CAPT Decision-Support Tools

PREVENTING PRESCRIPTION DRUG MISUSE: Programs and Strategies

Using Prevention Research to Guide Prevention Practice

SAMHSA's Center for the Application of Prevention Technologies

Updated May 2016

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INTRODUCTION

The nonmedical use of prescription drugs (NMUPD) has become an increasing public health concern in the United States, with abuse rates rising rapidly since the late 1990s. Yet preventing and reducing prescription drug misuse represents a major challenge for states and communities, as prescription drugs offer important health benefits, in addition to presenting risks. Prevention strategies, therefore, are often more restrained and less known than those targeting alcohol and illicit drug use; and involve key intermediaries different from those who supply alcohol and other drugs. Moreover, because NMUPD prevention is a relatively new field, few strategies have been subjected to evaluation.

This document provides brief summaries of substance abuse prevention strategies and associated programs that have been evaluated to determine their effects on NMUPD. It should be considered a resource for state and community prevention practitioners seeking information on interventions to reduce NMUPD.

The strategies highlighted in this document are organized into five categories:

- **Education** is implemented to increase awareness of prescription drug misuse dangers for the public and health care providers. It also provides opportunities to teach individuals how to properly dispense, store, and dispose of controlled substances.
- **Tracking and monitoring** helps detect "doctor shoppers" and identify prescribers who have aberrant prescribing practices. The objective of tracking and monitoring is to reduce access and availability of prescription drugs to those who would misuse them.
- **Proper medication disposal** provides ways for people to safely and responsibly get rid of controlled substances that they have in their household. The objective of proper medication disposal is to limit access and availability, as well as raise awareness of prescription drug misuse.
- **Harm reduction** mitigates risks associated with prescription drug misuse and overdose. These strategies are not necessarily focused on preventing drug misuse, rather they are designed to reduce death, disability, and other negative consequences associated with prescription drug misuse and overdose.
- **Multi-component** programs combine more than one type of strategy in order to address multiple risk factors (e.g., lack of awareness, perceptions of harm, access and availability, overdose antidote use) associated with prescription drug misuse and overdose.

Each intervention summary is designed to provide a brief answer to the following questions:

- **Description:** What are the key components of the program?
- **Populations:** What population group(s) does this program target?
- **Settings:** In what settings has this program been implemented (and evaluated)?
- **Evaluation Design:** How was this program evaluated?
- **Evaluation Outcomes:** What were the evaluation outcomes specific to NMUPD?
- **Evaluation Studies:** Which evaluation studies reported these NMUPD outcomes?

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- **Additional Information:** Where do I go or whom do I contact for more information?

RELATED TOOLS

Other CAPT tools that support the prevention of NMUPD, and which we suggest reviewing prior to strategy selection, include the following:

- ***Preventing Prescription Drug Misuse: Understanding Who Is at Risk****:* Offers a summary of research findings on factors associated with NMUPD
- ***Sources of Consumption Data Related to Non-Medical Use of Prescription Drugs – 2012****:* Includes national and local sources of consumption data on prescription drug misuse
- ***Sources of Consequence Data Related to Non-Medical Use of Prescription Drugs – 2012****:* Includes national and local sources of consequence data on prescription drug misuse
- ***Other Sources of Data Related to Non-Medical Use of Prescription Drugs – 2012****:* Includes four data sources related to non-medical use of prescription drugs

THE FINE PRINT: SEARCH METHODS AND INCLUSION CRITERIA

The strategies and programs included in this document were culled from studies published between 2005 and 2015. This time range was determined to be the most appropriate based on available resources and the determination that more recent articles would be more relevant to current prevention planning activities.

The search was conducted using the PSYCHINFO, MEDLINE, PSYCHARTICLES, and SOCINDEX databases. Search terms included the following:

- **(Substance Key Words)** *Prescription drug** OR *Opioid** OR *Opiate** OR *Tranquilizer** OR *Sedative** OR *Stimulant*
- AND **(Abuse Key Words)** *Abuse* OR *Misuse* OR *Overdose* OR *Addiction* OR *Depend**
- AND **(Effective Key Words)** *Effective* OR *Efficacy* OR *Evaluation*
- AND **(Strategies Key Words)** Prevention OR Strateg* OR Intervention OR Policy OR Policies OR Program*

Strategies and related studies selected for inclusion (or referenced) were those that had the following characteristics:

- Published in a peer-reviewed journal.
- Was an evaluated NMUPD prevention program implemented with a U.S.-based sample.
- Published in English.
- Demonstrated statistically significant positive effects with regard to NMUPD outcomes (e.g., reduced or prevented) using experimental, quasi-experimental or non-experimental (i.e., no comparison or control group) outcome evaluation research designs.

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- Assessed outcomes related to NMUPD consumption and consequences.
- Used quantitative data analyses.
- Included human participants.

Excluded studies had these characteristics:

- Focused on treating prescription drug misuse.
- Were literature reviews, non-primary sources, commentaries, news report, or historical perspectives. Note, however, that studies meeting inclusion criteria were distilled from literature reviews produced in our search.
- Included a combined or composite outcome measure of multiple types of drug use.
- Evaluated NMUPD prevention strategies and produced only negative findings or had no effect.

The strategies and programs included in this document are organized according to five categories similar to those listed in the national *Prescription Drug Abuse Prevention Plan*,[1] which calls for education, monitoring, proper disposal, and enforcement. We added an additional category—harm reduction—to highlight programs and strategies that reduce the likelihood of overdose and overdose consequences. Because our search yielded no evaluation studies of enforcement strategies, we eliminated that category. It is important to note, however, that enforcement stakeholders are involved with implementing many programs that are not explicitly designated as "enforcement," such as prescription drug take-back programs and prescription drug monitoring programs. We also added a multi-component category because some strategies were combined and evaluated together, and the outcomes of those studies cannot necessarily be attributed to one specific strategy.

USING THIS RESOURCE TO GUIDE PREVENTION PRACTICE

This tool comprises a series of individual tables, one for each included study. Each table provides a brief description of the strategy being studied, the population the strategy was tested with, the setting the test occurred in, the risk and protective factors the strategy is seeking to address, the study's evaluation design, and the study's outcomes.

Additional information on the risk and protective factors being addressed by these strategies, and other risk and protective factors relevant to NMUPD, may be found in the companion tool *Preventing Prescription Drug Misuse: Understanding Who Is at Risk*.

Although there are several ways to approach and use these tools, the following are suggested steps or guidelines.

[1] US Executive Office of the President. (2011). *Epidemic: Responding to America's prescription drug abuse crisis.* Retrieved from https://www.ncjrs.gov/pdffiles1/ondcp/rx_abuse_plan.pdf

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- **Start with risk and protective factors.** To select the most appropriate prevention strategy or program, first determine what are the most relevant risk and protective factors driving local NMUPD. You may discover factors different from what studies of other communities have found. For instance, not all communities may have a large number of high school students with a low perception of the risks associated with NMUPD—but yours may. To be effective, prevention strategies or interventions must be linked to the risk and protective factors that drive the problem in the community. Therefore, it is critical that you begin with a solid understanding of these factors, based on a comprehensive review of local quantitative and qualitative data.

- **Select a strategy.** Once you identify local risk and protective factors, use this document's companion tool *Preventing Prescription Drug Misuse: Understanding Who Is at Risk* to determine how well-supported they are by available research. Using the information and recommended instructions from that tool, select the risk and protective factors on which to focus.

  Next, review the tables in this document to identify strategies that seek to address your selected factors. There may be multiple strategies that address a selected factor, so be sure to search the entire document. Additionally, many strategies are designed to address more than one factor, and thus focusing on such strategies may be more cost-effective than focusing on strategies that are more narrowly-tailored. For instance, a single family-based intervention may seek to both reduce youth risk factors and strengthen parental protection factors.

  The "Populations" and "Settings" rows of each table can help you determine the relevance of a strategy to your selected risk and protective factors. For instance, a strategy shown to reduce NMUPD among veterans may not be relevant to a community seeking to reduce NMUPD among high school students. Additionally, a strategy specifically tailored for a certain geographic region may not be as effective among populations in other regions. However, due to the limitations of available literature, you may need to "settle" for an intervention shown to be effective for a population that does not exactly match your own. The "Evaluation Outcome(s)" row of each record may also help you determine which strategies provide the most effective results for the factors you select to address.

- **Learn more about those strategies that seem relevant**. This document provides basic information about each study to better inform your prevention planning decisions. However, there is more information available within the studies themselves, and each table contains a complete study citation so you can locate the original article. Additionally, where available, the tables provide links to other relevant information, such as federal or state publications about the strategy in question.

  Once you have selected a relevant strategy or strategies, determine whether the evidence of effectiveness is sufficient. Comparing and weighing the evidence of the different studies is

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beyond the scope of this tool. However, the "Evaluation Design" row provides some information on this topic, and communities that wish to do so are encouraged to further examine the original articles using guidance from other SAMHSA products, such as the Center for Substance Abuse Prevention's (CSAP's) 2009 *Identifying and Selecting Evidence-Based Interventions - Revised Guidance Document for the Strategic Prevention Framework State Incentive Grant Program*.

