



Prescription drug monitoring programs, nonmedical use of prescription drugs, and heroin use: Evidence from the National Survey of Drug Use and Health



Mir M. Ali ^{a,*}, William N. Dowd ^b, Timothy Classen ^c, Ryan Mutter ^a, Scott P. Novak ^d

^a Center for Behavioral Health Statistics & Quality, Substance Abuse & Mental Health Services Administration, 5600 Fishers Lane, Rockville, MD 20852, United States

^b Behavioral Health Economics, RTI International, United States

^c Department of Economics, Loyola University Chicago, United States

^d Behavioral Health Epidemiology, RTI International, United States

HIGHLIGHTS

- First paper to examine the role of prescription drug monitoring program (PDMP) on individual level opioid related outcomes.
- Significant association between PDMP implementation and reduction in ‘doctor shopping’ behavior.
- No significant associations between PDMP implementation or its associated features on heroin initiation.
- No significant associations between PDMP implementation on nonmedical use/initiation/abuse of opioids.

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ABSTRACT

In the United States, nonmedical prescription opioid use is a major public health concern. Various policy initiatives have been undertaken to tackle this crisis, including state prescription drug monitoring programs (PDMPs). This study uses the 2004–2014 National Survey of Drug Use and Health (NSDUH) and exploits state-level variation in the timing of PDMP implementation and PDMP characteristics to investigate whether PDMPs are associated with a reduction in prescription opioid misuse or whether they have the unintended consequence of increasing heroin use. In addition, the study examines the impact of PDMPs on the availability of opioids from various sources. The study finds no effect of PDMP status on various measures of nonmedical prescription opioid use (abuse, dependence, and initiation), but finds evidence of a reduction in the number of days of opioid misuse in the past year. The study also finds that implementation of PDMP was not associated with an increase in heroin use or initiation, but was associated with an increase in number of days of heroin use in the past year. Findings also suggest that PDMPs were associated with a significant decline in doctor shopping among individuals without increasing reliance on illegal sources (e.g., drug dealers, stealing, etc.) or social sources (friends or relatives) as a means of obtaining opioids. The President's FY2017 budget proposed the allocation of \$1.1 billion in an effort to reduce prescription drug misuse, and highlighted the use of PDMPs as a policy tool. This study documents evidence that PDMPs might be having measurable impact.

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1. Introduction

Nonmedical use of prescription pain relievers (NMPR), particularly opioid analgesics, is a major public health concern in the United States as evidenced by increasing numbers of emergency department visits

(Cai, Crane, Poneleit, & Paulozzi, 2010), treatment admissions (Ling, Mooney, & Hillhouse, 2011), and fatal overdoses (Centers for Disease Control and Prevention, 2016). Opioids accounted for 61% of all drug-related overdose deaths in 2014 (Rudd, Aleshire, Zibbell, & Gladden, 2016)—a rate that has nearly quadrupled since 2000 (Compton, Jones, & Baldwin, 2016). In addition, opioid-related hospitalizations increased 150% between 1993 and 2012 (Owens, Barrett, Weiss, Washington, & Kronick, 2014).

* Corresponding author.
E-mail address: mir.ali@samhsa.hhs.gov (M.M. Ali).

In response to the threat posed by NMPR use, federal and state agencies have implemented several different types of regulations, policies, and programs aimed at reducing opioid misuse and associated outcomes. These initiatives range from educational efforts targeted at health service providers and the general public about appropriate use, law enforcement engagement aimed at reducing inappropriate prescribing (i.e. eliminating “pill mills,” Chang et al., 2016), naloxone access laws and programs, and developing abuse-deterrent opioids. Another such policy initiative is the implementation of or strengthening of prescription drug monitoring programs (PDMPs) at the state level to track prescriptions of controlled substances. PDMPs are state-run electronic databases designed to track prescribing and dispensing of prescription drugs classified as controlled substances. These databases are intended not only to reduce over-prescribing of pain medications by doctors but also to identify individuals at high risk for opioid use disorder, such as individuals with opioid prescriptions from multiple providers. The types of drugs that are tracked by the PDMPs vary by state, but they typically include Schedule II and III opioids, which are those with a high potential for abuse available only by prescription. The PDMPs are accessible to physicians, pharmacists, other health care providers, and law enforcement agencies.

