems
Expand and improve proactive reporting (i.e., prescriber notifications)	Enhance uptake of evidence-based opioid prescribing guidelines
Conduct public health surveillance with PDMP data and publically disseminate	

Table 2

Alignment of PfS major activities and similar recommendations.

PfS major activities	The opioid epidemic: From evidence to impact – Clinton Foundation/JHSPH (Oct 2017)	Prescription drug monitoring programs: Evidence-based practices to optimize prescriber use – Pew Trusts (Dec 2016)	The President's Commission on Combating Drug Addiction and the Opioid Crisis: Report (Nov 2017)	Finding solutions to the prescription opioid and heroin crisis: a road map for States – NGA (July 2016)
Move toward universal PDMP registration & use	X	X	X	
Make PDMPs easier to use & access	X	X		X
Expand and improve proactive PDMP reporting	X	X		
Conduct PH surveillance with PDMP data and publically disseminate	X	X	X	X
Implement opioid prescribing interventions for insurers & health systems	X		X	X
Enhance uptake of evidence-based opioid prescribing guidelines	X		X	X
Provide TA to high-burden communities & counties, esp. efforts to address problematic prescribing	X			