In general, it is best to leave rigorous study comparisons to researchers, evaluators, or others with appropriate training and experience. Fortunately, in response to conditions of CSAP-funded initiatives, such as the Partnerships for Success grant program, many states, tribes, and jurisdictions have evidence-based workgroups that can help assess research literature.

- **Determine the feasibility of implementation**. Once you have identified a strong potential strategy, the next step is to determine how feasible it will be to implement, given available resources and local conditions (i.e., the community's willingness and readiness to implement). The processes of assessing feasibility and the sources that can help with these processes are discussed in the Center for Substance Abuse Prevention's (CSAP's) 2009 *Identifying and Selecting Evidence-Based Interventions - Revised Guidance Document for the Strategic Prevention Framework State Incentive Grant Program*. Additional resources related to feasibility can be found on the CAPT section of SAMHSA's website (samhsa.gov/capt).

- **Don't give up if you don't find an appropriate program.** Given the relatively small number of interventions included in this document, you may not be able to identify a strategy that meets your needs—that is, that addresses the risk and protective factors associated with local NMUPD for which there is sufficient evidence of effectiveness—and that is feasible to implement. Should this occur, consider searching the databases listed above or other databases to retrieve more research articles. For example, you may want to widen your search to include articles from outside this document's time range or inclusion criteria, or try other search terms.

  Another possibility is to consider strategies that rigorous studies show can influence the selected risk and protective factors, but that lack evidence related to NMUPD use, specifically. For instance, there may be a well-researched prevention strategy that has been shown to reduce alcohol or other substance use by addressing the protective factor *youth concern about academic performance,* but that has not been measured for outcomes related to NMUPD. However, before implementing this sort of strategy, consider whether it may need to be adapted to more specifically to address NMUPD. For instance, refusal skill exercises may need to be altered to include prescription drugs. Also note that such a strategy simply may not be effective at influencing NMUPD.

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A FEW CAUTIONARY NOTES REGARDING USE

Please use prudence when interpreting the information included in these records. Here is why:

1. The findings are limited to the time frame, databases, search parameters, and exclusion criteria described above.

2. Our review did not focus on the quality of research methods employed. Although we include brief information on general types of evaluation methods, we do not rate the quality of, for example, research design, reliability and validity of measures, fidelity of program implementation, and appropriateness of statistical analyses. For more information on the types of methods used, and to determine limitations specific to individual studies, review the full text article and/or consult your evaluator.

3. Scientifically rigorous study of strategies to address NMUPD is a relatively recent development, and there are not yet a robust number of completed studies. Some strategies that could eventually be found effective may have not yet been evaluated or only evaluated in studies that found weak evidence supporting them. As such, additional studies of previously evaluated and not-yet-evaluated strategies should occur.

4. The methodological rigor of the studies in this tool varies widely, from experimental studies that include pre- and post-assessment of intervention and control groups to which participants are assigned at random, to quasi-experimental designs that include pre- and post-assessment of intervention and comparison groups that are assumed to be non-equivalent, to non-experimental studies that include participant assessment before and after intervention participation but no comparison group. Most studies use non-experimental designs that cannot categorically determine whether a given strategy affected NMUPD.

GLOSSARY OF TERMS

To keep the tool as concise and consistent as possible, many technical terms are used without explanation. While many of these terms may be familiar to prevention experts, such as the difference between *misuse* and *dependence*, others are terms more commonly used in other fields. The following is a list of terms used in this tool with which prevention experts might be less familiar, accompanied by short definitions:

Agonist drugs: Drugs that bind to and mimic the effects of neurotransmitters naturally found in the human brain.

Antagonist drugs: Drugs that block the brain's neurotransmitters. See *Naloxone*.

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Agonist/antagonist combinations: Drugs that activate or mimic neurotransmitters naturally found in the brain combined with those that block other neurotransmitters. For example, co-administration of buprenorphine (partial agonist) and naltrexone (antagonist) is proposed to ease opioid withdrawal.[2]

Benzodiazepines: A class of drug used mainly as tranquilizers to control symptoms of anxiety.

Buprenorphine: A medication used to treat pain and opioid dependence.

Control group: A group of individuals in a sample who did not receive the intervention. Their post-intervention data are compared to individuals in the sample who did receive the intervention (i.e., the test group) to determine the effect of the intervention.

Doctor Shoppers: A term used to describe individuals who simultaneously visit multiple health care providers to obtain multiple prescriptions for medications during a single illness episode or for treating a continuous illness.[3]

Drug dependence: A need for repeated doses of a drug to feel good or to avoid feeling bad.[4]

Drug misuse: The use of a substance for a purpose not consistent with legal or medical guidelines.[5]

DSM-IV: Short-hand for the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition,* which is published by the American Psychiatric Association and describes all mental health disorders for both children and adults, including substance use disorders.

Experimental design: Refers to a study that meets certain rigorous design criteria, such as longitudinal data collection (collecting data before and after participation) and random assignment to a control or intervention group. Experimental designs using humans are often unfeasible; however, those that exist provide the most robust data.

Fentanyl: A powerful opioid pain medication similar to, but more potent than, morphine.

Hydromorphone: An opioid pain medication that goes by the brand name Dilaudid.

Intervention: The strategy, program, or policy that is being implemented.

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[2] Mannelli, P (2010) Agonist-antagonist combinations in opioid dependence: A translational approach. *Dipend Patologiche, 5*(1), 17-24. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3311161/

[3] Sansone, R. A., & Sansone, L. A. (2012). Doctor shopping: A phenomenon of many themes. *Innovations in clinical neuroscience*, *9*(11-12), 42-46.

[4] National Institute on Drug Abuse. (2007). *Introduction to the brain*. Retrieved from https://www.drugabuse.gov/publications/teaching-packets/neurobiology-drug-addiction/section-iii-action-heroin-morphine/8-definition-dependence

[5] World Health Organization (WHO) (2006) *Lexicon of Alcohol and Drug Terms Published by the World Health Organization*. Retrieved from http://www.who.int/substance_abuse/terminology/who_lexicon/en/

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Methadone: An opioid pain medication that is used for maintenance therapy in people with opioid dependence.

Naloxone: An opioid antagonist used to counter the effects of opioid overdose.

Non-experimental design: Typically a catch-all term for evaluations that do not include a comparison group, but that may include a pre- and post-assessment of participants or of those exposed to the intervention.

Opioid: A medication that relieves pain. Opioids are sometimes referred to as *narcotics*.

Oxycodone: An opioid medication that is used to treat moderate to severe pain.

Pill Mill: A term used to describe a doctor, pain clinic, or pharmacy that indiscriminately prescribes or dispenses controlled prescription drugs.[6]

Pooled cross-sectional analysis: Refers to a study in which data are collected from different samples at different points in time. In analyses, data are pooled to determine whether introduction of a program or intervention is associated with change over time with different samples.

Prodrug: A medication that it is not pharmacologically active until it is metabolized. Prodrugs are sometimes used to improve how a drug is absorbed, distributed, or metabolized by the body.

Prospective Study: A study that looks for the development of outcomes over the course of its time range. The study is seeking to determine what outcomes will derive from selected factors. Contrast with *Retrospective Study*.

Quasi-experimental design: A study in which participants are assigned to a test or comparison group, not at random, and assessed before and after participation in a program or intervention. Because groups are assigned not at random, they are assumed to be non-equivalent. Statistical procedures are needed to correct for non-equivalence between groups.

Retrospective Study: A study that looks at data where the outcome has already occurred. The study is seeking to determine what factors led to the outcome. Contrast with *Prospective Study*.

Test group: A group of individuals in a sample that receive or are exposed to the intervention. Their post-intervention data are compared to individuals in the sample who did not receive the intervention (i.e., the control group) to determine the effect of the intervention.

Wait-list control group: A group of participants included in an evaluation study that serves as a comparison group during the study, but eventually receives or participates in the intervention or program at a later date.

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[6] Rigg, K. K., March, S. J., & Inciardi, J. A. (2010). Prescription drug abuse and diversion: Role of the pain clinic. *Journal of Drug Issues*, *40*(3), 681-701.

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STRATEGIES AND PROGRAMS

EDUCATION

Given that opioids are one of the most commonly researched misused prescription drug,[7] many of the educational strategies our search yielded specifically focused on opioid misuse. Because most misused opioids derive from social sources (e.g., receiving controlled substances through family and friends for free[8]), educational strategies have focused—with some success—on reducing this kind of access. For example, parents who were taught the dangers of prescription drug misuse through interactive "family night" sessions were more likely to restrict access to prescription drugs in their household,[9] thus reducing opportunities for their children or other individuals to obtain the drugs for misuse. This program may also cultivate greater parental disapproval toward prescription drug misuse—an identified protective factor for youth.[10] In addition, a widespread media campaign implemented in Utah demonstrated that those who saw the media messages were less likely to share their prescription drugs and less likely to use prescription drugs that were not prescribed to them.[11] Although these educational strategies are not directly associated with misuse, they are linked to factors (e.g., lack of knowledge about the potential dangers of prescription opioid misuse, ease of access) that place people at potentially higher risk of NMUPD.