The U.S. Department of Health and Human Services (DHHS) considers PDMPs to be among the most important policy mechanisms for reducing prescription drug abuse (Department of Health and Human Services & Assistant Secretary for Planning and Evaluation, 2015). Recent research has shown that PDMPs are effective in reducing the number of prescriptions written for opioids (Bao et al., 2016). Data have also shown that opioid-related mortality is lower in states with a PDMP than in states without a PDMP (Patrick, Fry, Jones, & Buntin, 2016). To date, no studies have examined the impact of PDMPs on opioid-related outcomes among a nationally representative population. For example, Bao et al. (2016) analyzed data from office-based physicians' visits only and found a reduction in prescriptions issued for Schedule II opioids, and Meara et al. (2016) studied disabled Medicare beneficiaries and found little impact of PDMPs on opioid prescribing. Chang et al. (2016) studied the impact of PDMPs on opioid prescribing in Florida and Georgia, and found a reduction in prescribing patterns only among high-volume prescribers. These apparently conflicting findings from the literature suggest that PDMPs might not have a uniform impact on prescribers and patients and across substances. In addition, no studies to date have examined the impact of PDMPs on initiation, use, and addiction in the nonmedical use of prescription opiate painkillers among a nationally representative population.

In this study, we use state-level variation in the dates of PDMP implementation to investigate associations between PDMP status and NMPR use and associated outcomes on a nationally representative sample of adults in the United States. In addition, associations with PDMP characteristics are explored. Although PDMPs are designed as a policy tool targeted toward providers, examination of patient-level outcomes is important because a reduction in the rates of individual-level opiate misuse is the main policy goal. In addition, some are concerned that an unintended consequence of the policies and practices implemented to curb opioid misuse might be an increase in the rates of heroin use (Compton et al., 2016) given that heroin use is 19 times higher among those who report prior nonmedical use of prescription drugs than among those who do not (Muhuri, Gfroerer, & Davies, 2013). To our knowledge, no studies to date have examined the impact of PDMPs on heroin use using a nationally representative population data. Many opioid and heroin misuse related policy measures have been put in place and even though it is beyond the scope of this paper to examine all of them simultaneously, this study makes the important first step in testing for an association between PDMP and opioid and heroin related outcomes at the individual level.

2. Materials and methods

2.1. Design

Respondent data for this analysis were drawn from the National Survey of Drug Use and Health (NSDUH) conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA). NSDUH is an annual nationwide survey of the civilian (noninstitutionalized) population that involves interviews with approximately 67,000 randomly selected individuals 12 years of age and older. The data from NSDUH provide national- and state-level estimates on use of tobacco products, alcohol, illicit drugs (including nonmedical use of prescription drugs) and mental health in the United States. The restricted NSDUH data set contains state and substate identifiers (e.g., county, metropolitan statistical area) that permit evaluation of state-level policies that can influence individual-level substance use attitudes and behaviors. Details about NSDUH design can be found elsewhere (Substance Abuse and Mental Health Services Administration, 2015). For the current study, we combined the restricted data from 2004 to 2014. As shown in Fig. 1, this period encompassed the implementation of 36 state PDMPs, and 2014 was the most recent year for which data are available.

2.2. Measures

We examined three categories of outcomes: NMPR use, heroin use, and sources of NMPR for misuse. To assess NMPR use, NSDUH asks the respondent if they used prescription pain relievers *without a doctor's prescription* or *purely for the feeling or effects*. The question wording leaves the interpretation of NMPR as using prescription pain relievers for self-treatment or euphoria, using medication that could have been obtained with a doctor's prescription or acquired using some other method. We examined four outcomes associated with NMPR: (1) past-year NMPR use, (2) past-year DSM-IV abuse or dependence of NMPR, (3) past-year NMPR initiation based on respondents' answers to dates of first use, and (4) past-year days of NMPR use. The past-year initiation measure excludes users who began using NMPRs before the past year, so that recent initiates are compared to never-users. We created identical measures of past-year heroin use, abuse/dependence, initiation, and days of use from analogous NSDUH measures.

NSDUH also asks respondents reporting past-month use of NMPRs how they obtained the medication. These questions were added to the NSDUH questionnaire in 2005; thus, 2004 respondents are excluded from the analyses of these outcomes. Respondents are asked to identify as many sources as they used to obtain their drugs in the past month from the following list: one doctor, two or more doctors, from fake prescriptions, by theft, from friends/relatives (bought, stolen, or received for free are separate options), from a dealer/stranger, or from the internet. From these, we created four measures: (1) receipt from two or more prescribers, (2) receipt from two or more prescribers or fake prescriptions, (3) receipt from social sources (i.e., bought, stolen, or received for free from friends or family), (4) and receipt from illegitimate sources (i.e., stolen from a pharmacy, bought from a dealer, or obtained on the internet).

The independent variables of interest were measures of PDMP implementation at the state level. We created a binary measure, where 1 represents an operational PDMP in the respondent's state for the calendar quarter in which the interview took place, based on dates of PDMP implementation obtained from Brandeis's PDMP Training and Technical Assistance Center (2016) and the National Alliance for Model State Drug Laws (NAMSDL, 2014b). A second, categorical measure divided PDMPs into groups based on whether or not they had provisions requiring mandatory access by providers and/or mandatory prescriber enrollment. Dates of enactment of these provisions, which were often added to an existing PDMP, were obtained from NAMSDL

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