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A path out: Prescription drug abuse, treatment, and suicide☆☆☆

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ABSTRACT

In this paper we investigate the dual role of supply restrictions and drug treatment in combating the concurrent rise of opioid abuse and suicide in the United States over the last two decades. We find that supply-side interventions decrease suicides in places with strong addiction-help networks, implying that prescription drug abuse is associated with an inherent risk of suicide. Our findings support an important role for access to treatment services in policies designed to combat the opioid epidemic.

1. Introduction

Over the past two decades, a prescription drug abuse epidemic has spread across the United States, driven primarily by the increased use and abuse of opioid medications.[1] Recent research attributes a reversal of the decades-long trend in falling mortality rates among middle-aged white non-Hispanics to the combined effects of drug and alcohol abuse, as well as a potentially related cause, suicide (Case and Deaton, 2015a). In tandem with the rise in prescription drug abuse has

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[1] The CDC and its researchers have issued regular reports on the rise in drug overdoses, as in Jones et al. (2013); Paulozzi et al. (2011), and Rudd et al. (2016). Maxwell (2011) reviews the literature.

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been an increase in reported pain, which is strongly associated with the age and geography of the rise in suicide.[2] However, despite these suggestive correlations, the causal links between the rise in deaths due to prescription drug abuse and suicide largely remain unexplored.

Responses to the prescription drug abuse epidemic must weigh the merits of policies targeting the supply or demand for prescription drugs. Traditional law enforcement approaches to combating drug abuse focus on reducing the supply of illegal or diverted drugs. However, economists and public health researchers have long been critical of an exclusive focus on supply-side measures, instead suggesting that demand-side interventions, particularly drug treatment, can be as or more effective in reducing mortality and other adverse outcomes.[3] Given the unsettled debate on the merits of supply versus demand-side policies, it is unsurprising that we know very little about interactions and potential complementaries between the two approaches.

In this paper, we examine the response of suicide to disruptions in the supply of prescription drugs, with a particular focus on the role of drug treatment in mediating the relationship between abuse and suicide. We identify supply shocks using the passage of state legislation that implements a Prescription Drug Monitoring Program (PDMPs), one of the primary policy tools used to combat the prescription drug abuse epidemic. PDMPs require pharmacies to report the names of both the patient and prescriber to a central database when dispensing potentially addictive prescription drugs, and have expanded from 12 to 49 states since 1999, reflecting their importance in the policy response to the epidemic. While early studies of PDMPs found mixed evidence for their efficacy, recent research has found their implementation to result in reductions in the prescribing of opioids with the highest potential for abuse (i.e. drugs classified in Schedule II), fewer prescriptions written to those receiving drugs from many doctors or dispensers, improvements in time required for drug diversion investigations, and reductions in overdose deaths.[4] PDMPs vary in their details, and have been passed in standalone bills, as well as in legislation that includes measures to combat pill mills and doctor shopping, and regulate pain management clinics. We assume these programs, and related legislation, make it more difficult for addicts to maintain a regular supply of prescription drugs, acting as a negative supply shock to the market for diverted drugs. However, these supply-side restrictions on the availability of prescription drugs are not usually combined with demand-side expansions in treatment services. For example, we find no response in the number of treatment facilities at or around the time of PDMP implementation.[5] Thus, we hypothesize that these policy-induced supply shocks have the potential to lead to undesirable outcomes, such as suicide, in places where treatment services are unavailable to meet this new demand. In the remainder of the paper, we refer to these supply shocks as "PDMPs."

To better understand the response to these policies, we propose a dynamic model that describes how a supply shock affects an addict's choice between continued drug use, effort put towards quitting, and suicide. We model suicide as a rational choice (as in Hamermesh and Soss, 1974, Cutler et al., 2000, and Koo and Cox, 2008), within the constraints imposed by addiction. In the model, suicide occurs when the drug habit becomes unsustainable—for instance, due to restrictions on access to the drug—and also when the addict's non-withdrawal pain becomes intolerable—for instance, due to emotional pain or depression. In line with existing research, we assume the latter is beyond the control of a drug user and we call it *inherent risk*, as it is not necessarily related to having lost access to the drug.[6] Addicts also choose how much effort to exert towards recovery which, combined with the efficacy of drug addiction treatment, determines the rate of recovered addicts. Thus, addicts have two possible paths out of addiction: drug addiction treatment or suicide.

In the model, PDMPs reduce the frequency with which drugs arrive, which in turn reduces the value of using the drug, as the withdrawal symptoms are alleviated less frequently. The effect of PDMPs on the value of using the drug has two effects on suicides, reflecting the two paths out of addiction. First, it causes some drug habits to become unsustainable, triggering an increase in the rate of suicides. Second, it makes recovery more attractive relative to using the drug, which increases the equilibrium levels of effort with which addicts seek recovery. More effort increases the likelihood of recovery, which reduces the number of people exposed to the inherent risk of using the drug. The model predicts that a greater drug treatment effectiveness or availability reduces the first effect, while it intensifies the second effect (i.e., it makes each unit of effort more productive). Together, these competing effects lead to the conclusion that suicides may increase following the introduction of PDMPs in places where drug treatment is unavailable (e.g., places fewer drug abuse treatment centers or

[2] Volkow and McLellan (2016) reviews the literature on opioid abuse and the rise in chronic pain. Phillips (2014) reports on the rising trend in suicides. Case and Deaton (2015b) find a strong association between pain and suicide using data from the Gallup surveys; from their paper: "The suicide epidemic in middle age is the tip of an iceberg of mortality and morbidity, especially pain, among middle-aged Americans."

[3] The research on supply-side policies has generally found them to have, at best, temporary effects on prices and usage of illicit substances; for example, see DiNardo (1993) and Dobkin and Nicosia (2009). Swensen (2015) provides demand-side evidence and for further citations to the literature.

[4] Buchmueller and Carey (2018) provides evidence on the reduction in supply to heavy users who are most likely to be addicts. See Finklea et al. (2014); Kilby (2015); Meara et al. (2016); Patrick et al. (2016); Reifler et al. (2012); Reisman et al. (2009), and Moyo et al. (2017) for further evidence on the effects of PDMPs. We address heterogeneity in PDMP legislation, specifically the role of mandatory access provisions, in the analysis. Missouri is the only state which has not passed a PDMP.

[5] In addition, Jones et al. (2013) reports that the number of patients treated at methadone clinics has not changed in the last decade. Anecdotal evidence in Vestal (2016) suggests that methadone-prescribing clinics have not expanded during the epidemic, and as a result, have long waiting lists and difficulty in keeping up with the demand for their services.

[6] Previous research in economics finds that the supply of drugs and alcohol can affect suicide rates (Carpenter 2004, Anderson et al. 2014). See Kuramoto et al. (2012) and Ilgen et al. (2016) for evidence showing an association between prescription drug abuse and suicidal attempts as well as Fischer et al. (2005) for evidence showing an association between prescription drug abuse and depression. These studies do not address causality.