We also found several educational strategies that aimed to reduce access to and availability of prescription drugs for those who are likely to misuse them. These types of strategies typically targeted drug prescribers. In fact, evidence suggests that prescribers taught best practices for opioid prescribing and provided information regarding opioid dosing guidelines were more likely to safeguard against potential patient misuse. For example, prescribers were less likely to prescribe opioids at high dosages when they were provided opioid dosing guidelines.[12] Physicians participating in educational presentations describing recommended prescribing practices also were less likely to prescribe long-

[7] Zosel, A., Bartelson, B. B., Bailey, E., Lowenstein, S., & Dart, R. (2013). Characterization of adolescent prescription drug abuse and misuse using the Researched Abuse Diversion and Addiction-related Surveillance (RADARS®) System. *Journal of the American Academy of Child & Adolescent Psychiatry*, *52*(2), 196-204.

[8] Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings, NSDUH Series H-48, HHS Publication No. (SMA) 14-4863*. Rockville, MD: Substance Abuse and Mental Health Services Administration. Retrieved from http://www.samhsa.gov/data/sites/default/files/NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.htm

[9] Collins, D. A., Johnson, K. W., & Shamblen, S. R. (2012). Examining a home environmental strategy to reduce availability of legal products that can be misused by youth. *Substance Use & Misuse, 47*(12) doi: 10.3109/10826084.2012.716481

[10] Collins, D., Abadi, M. H., Johnson, K., Shamblen, S., & Thompson, K. (2011). Non-medical use of prescription drugs among youth in an Appalachian population: Prevalence, predictors, and implications for prevention. *Journal of Drug Education*, *41*(3), 309–326.

[11] Johnson, E. M., Porucznik, C. A., Anderson, J. W., & Rolfs, R. T. (2011). State-level strategies for reducing prescription drug overdose deaths: Utah's prescription safety program. *Pain Medicine, 12*(Suppl 2), S66–S72. doi: 10.1111/j.1526-4637.2011.01126.x

[12] Garg, R. K., Fulton-Kehoe, D., Turner, J. A., Bauer, A. M., Wickizer, T., Sullivan, M. D., & Franklin, G. M. (2013). Changes in opioid prescribing for Washington workers' compensation claimants after implementation of an opioid dosing guideline for chronic noncancer pain: 2004 to 2010. *The Journal of Pain, 14* (12), 1620-1628. doi: 10.1016/j.jpain.2013.08.001

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acting opioids for acute pain and adopt other recommended practices.[13] Having a prescription for a controlled substance,[14] obtaining multiple prescriptions,[15] and having a large dosage prescribed[16] are all risk factors related to elements of prescription misuse.

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[13] Cochella, S., & Bateman, K. (2011). Provider detailing: An intervention to decrease prescription opioid deaths in Utah. *Pain Medicine, 12*(Suppl 2), S73–S76. doi: 10.1111/j.1526-4637.2011.01125.x

[14] Edlund, M. J., Martin, B. C., Fan, M.-Y., Devries, A., Braden, J. B., & Sullivan, M. D. (2010). Risks for opioid abuse and dependence among recipients of chronic opioid therapy: Results from the TROUP study. *Drug and Alcohol Dependence*, *112*(1-2), 90–98. Retrieved from http://doi.org/10.1016/j.drugalcdep.2010.05.017

Jeffery, D. D., Babeu, L. A., Nelson, L. E., Kloc, M., & Klette, K. (2013). Prescription drug misuse among U.S. active duty military personnel: A secondary analysis of the 2008 DoD survey of health related behaviors. *Military Medicine*, *178*(2), 180–195.

Silva, K., Schrager, S. M., Kecojevic, A., & Lankenau, S. E. (2013). Factors associated with history of non-fatal overdose among young nonmedical users of prescription drugs. *Drug and Alcohol Dependence*, *128*(1-2), 104–110. Retrieved from http://doi.org/10.1016/j.drugalcdep.2012.08.014

[15] Ehrentraut, J. H., Kern, K. D., Long, S. A., An, A. Q., Faughnan, L. G., & Anghelescu, D. L. (2014). Opioid misuse behaviors in adolescents and young adults in a hematology/oncology setting. *Journal of Pediatric Psychology*, *39*(10), 1149–1160. Retrieved from http://doi.org/10.1093/jpepsy/jsu072

Peirce, G. L., Smith, M. J., Abate, M. A., & Halverson, J. (2012). Doctor and pharmacy shopping for controlled substances. *Medical Care*, *50*(6), 494–500. Retrieved from http://doi.org/10.1097/MLR.0b013e31824ebd81

[16] Bohnert, A. S. B., Valenstein, M., Bair, M. J., Ganoczy, D., McCarthy, J. F., Ilgen, M. A., & Blow, F. C. (2011). Association between opioid prescribing patterns and opioid overdose-related deaths. *Journal of the American Medical Association*, *305*(13), 1315–1321. Retrieved from http://doi.org/10.1001/jama.2011.370

Edlund, M. J., Martin, B. C., Russo, J. E., DeVries, A., Braden, J. B., & Sullivan, M. D. (2014). The role of opioid prescription in incident opioid abuse and dependence among individuals with chronic noncancer pain: The role of opioid prescription. *The Clinical Journal of Pain*, *30*(7), 557–564. Retrieved from http://doi.org/10.1097/AJP.0000000000000021

Edlund, M. J., Steffick, D., Hudson, T., Harris, K. M., & Sullivan, M. (2007). Risk factors for clinically recognized opioid abuse and dependence among veterans using opioids for chronic non-cancer pain. *Pain*, *129*(3), 355–362. Retrieved from http://doi.org/10.1016/j.pain.2007.02.014

Koyyalagunta, D., Bruera, E., Aigner, C., Nusrat, H., Driver, L., & Novy, D. (2013). Risk stratification of opioid misuse among patients with cancer pain using the SOAPP-SF. *Pain Medicine (Malden, Mass.)*, *14*(5), 667–675. Retrieved from http://doi.org/10.1111/pme.12100

Sullivan, M. D., Edlund, M. J., Fan, M.-Y., Devries, A., Brennan Braden, J., & Martin, B. C. (2010). Risks for possible and probable opioid misuse among recipients of chronic opioid therapy in commercial and Medicaid insurance plans: The TROUP Study. *Pain*, *150*(2), 332–339. Retrieved from http://doi.org/10.1016/j.pain.2010.05.020

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Educational Interventions (Simulation)	
Description	Researchers developed a systems dynamic (SD) model using various relevant prescription opioid use/misuse data from 1995 to 2008 and expert recommendations for its parameters and structure. The model results were tested against real world data to ensure its accuracy and were then used to separately simulate the results of three potential educational interventions: (1) a prescriber education program, (2) a patient education program, and (3) a public education program.
Populations	Prescribers, patients, general public
Settings	Nationwide (simulation)
Risk & Protective Factors	The model primarily focused on the effect that the intervention had on risk and protective factors related to inappropriate prescriber practices and lack of knowledge about the potential dangers of prescription opioid use/misuse.
Evaluation Design	Simulated prospective experimental study model using data collected from 1995 to 2008 (Wakeland et al., 2013). Researchers simulated the effects of (1) a prescriber education program that would double prescribers' perceptions of risk of prescribing opioids and effectiveness in monitoring patients for opioid misuse; (2) a patient education program that would halve patient rates of misuse or abuse of prescribed opioids; and (3) a public education program that halved prescription opioid abuse rates of initiation and the overall perceived popularity of opioid abuse.
Evaluation Outcome(s)	Implementation of the prescriber education program predicted decreases in (Wakeland et al., 2013): • The number of patients misusing or abusing prescription opioids • The number of patients treated with opioids, including those with legitimate treatment needs • Prescribed opioid overdose death rates • Diverted opioid and heroin overdose death rates due to drug trafficking being constrained by reduced supply Implementation of the patient education program predicted (Wakeland et al., 2013): • Decreases in the rate of prescribed opioid overdose deaths • Increases in the diverted opioid overdose death rate. The researchers attributed this to the fact that the decrease in prescribed opioid overdose deaths would lead to reduced perceptions of risk among prescribers and law enforcement, enabling easier diversion of prescription opioids to occur. Implementation of the public education program predicted decreases in (Wakeland et al., 2013): • All opioid-related rates of overdose deaths • The rate of prescription opioid misuse and abuse

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Educational Interventions (Simulation)	
Evaluation Studies	Wakeland, W., Nielsen, A., Schmidt, T. D., McCarty, D., Webster, L. R., Fitzgerald, J., & Haddox, J. D. (2013). Modeling the impact of simulated educational interventions on the use and abuse of pharmaceutical opioids in the United States: A report on initial efforts. *Health Education & Behavior, 40*(1, Suppl), 74S–86S. doi: 10.1177/1090198113492767

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Home Environmental Strategy to Reduce Access to Harmful Legal Products	
Description	From 2004 to 2008, researchers, community coalitions, and schools collaborated to implement multiple prevention strategies in rural/frontier Alaska communities as part of a National Institute on Drug Abuse (NIDA) pilot project. The three primary strategies were (1) the Community Readiness Model, (2) the Home Environmental Strategy (HES), and (3) Think Smart. The HES encouraged parents of children in the 5th to 7th grades to reduce home availability to harmful legal products (HLPs), including prescription drugs, through educational "Family Nights," which provided information on the dangers of HLPs.
Populations	Parents of 5th to 7th graders
Settings	Four rural/frontier Alaska communities
Risk & Protective Factors	The strategy focused on reducing the risk factor of: • Ease of access to harmful legal products, including prescription drugs The strategy focused on strengthening the protective factor of: • Parental awareness of the dangers of harmful legal products, including prescription drugs
Evaluation Design	Prospective, non-experimental design using a survey of all parents of 5th to 7th graders in all 11 public schools in the four selected communities (Collins, Johnson, & Shamblen, 2012). Data were collected before and after the intervention was implemented in 2006 via telephone interviews with 277 parents.
Evaluation Outcome(s)	After participating in the Home Environmental Strategy, parents were more likely to restrict access to their prescription drugs. HES implementation also was found to be associated with a decrease in the availability of prescription drugs and other HLPs (Collins et al., 2012).
Evaluation Studies	Collins, D. A., Johnson, K. W., & Shamblen, S. R. (2012). Examining a home environmental strategy to reduce availability of legal products that can be misused by youth. *Substance Use & Misuse, 47*(12) doi: 10.3109/10826084.2012.716481
Additional Information	Akeela, Inc.: http://www.akeela.us/prevention-training/hlp-research/

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Prescription Opioid Dosing Guidelines (Washington)	
Description	Dosing guidelines are a voluntary resource intended to provide prescribers additional information on appropriate levels of use of prescription drugs. Guidelines provide recommendations on safe and effective dosage amounts for different patient characteristics and conditions. In 2007, the Washington State Agency Medical Directors' Group, a collaboration of various state agencies, developed a new set of opioid dosing guidelines for prescribers. The group cited primary care providers who do not specialize in pain management as a particular focus of the guidelines.
Populations	Prescribers
Settings	Washington State
Risk & Protective Factors	The study focused on improving prescriber-related risk factors, such as: • Lack of knowledge about best prescribing practices • Use of inappropriate prescribing practices
Evaluation Design	Prospective, non-experimental study that used monthly prescription coverage claims data from Washington's worker compensation fund from April 1, 2004–December 31, 2010 to evaluate changes in prescription opioid use and dosage amounts before and after guideline implementation in 2007 (Garg et al., 2013). There were 161,283 individuals who received at least one prescription during the study period.
Evaluation Outcome(s)	Dosing guidelines have been linked to ***declines*** in the (Garg et al., 2013): • Monthly prevalence of prescription opioid use • Number of individuals with any prescription who received chronic opioid therapy • Odds of an individual prescribed opioids receiving a high-dosage prescription (greater than 120 milligrams/dose)
Evaluation Studies	Garg, R. K., Fulton-Kehoe, D., Turner, J. A., Bauer, A. M., Wickizer, T., Sullivan, M. D., & Franklin, G. M. (2013). Changes in opioid prescribing for Washington workers' compensation claimants after implementation of an opioid dosing guideline for chronic noncancer pain: 2004 to 2010. *The Journal of Pain, 14* (12), 1620-1628. doi: 10.1016/j.jpain.2013.08.001
Additional Information	Washington State Agency Medical Directors' Group Opioid Dosing Guideline for Chronic Non-Cancer Pain: http://www.agencymeddirectors.wa.gov/opioiddosing.asp

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Provider Detailing in Utah	
Description	Provider Detailing is a Utah Department of Health educational program on recommended opioid prescribing practices developed for and presented to health care workers, with an emphasis on primary care physicians. The program was composed of one-hour presentations on each of six recommended practices: 1. Set prescription dosages low to start and increase gradually as needed. 2. Obtain sleep studies for all patients prescribed moderate or high dosages of long-acting opioids. 3. Obtain EKGs prior to methadone dosage increases. 4. Avoid mixing opioid prescriptions with prescriptions for sleep aids or benzodiazepines. 5. Avoid prescribing long-acting opioids for acute pain. 6. Educate patients and their families about the risks of opioids.
Populations	Primary care physicians and other health care workers
Settings	Rural and urban physician offices and practices
Risk & Protective Factors	The strategy focuses on reducing risk factors such as: • Availability of prescription drugs • Ease of access to prescription drugs • Overdose potential of prescription drug interactions And strengthening protective factors such as: • Provider knowledge of prescription drug abuse potential
Evaluation Design	Prospective, non-experimental survey of program participants assessed immediately after presentations in 2008 and again after one and six months on confidence in their prescribing practices and adoption of recommended practices (Cochella & Bateman, 2011). Also, prospective, non-experimental review of annual medication-related overdose death rates from state epidemiological surveillance data from 2007–2009.
Evaluation Outcome(s)	Among physicians participating in the detailing educational program (Cochella & Bateman, 2011): • Most (90%) reported confidence in describing the need for improved prescribing practices and adopting the recommended practices. • Most (85%) reported confidence in describing the practices and evaluating them. • Most (60 to 80%) physicians stopped prescribing long-acting opioids for acute pain. • Half started opioid prescriptions at lower dosages and increased them gradually. • Between 30 to 50 percent obtained EKGs and sleep studies as appropriate.

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Provider Detailing in Utah	
Evaluation Outcome(s) (cont.)	Detailing has been linked to decreases in the number of unintentional prescription-drug-involved overdose deaths statewide from 2007 to 2008 (Cochella & Bateman, 2011).
Evaluation Studies	Cochella, S., & Bateman, K. (2011). Provider detailing: An intervention to decrease prescription opioid deaths in Utah. *Pain Medicine, 12*(Suppl 2), S73–S76. doi: 10.1111/j.1526-4637.2011.01125.x
Additional Information	Community Catalyst's Prescription Drugs: Academic Detailing report: http://www.communitycatalyst.org/resources/tools/medicaid-report-card/prescription-drugs/prescription-drugs-academic-detailing

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SmartRx: Web-Based Intervention	
Description	SmartRx is a multimedia, Web-based education and intervention program, focusing on five classes of prescription drugs: analgesics, sedative-hypnotics, stimulants, antidepressants, and tranquilizers. The program consists of education on the medication properties of these prescriptions, safe and responsible use of these prescriptions, and self-management strategies to improve health without these prescriptions.
Populations	Working women employed by hospitals in West Virginia and Ohio
Settings	Online via personal computers and Web-enabled devices
Risk & Protective Factors	The study focused on strengthening protective factors such as the following: • Participation in employee wellness program • Perception of risk • Medication management skills • Health improvement skills
Evaluation Design	Prospective, randomized controlled experimental design with 362 volunteer participants (346 completed pre- and post-tests) in 2007 (Deitz, Cook, & Hendrickson, 2011). Participants completed a pre-test questionnaire, were randomly assigned to the program or a wait-list control group, and completed a post-test questionnaire after the intervention.
Evaluation Outcome(s)	Compared to those who did not participate in SmartRx, program participants showed increases in the following (Deitz et al., 2011): • Knowledge about prescription drug medication properties among individuals who received the intervention compared to the control group • Measures of confidence in adhering to physician medication instructions and managing problems with the medication However, SmartRx participants were no more likely than comparison group participants to demonstrate improvements in knowledge on safe and responsible use or self-management strategies (Deitz et al., 2011).
Evaluation Studies	Deitz, D. K., Cook, R. F., & Hendrickson, A. (2011). Preventing prescription drug misuse: Field test of the SmartRx Web program. *Substance Use & Misuse, 46*(5), 678–686. doi: 10.3109/10826084.2010.528124
Additional Information	Ohio State Medical Association's Smart Rx homepage: https://www.osma.org/smartrx

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Think Smart	
Description	From 2004 to 2008, researchers, community coalitions, and schools collaborated to implement multiple prevention strategies in rural/frontier Alaska communities as part of a National Institute on Drug Abuse (NIDA) pilot project. The three primary strategies were (1) the Community Readiness Model, (2) the Home Environmental Strategy (HES), and (3) Think Smart. Think Smart is a weekly interactive program for 5th and 6th graders taught by teachers in the classroom. Among other lessons, it teaches alternatives to drug use and how to refuse drug offers.
Populations	5th and 6th graders
Settings	Classrooms in schools in 14 communities in rural/frontier Alaska
Risk & Protective Factors	Think Smart seeks to reduce two risk factors: • Peer use of HLPs • Peer perceptions of HLP use And strengthen four protective factors: • Knowledge about drugs and consequences of drug use • Assertiveness skills • Refusal skills • Alaskan cultural identity
Evaluation Design	Prospective, experimental design with communities placed in either the intervention or control group using a procedure that first matched communities on three variables before random assignment to intervention or control conditions; data collected from 460 youth at baseline, 401 youth at immediate post-intervention and 428 youth at six to seven months follow-up (Johnson, Shamblen, Ogilvie, Collins, & Saylor, 2009).
Evaluation Outcome(s)	Compared to youth in the control group, Think Smart participants were less likely to be using HLPs, including prescription drugs, at post-intervention. No effect was found on past 30-day alcohol, marijuana, or tobacco use (Johnson et al., 2009).
Evaluation Studies	Johnson, K. W., Shamblen, S. R., Ogilvie, K. A., Collins, D., & Saylor, B. (2009). Preventing youths' use of inhalants and other harmful legal products in frontier Alaskan communities: A randomized trial. *Prevention Science: The Official Journal of the Society for Prevention Research, 10*(4), 298–312. doi: 10.1007/s11121-009-0132-2
Additional Information	National Center for Frontier Communities: http://frontierus.org/preventing-youths-inhalant-use-ak/.

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Utah Prescription Pain Medication Program	
Description	The Utah Prescription Pain Medication Program was an educational program designed to improve prescribing practices, prevent prescription drug misuse, and reduce the harm caused by prescription drug misuse, with a focus on prescription opioids. Developed by the Utah Department of Health in collaboration with other state agencies, the program included a statewide media campaign targeting the public, educational sessions for prescribers (Provider Detailing) and the development of new prescriber guidelines.
Populations	Patients and prescribers
Settings	Utah media outlets and channels
Risk & Protective Factors	The strategy sought to address three risk factors: • Lack of knowledge about the risks of prescription opioid use and misuse • Ease of access to prescription opioids • Prescribers' inability to identify other risk factors for NMUPD in patients
Evaluation Design	Retrospective, non-experimental design using public survey data and statewide administrative data on overdose death rates (Johnson et al., 2011). Public surveys were conducted in May 2009, after a year-long statewide media campaign that began in May 2008. Annual state epidemiological surveillance data was analyzed for 2007, 2008, and 2009.
Evaluation Outcome(s)	Forty-eight percent of those surveyed recalled the Utah Prescription Pain Medication media campaign's TV commercial. Of those respondents who recalled any of the campaign's media messages (Johnson, Porucznik, Anderson, & Rolfs, 2011): • About half (52%) said they were less likely to share their prescription drugs than before seeing the campaign. • About half (51%) said they were less likely to use prescription drugs not prescribed to them. • 29 percent said their understanding of the potential dangers of prescription drugs had changed. • 18 percent said they disposed of leftover prescription drugs as a result of the media campaign. However, there was not a significant number of respondents who said that their knowledge of the community burden that misuse causes or of the appropriate way to dispose of leftover prescription drugs had changed. During campaign implementation, the number of unintentional prescription-drug-involved overdose deaths statewide decreased 14 percent from 2007 to 2008. The number of such deaths increased slightly (259 to 265) in 2009 (Johnson et al., 2011).

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Utah Prescription Pain Medication Program	
Evaluation Studies	Johnson, E. M., Porucznik, C. A., Anderson, J. W., & Rolfs, R. T. (2011). State-level strategies for reducing prescription drug overdose deaths: Utah's prescription safety program. *Pain Medicine, 12*(Suppl 2), S66–S72. doi: 10.1111/j.1526-4637.2011.01126.x
Additional Information	Utah Department of Health Prescription Pain Medication Management & Education Program: http://www.health.utah.gov/prescription/

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TRACKING AND MONITORING

Tracking and monitoring strategies help law enforcement and regulatory agencies detect "doctor shoppers" and identify prescribers who have unusual prescribing practices. The best-known example of tracking and monitoring interventions are prescription drug monitoring programs (PDMPs): electronic databases, which track prescribing and dispensing of opioid analgesics and other controlled substances. PDMPs allow prescribers to obtain information on individuals' prescription drug use, and allow pharmacists and law enforcement to follow the prescribing behavior of health professionals. For example, if a prescriber finds, after examining PDMP data, that a patient has many prescriptions for commonly misused prescription drugs (i.e., opioids, tranquilizers, sedatives, and stimulants), then s/he can make an informed decision about whether or not to provide that patient with another prescription and/or to screen for a potential substance abuse disorder. Pharmacists and law enforcement agents may use PDMP data to determine which health care professionals in their community are prescribing commonly misused prescription drugs often and in large dosages. This kind of prescribing behavior may signal the presence of "pill mills" where health care professionals are overprescribing potentially addictive medication.

"Pill mills" and "doctor shopping" behavior contributes to the possibility of diversion—that is, using prescription drugs, without doctors' orders, to get high. Research suggests that prescription drug abusers and traffickers use pain clinics to obtain controlled substances in large doses, and engage in "doctor shopping" behavior in order to obtain drugs for themselves to abuse or to sell to others for profit.[17] Individuals who have a history of doctor shopping are at an increased risk of a drug-related death.[18] Tracking and monitoring strategies, such as PDMPs, have been somewhat successful in reducing NMUPD and its precursors (e.g., limiting access). In those states with a functioning PDMP, there were significantly lower increases in the number of Oxycodone shipments,[19] intentional exposures to NMUPDs,[20] and treatment admissions associated with NMUPD compared to states without a PDMP.[21]

Another tracking and monitoring strategy is Triplicate Prescription Programs (TPPs) which require physicians to issue prescriptions for certain controlled substances using multiple copy forms, with the extra copies either retained for record-keeping purposes or submitted to monitoring agencies. Some states have implemented TPPs as precursors to PDMPs. The New York TPP demonstrated significant reductions in problematic benzodiazepine use, pharmacy-hopping, and non-problematic benzodiazepine

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[17] Inciardi, J. A., Surratt, H. L., Kurtz, S. P., & Cicero, T. J. (2007). Mechanisms of prescription drug diversion among drug-involved club-and street-based populations. *Pain Medicine*, *8*(2), 171-183.

[18] Peirce, G. L., Smith, M. J., Abate, M. A., & Halverson, J. (2012). Doctor and pharmacy shopping for controlled substances. *Medical Care*, *50*(6), 494–500. Retrieved from http://doi.org/10.1097/MLR.0b013e31824ebd81

[19] Reisman, R. M., Shenoy, P. J., Atherly, A. J., & Flowers, C. R. (2009). Prescription opioid usage and abuse relationships: An evaluation of state prescription drug monitoring program efficacy. *Substance Abuse: Research and Treatment, 3*, 41–51.

[20] Reifler, L. M., Droz, D., Bailey, J. E., Schnoll, S. H., Fant, R., Dart, R. C., & Bucher Bartelson, B. (2012). Do prescription monitoring programs impact state trends in opioid abuse/misuse? *Pain Medicine, 13*(3), 434–442. doi: 10.1111/j.1526-4637.2012.01327.x

[21] Reifler, L. M., Droz, D., Bailey, J. E., Schnoll, S. H., Fant, R., Dart, R. C., & Bucher Bartelson, B. (2012). Do prescription monitoring programs impact state trends in opioid abuse/misuse? *Pain Medicine, 13*(3), 434–442. doi: 10.1111/j.1526-4637.2012.01327.x

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use with non-problematic and potentially problematic use decreasing the most among African-American individuals.[22]

[22] Pearson, S., Soumerai, S., Mah, C., Zhang, F., Simoni-Wastila, L., Salzman, C., . . . Ross-Degnan, D. (2006). Racial disparities in access after regulatory surveillance of benzodiazepines. *Archives of Internal Medicine, 166*(5), 572–579. doi: 10.1001/archinte.166.5.572

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New York Triplicate Prescription Program for Benzodiazepines	
Description	Triplicate prescription programs (TPPs) require physicians to issue prescriptions for certain controlled substances using multiple copy forms, with the extra copies either retained for record-keeping purposes or submitted to monitoring agencies. TPPs were used in some states as precursors to modern PDMPs. In 2006, 17 states had TPPs. This 2006 study analyzed the effect of New York's decision in 1989 to become the first state to add benzodiazepines to its TPP.
Populations	New York Medicaid program enrollees
Settings	New York
Risk & Protective Factors	The strategy focused on reducing the risk factor of: • Ease of access to prescription drugs
Evaluation Design	Retrospective quasi-experimental design using New York Medicaid administrative data comparing outcomes of interest 12 months prior to the intervention in 1989 to 24 months post-intervention, with follow-up data seven years post-intervention (Pearson, et al., 2006). All 124,867 individuals continuously enrolled in Medicaid for the length of the study range were included in the sample population.
Evaluation Outcome(s)	NY Triplicate Program for Benzodiazepines was associated with significant reductions in (Pearson et al., 2006): • Problematic benzodiazepine use • Pharmacy hopping • Non-problematic benzodiazepine use Non-problematic and potentially problematic use decreased the most among African Americans, despite already having a lower baseline use rate than the white or Hispanic use (Pearson et al., 2006).
Evaluation Studies	Pearson, S., Soumerai, S., Mah, C., Zhang, F., Simoni-Wastila, L., Salzman, C., . . . Ross-Degnan, D. (2006). Racial disparities in access after regulatory surveillance of benzodiazepines. *Archives of Internal Medicine, 166*(5), 572–579. doi: 10.1001/archinte.166.5.572
Additional Information	New York State Department of Health Questions and Answers for Practitioners Regarding the New Official Prescription Program: https://www.health.ny.gov/professionals/narcotic/official_prescription_program/questions_and_answers_for_practitioners.htm

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Ohio Prescription Drug Monitoring Program	
Description	Prescription Drug Monitoring Programs (PDMPs) are electronic databases, established by states, that track the prescribing and dispensing of opioid analgesics and other controlled substances. Some states mandate that prescribers or dispensers register or use the PDMP in certain circumstances, with statutes varying by state. Ohio implemented its PDMP in 2006 with mandatory reporting requirements for dispensers.
Populations	Hospital emergency room (ER) patients with painful conditions
Settings	Hospital ERs
Risk & Protective Factors	PDMPs focus on reducing risk factors such as: • Ease of access to prescription drugs PDMPs focus on strengthening protective factors such as: • Physician knowledge of prescription history
Evaluation Design	Prospective, non-experimental design with ER physicians treating 199 individuals that reported painful conditions without an acute injury to the University of Toledo Medical Center ER during June–July 2008 (Baehren et al., 2010). Researchers questioned ER physicians after they conducted an initial physical examination of the patient, then they presented the patients' PDMP records to the physicians and questioned physicians again, noting any change in answers or prescriptions issued.
Evaluation Outcome(s)	After reviewing PDMP data, patients' physicians altered either their opinion of whether they would prescribe a controlled substance or the type/quantity of controlled substance in 41 percent of cases. In these cases, physicians decided (Baehren et al., 2010): • Against prescribing a controlled substance or to reduce the prescription size or dosage 61 percent of the time • To increase the prescription size or dosage 39 percent of the time
Evaluation Studies	Baehren, D. F., Marco, C. A., Droz, D. E., Sinha, S., Callan, E. M., & Akpunonu, P. (2010). A statewide prescription monitoring program affects emergency department prescribing behaviors. *Annals of Emergency Medicine, 56*(1), 19–23 e11–13. doi: 10.1016/j.annemergmed.2009.12.011
Additional Information	Ohio Automated Rx Reporting System: https://www.ohiopmp.gov/Portal/Default.aspx National Association of Boards of Pharmacy: The Ohio Prescription Monitoring Program – Ohio Automated Rx Reporting System: https://www.nabp.net/news/ohio-news-the-ohio-prescription-monitoring-program-ohio-automated-rx-reporting-system

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Prescription Drug Monitoring Programs Nationwide	
Description	Prescription Drug Monitoring Programs (PDMPs) are electronic databases, established by states, that track the prescribing and dispensing of opioid analgesics and other controlled substances. Some states mandate that prescribers or dispensers register or use the PDMP in certain circumstances, with statutes varying by state.
Populations	Prescribers, dispensers, and patients
Settings	Nationwide
Risk & Protective Factors	PDMPs focus on reducing risk factors such as: • Ease of access to prescription drugs PDMPs focus on strengthening protective factors such as: • Physician knowledge of prescription history
Evaluation Design	Retrospective quasi-experimental design comparing state-level data from 1997 to 2003 on manufacturer shipments of prescription drugs and levels of inpatient admissions for prescription drug abuse (Reisman, Shenoy, Atherly, & Flowers, 2009). States were assigned to either the control group (no operational PDMP) or the intervention group (operational PDMP). At the time of the study, 14 states had PDMPs and 36 states and the District of Columbia did not. Retrospective quasi-experimental design comparing quarterly state-level data inputted into the Researched, Abuse, Diversion and Addiction-Related Surveillance (RADARS) System from 2003 from 2009 (Reifler et al., 2012). The study compared data from states with PDMPs to states without PDMPs, and it only included the 44 states that report RADARS system data. At the time of the study, 34 states had PDMPs and 16 states and the District of Columbia did not.
Evaluation Outcome(s)	Compared to states without PDMPs, states with PDMPs experienced significantly lower increases in the number of: • Oxycodone shipments (Reisman et al., 2009) • Intentional exposures to NMUPDs (Reifler et al., 2012) • Treatment admissions (Reifler et al., 2012)
Evaluation Studies	Reifler, L. M., Droz, D., Bailey, J. E., Schnoll, S. H., Fant, R., Dart, R. C., & Bucher Bartelson, B. (2012). Do prescription monitoring programs impact state trends in opioid abuse/misuse? *Pain Medicine, 13*(3), 434–442. doi: 10.1111/j.1526-4637.2012.01327.x Reisman, R. M., Shenoy, P. J., Atherly, A. J., & Flowers, C. R. (2009). Prescription opioid usage and abuse relationships: An evaluation of state prescription drug monitoring program efficacy. *Substance Abuse: Research and Treatment, 3*, 41–51.

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Prescription Drug Monitoring Programs Nationwide	
Additional Information	Centers for Disease Control and Prevention Injury Prevention & Control: Prescription Drug Overdose: http://www.cdc.gov/drugoverdose/pdmp/

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PROPER MEDICATION DISPOSAL

Proper medication disposal provides safe and responsible ways for people to dispose of prescription drugs kept in their homes. Take-back programs, a popular proper medication disposal strategy, provide avenues to reduce the supply of drugs available for diversion. The logic behind take-back programs goes something like this: If people dispose of their drugs, then they may be less likely to offer them to friends or family, have drugs ingested by and poison young children or unknowing guests, or have drugs taken from their homes for illicit purposes. Prescription Drug Take-Back Programs collect individuals' unwanted or expired prescription drugs voluntarily through the use of drop boxes or take-back events. Evidence does not support the logic provided above in terms of how take-back programs influence individuals' misuse; however, we do know that these programs collect thousands of pounds of drugs with only 10% of the drugs being commonly abused prescription drugs.[23] Practice-based evidence indicates that take-back programs also may be implemented to increase awareness of NMUPD and enhance community readiness to implement a more comprehensive prevention strategy.[24]

[23] Ma, C. S., Batz, F., Juarez, D. T., & Ladao, L. C. (2014). Drug take back in Hawai'i: Partnership between the University of Hawai'i Hilo College of Pharmacy and the Narcotics Enforcement Division. *Hawai'i Journal of Medicine & Public Health, 73*(1), 26–31.

[24] G. Rots, personal communication, July 30, 2015

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Prescription Drug Take-Back Programs	
Description	Prescription Drug Take-Back Programs are programs created to recover individuals' unwanted or expired prescription drugs voluntarily. Programs may take several forms, including drop box programs and take-back events. Drop box programs are where an organization sets up secure drop boxes in locations around a community for individuals to leave unwanted/unused/expired prescription drugs. Drop boxes may be permanently installed, often at law enforcement agencies, or temporarily available for "Take-Back days" or other events. Take-back events are limited one-time only or recurring events that may stand alone or be associated with a larger, unrelated event.
Populations	General public
Settings	• Eight localities in northeast Tennessee • Honolulu expo event and health clinics in Hawaii • Nationwide
Risk & Protective Factors	The strategy focused on reducing the risk factor of: • Availability of or access to prescription drugs
Evaluation Design	Prospective, pooled, cross-sectional analysis tracking the amount of prescription drugs disposed via eight permanent drop box locations in northeast Tennessee from June 2012 to April 2014 (Gray, Hagemeier, Brooks, & Alamian, 2015). Prospective, non-experimental design tracking the amount of prescription drugs disposed via 1 three-day Take-Back event occurring during an unrelated senior-focused expo and 9 one-day events occurring at health clinics in Hawaii in 2011 (Ma, Batz, Juarez, & Ladao, 2014). Prospective, non-experimental design tracking the amount of prescription drugs disposed during the 2014 National Take-Back Day at 5,495 sites (DEA, 2014).
Evaluation Outcome(s)	Drop boxes collected 4,841 pounds of prescription drugs, including 238.5 pounds (4.9%) of controlled substances (Gray et al., 2015). Ten take-back events collected a combined total of 8,011 pounds of prescription and over-the-county drugs, approximately 10 percent of which were controlled substances (Ma et al., 2014). The national take-back event collected 617,150 pounds of prescription drugs (DEA, 2014).
Evaluation Studies	Gray, J., Hagemeier, N., Brooks, B., & Alamian, A. (2015). Prescription disposal practices: A 2-Year ecological study of drug drop box donations in Appalachia. *American Journal of Public Health*, *105*(9), e89–e94. doi: 10.2105/AJPH.2015.302689

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Prescription Drug Take-Back Programs	
Evaluation Studies (cont.)	Ma, C. S., Batz, F., Juarez, D. T., & Ladao, L. C. (2014). Drug take back in Hawai'i: Partnership between the University of Hawai'i Hilo College of Pharmacy and the Narcotics Enforcement Division. *Hawai'i Journal of Medicine & Public Health, 73*(1), 26–31. U.S. Drug Enforcement Administration (DEA). (2014, November 5). DEA and partners collect 309 tons of pills on ninth prescription drug take-back day. *DEA Public Affairs*. Retrieved from http://www.dea.gov/divisions/hq/2014/hq110514.shtml
Additional Information	U.S. Department of Justice, Drug Enforcement Administration, Office of Diversion Control, National Take-Back Initiative: http://www.deadiversion.usdoj.gov/drug_disposal/takeback/

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HARM REDUCTION

Harm reduction strategies mitigate risks associated with prescription drug misuse and overdose. These strategies do not focus solely on preventing prescription drug use and initiation, rather they are designed to reduce death, disability, and other negative consequences associated with NMUPD and overdose. Two of the three harm reduction strategies we identified, combine overdose education with naloxone distribution. Naloxone is an overdose antidote that sometimes goes by the brand name Narcan™. This combination has been associated with increased overdose reversals[25] and knowledge of overdose symptoms.[26] The third harm reduction strategy our search yielded is the alteration of the drug's chemical or physical formulation to inhibit its abusive properties. Prescription drug abuse deterrent formulation packaging has been associated with a decrease in participants reporting OxyContin as their primary drug of abuse and a decrease in past 30-day OxyContin misuse; however, a substantial percent (24%) of participants were able to overcome the new formulation and a majority (66%) of participants moved on to other opioids.[27] While the reformulations diverted users from OxyContin misuse, the majority turned to other opioids and continued to misuse.

[25] Walley, A. Y., Doe-Simkins, M., Quinn, E., Pierce, C., Xuan, Z., & Ozonoff, A. (2013). Opioid overdose prevention with intranasal naloxone among people who take methadone. *Journal of Substance Abuse Treatment, 44*(2), 241–247. doi: 10.1016/j.jsat.2012.07.004

[26] Green, T. C., Heimer, R., & Grau, L. E. (2008). Distinguishing signs of opioid overdose and indication for naloxone: An evaluation of six overdose training and naloxone distribution programs in the United States. *Addiction, 103*(6), 979–989. doi: 10.1111/j.1360-0443.2008.02182.x

[27] Cicero, T. J., Ellis, M. S., & Surratt, H. L. (2012). Effect of abuse-deterrent formulation of OxyContin. *New England Journal of Medicine, 367*(2), 187–189. doi:10.1056/NEJMc1204141

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Overdose Education and Naloxone Distribution Programs	
Description	Overdose education and naloxone distribution (OEND) programs focus on providing training on recognizing and preventing opioid overdoses to individuals, usually current or former opioid misusers/abusers, likely to be in contact with individuals at risk for an overdose. Program participants learn what the start of an overdose looks like and how to administer naloxone to prevent overdoses. Program participants are also provided prescriptions for naloxone.
Populations	Current and former opioid misusers/abusers
Settings	OEND programs located in Baltimore, San Francisco, Chicago, New York (two) and New Mexico. Program training occurred in varied settings, including substance abuse treatment programs, needle exchanges, private homes, community events, and street settings.
Risk & Protective Factors	Risk factors commonly associated with overdoses include: • Previous overdose history • Past-year detox program participation • Recent incarceration • Poly-substance use • Past-30 day substance use The OEND programs sought to increase protective factors such as: • Knowledge about overdose responses • Availability of naloxone
Evaluation Design	Retrospective, quasi-experimental design using individual surveys and interviews to determine outcomes of six OEND programs (Green, Heimer, & Grau, 2008). Researchers interviewed 62 individuals, an average of 10 individuals from each program, of whom 5 had received OEND training and 5 had not.
Evaluation Outcome(s)	Compared to those who did not receive OEND training, those who did were (Green et al., 2008): • Better able to correctly identify opioid overdose cases • More likely to report responding to at least one overdose in the past year
Evaluation Studies	Green, T. C., Heimer, R., & Grau, L. E. (2008). Distinguishing signs of opioid overdose and indication for naloxone: An evaluation of six overdose training and naloxone distribution programs in the United States. *Addiction, 103*(6), 979–989. doi: 10.1111/j.1360-0443.2008.02182.x
Additional Information	Massachusetts Department of Public Health Opioid Overdose Education and Naloxone Distribution: http://www.mass.gov/eohhs/docs/dph/substance-abuse/core-competencies-for-naloxone-pilot-participants.pdf

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Overdose Education and Naloxone Distribution within Methadone Treatment	
Description	This program specifically targeted individuals receiving methadone through a treatment program (inpatient detox, needle exchange, methadone maintenance, and other settings), providing education on how to recognize and prevent an opioid overdose and distributing intranasal naloxone rescue kits.
Populations	Individuals with past 30-day methadone use through a treatment program
Settings	Various methadone treatment programs in Massachusetts from 2008 to 2010, including detox programs, methadone maintenance programs, needle exchanges, residential and outpatient substance abuse treatment programs, and hospital ERs. Also community meetings and homeless shelters.
Risk & Protective Factors	The program targets individuals at high risk for an opioid overdose, with factors such as the following: • Previous overdose history • Past-year detox program attendance • Recent incarceration • Poly-substance use • Past 30-day substance use (in addition to methadone use) It seeks to increase protective factors such as these: • Knowledge about overdose responses • Availability of naloxone
Evaluation Design	Prospective, non-experimental design using program data for the 1,553 Massachusetts Opioid Overdose Prevention Pilot Program participants who reported past 30-day methadone use and their program enrollment setting (Walley et al., 2013). Data were collected from September 28, 2008, to December 31, 2010, at program enrollment and whenever a participant requested a naloxone kit refill.
Evaluation Outcome(s)	Intervention participants reported reversing a total of 92 overdoses with the provided naloxone kits, with two-thirds of the reversed overdoses occurring in private settings and one-third occurring in public settings (Walley et al., 2013).
Evaluation Studies	Walley, A. Y., Doe-Simkins, M., Quinn, E., Pierce, C., Xuan, Z., & Ozonoff, A. (2013). Opioid overdose prevention with intranasal naloxone among people who take methadone. *Journal of Substance Abuse Treatment, 44*(2), 241–247. doi: 10.1016/j.jsat.2012.07.004
Additional Information	Massachusetts Department of Public Health Opioid Overdose Prevention & Reversal Information Sheet: http://www.mass.gov/eohhs/docs/dph/substance-abuse/naloxone-info.pdf

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Prescription Drug Abuse Deterrent Formulation Packaging	
Description	Prescription drug formulation alterations are designed to inhibit the abusive properties of prescription drugs. These alterations can take many forms, including physical alterations (e.g., alterations to a drug's manufactured form that are designed to deter individuals from extracting its active ingredient) or pharmacological alterations (e.g., alterations to a drug's chemical compound designed to reduce its rate of absorption). Common alterations include physical composition changes, chemical composition changes, new agonist/antagonist combinations, adding aversion formulations, altering the drug delivery system, or adding prodrug alternations.
Populations	Individuals with a DSM-IV-defined opioid dependence who entered a treatment program
Settings	Pharmaceutical corporation manufacturing sites
Risk & Protective Factors	Aims to lessen the pharmacological abuse potential of prescription drugs
Evaluation Design	Retrospective, non-experimental, self-administered anonymous surveys of individuals entering a substance abuse treatment program with prescription opioids identified as their primary drug of abuse; from July 1, 2009, through March 31, 2012 (Cicero, Ellis, & Surratt, 2012). Data were collected quarterly from 2,566 individuals in independent cohorts; 103 of these individuals also voluntarily participated in qualitative online or telephone interviews.
Evaluation Outcome(s)	Prescription Drug Abuse Deterrent Formulation Packaging has been associated with the following (Cicero et al., 2012): • Decrease in the percentage of survey participants who reported OxyContin as their primary drug of abuse • Decrease in past 30-day misuse of OxyContin among survey participants • A substantial percent (24) of participants overcoming the new formulation • A majority (66 percent) of participants misusing other opioids (The most common transition was to heroin, followed by high-potency fentanyl and hydromorphone.)
Evaluation Studies	Cicero, T. J., Ellis, M. S., & Surratt, H. L. (2012). Effect of abuse-deterrent formulation of OxyContin. *New England Journal of Medicine, 367*(2), 187–189. doi:10.1056/NEJMc1204141
Additional Information	Federal Drug Administration's Guidance for Industry on Abuse-Deterrent Opioids – Evaluation and Labeling http://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm334743.pdf

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MULTI-COMPONENT

Multi-component programs combine multiple strategies in order to address the various factors that influence NMUPD. One program that we found, Project Lazarus, has five major components: (1) community activation and coalition building to raise community awareness and actively engage the community in intervention design; (2) monitoring data on overdose, prescribing behavior and other relevant data; (3) prevention program implementation at multiple levels throughout the community; (4) education on overdose antidote use for prescribers and the general community in order to change attitudes toward opioid misuse and abuse; and (5) evaluation to assess program impact and identify areas needing improvement. Project Lazarus activities have been linked to decreases in overdose death rates.[28]

Another multi-component program we found in our search, Communities that Care (CTC), requires communities to create and implement a data-informed community action plan for preventing NMUPD. While communities implementing the CTC approach have demonstrated reductions in risk behaviors associated with NMUPD, they have not affected prescription drug use rates.[29]

A third multi-component strategy, Iowa Strengthening Families Program (ISFP): For Parents and Youth 10 – 14, includes intensive youth and parent skill-building components paired with family and classroom curricula. Compared to non-participants, ISFP participants demonstrated lower rates of lifetime prescription drug misuse which persisted over time.[30]

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[28] Albert, S., Brason II, F.W., Sanford, C. K., Dasgupta, N., Graham, J., & Lovette, B. (2011). Project Lazarus: Community-based overdose prevention in rural North Carolina. *Pain Medicine, 13*(Suppl 2), S77-S85. Doi: 10.1111/j.1526-4637.2011.01128.x

[29] Hawkins, J. D., Oesterle, S., Brown, E. C., Arthur, M. W., Abbott, R. D., Fagan, A. A., & Catalano, R. F. (2009). Results of a type 2 translational research trial to prevent adolescent drug use and delinquency: A test of communities that care. *Archives of Pediatrics and Adolescent Medicine, 163*(9), 789–798. doi: 10.1001/archpediatrics.2009.141

Hawkins, J. D., Oesterle, S., Brown, E. C., Monahan, K. C., Abbott, R. D., Arthur, M. W., & Catalano, R. F. (2012). Sustained decreases in risk exposure and youth problem behaviors after installation of the communities that care prevention system in a randomized trial. *Archives of Pediatrics and Adolescent Medicine, 166*(2), 141–148. doi: 10.1001/archpediatrics.2011.183

[30] Spoth, R., Trudeau, L., Shin, C., Ralston, E., Redmond, C., Greenberg, M., & Feinberg, M. (2013). Longitudinal effects of universal preventive intervention on prescription drug misuse: Three randomized controlled trials with late adolescents and young adults. *American Journal of Public Health, 103*(4), 665–672. doi: 10.2105/10ajph.2012.301209

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Communities that Care (2009 & 2012)	
Description	Communities that Care is a community-based prevention system designed to improve community stakeholder prevention capacity. Under the program, initial stakeholders survey the community to identify its risk and protective factors, additional stakeholders, current substance use profile, and other epidemiological data. Stakeholders then develop a community action plan to provide prevention organizational assistance and training and to implement youth prevention programming, focusing on selected risk factors. Articles were published in 2009 and 2012 using data from the same ongoing study.
Populations	Students (5th–8th grade)
Settings	24 small towns across seven states (Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington)
Risk & Protective Factors	The strategy focused on reducing these risk factors: • Youth delinquent behavior (stealing, shoplifting, property damage, etc.) • Youth serious delinquent behavior (violence, stealing a car, drug selling, arrests, etc.) • Youth drug use (With each type measured separately) • Youth alcohol use and binge drinking • Youth "rebelliousness" (as measured from the mean of pre-written statement options) And strengthening these protective factors: • Community norms that discourage substance abuse • Community awareness of substance abuse issues
Evaluation Design	Prospective, experimental design with 24 small towns randomly selected from among 41 small towns that had participated in an earlier study of a different intervention (Hawkins et al., 2009). The 24 small towns were matched within state and then randomly assigned to the control or intervention group. The study assessed 4,407 fifth-grade students at baseline and then annually, through eighth grade, from 2004 through 2009.
Evaluation Outcome(s)	Relative to those in the control group, Communities that Care participants demonstrated greater reductions in the following (Hawkins et al., 2009): • Initiation of drug use • Initiation of alcohol use • Evidence of delinquent behavior • Prevalence of drug use Although there was improvement among the risk factors, there was not a significant change in the prevalence of prescription drug use.

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Communities that Care (2009 & 2012)	
Evaluation Outcome(s) (cont.)	The 2012 study found similar results and that the effects found in the 2009 study continued to persist (Hawkins et al., 2012).
Evaluation Studies	Hawkins, J. D., Oesterle, S., Brown, E. C., Arthur, M. W., Abbott, R. D., Fagan, A. A., & Catalano, R. F. (2009). Results of a type 2 translational research trial to prevent adolescent drug use and delinquency: A test of communities that care. *Archives of Pediatrics and Adolescent Medicine, 163*(9), 789–798. doi: 10.1001/archpediatrics.2009.141 Hawkins, J. D., Oesterle, S., Brown, E. C., Monahan, K. C., Abbott, R. D., Arthur, M. W., & Catalano, R. F. (2012). Sustained decreases in risk exposure and youth problem behaviors after installation of the communities that care prevention system in a randomized trial. *Archives of Pediatrics and Adolescent Medicine, 166*(2), 141–148. doi: 10.1001/archpediatrics.2011.183
Additional Information	SAMHSA's National Registry of Evidence-Based Programs and Practices, Communities that Care: http://legacy.nreppadmin.net/ViewIntervention.aspx?id=392

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Iowa Strengthening Families Program: For Parents and Youth 10 – 14	
Description	The Iowa Strengthening Families Program (ISFP) includes 6, two-hour concurrent parent and youth curricular sessions followed by a family skill-building segment. A seventh conjoint family session concludes the program. Sessions are typically conducted in the evenings; limited to 7 – 10 families; and use videos that model youth-parent situations designed to promote parent nurturing skills, effective parental discipline, youth coping and stress-reduction skills, and youth future-orientation. ISFP for Parents and Youth 10 – 14 includes additional booster sessions conducted in the classroom by teachers one year after middle school sessions and again in 11th grade.
Populations	6th and 7th grade students and their parents
Settings	Iowa and Pennsylvania school districts with at least 15 percent of the students eligible for free or reduced-cost lunch programs
Risk & Protective Factors	The ISFP seeks to reduce numerous risk factors, including: • Aggressive or withdrawn behavior • Negative peer influence • Poor school performance • Lack of pro-social goals • Poor relationship with parents The ISFP seeks to promote these protective factors: • Positive future orientation • Peer pressure resistance skills • Pro-social peer relationships • Positive management of emotions • Empathy with parents
Evaluation Design	Three prospective, experimental trials with youth assigned to: (Study 1) the Iowa Strengthening Families Program (ISFP) or a control group; (Study 2) a modification of ISFP called the Strengthening Families Program: For Parents and Youth 10–14 (SFP 10–14) or a control group; and (Study 3) the SFP 10–14 in conjunction with a second intervention chosen from a menu (Life Skills Training, Project Alert, or All Stars) or a control group. Pre-test baseline data and follow-up data were collected up to 14 years after program implementation: In trial one, 446 sixth graders completed the pre-test; and in trial two, 226 seventh graders completed the pre-test; and for trial three, no sample size was provided (Spoth et al., 2013).
Evaluation Outcome(s)	In 12th grade, and at ages 21, 22, 23, and 25, former intervention students had a lower lifetime prescription drug misuse rate than control students (Spoth et al., 2013).

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Iowa Strengthening Families Program: For Parents and Youth 10 – 14	
Evaluation Studies	Spoth, R., Trudeau, L., Shin, C., Ralston, E., Redmond, C., Greenberg, M., & Feinberg, M. (2013). Longitudinal effects of universal preventive intervention on prescription drug misuse: Three randomized controlled trials with late adolescents and young adults. *American Journal of Public Health, 103*(4), 665–672. doi: 10.2105/10ajph.2012.301209
Additional Information	Iowa Strengthening Families Program: http://www.extension.iastate.edu/sfp10-14/ SAMHSA's National Registry of Evidence-Based Programs and Practices: • LifeSkills Training Program: http://legacy.nreppadmin.net/ViewIntervention.aspx?id=109 • Project Alert: http://legacy.nreppadmin.net/ViewIntervention.aspx?id=62 • All Stars Program: http://legacy.nreppadmin.net/ViewIntervention.aspx?id=28

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Project Lazarus	
Description	Project Lazarus is a four-component prevention model which includes (1) community activation and coalition building, (2) monitoring and epidemiologic surveillance, (3) prevention of overdoses through medical education and other means, and (4) use of rescue medication to reverse overdoses. Each component is intended to work in conjunction with the others to identify and correct causes of prescription drug overdoses and reduce the harm caused by overdoses that continue to occur.
Populations	Opioid prescribers and individuals who meet at least one of the risk factors identified in the strategy
Settings	Wilkes County, North Carolina
Risk & Protective Factors	The strategy focuses on individuals with risk factors such as: • A prescription for high-dose opioids • An opioid prescription for the first time • An opioid prescription in conjunction with a benzodiazepine or antidepressant prescription, alcohol use, or certain diseases • A history of prescription drug misuse or heroin use • Recent treatment for opioid poisoning, intoxication, or overdose • Recent release from jail or prison or from a mandatory abstinence or detox program • Enrollment in a methadone or buprenorphine program • Lack of regular access to medical care or a voluntary request to participate
Evaluation Design	Retrospective non-experimental design evaluating overdose death rates in Wilkes County, NC (population of 66,500 in 2011); pre- and post-strategy implementation using state and county epidemiological surveillance data. Annual data was reported from four years pre-implementation to two-years post-implementation (2005 to 2011) (Albert et al., 2011).
Evaluation Outcome(s)	Implementation of Project Lazarus has been associated with decreases in the following (Albert et al., 2011): • Prescription drug overdose death rate in Wilkes County • Percentage of individuals who died from a prescription overdose who had received their prescription from a prescriber operating within Wilkes County
Evaluation Studies	Albert, S., Brason II, F.W., Sanford, C. K., Dasgupta, N., Graham, J., & Lovette, B. (2011). Project Lazarus: Community-based overdose prevention in rural North Carolina. *Pain Medicine, 13*(Suppl 2), S77-S85. doi: 10.1111/j.1526-4637.2011.01128.x
Additional Information	Project Lazarus website: http://www.projectlazarus.org/

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