Drug Search and Physician Hazard: An Investigation into Addict Behavior and Policy Remedies

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Abstract

Keywords:

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1 Introduction

1.1 Background and Motivation

Over the last few decades, prescription drug abuse has become a significant and growing public health concern across the globe. The misuse of prescription drugs, specifially opioids, benzodiazepines, and stimulants, has led to the question of how to mitigate the practice of physician search. Physician search refers to the practice of patients seeking multiple doctors in the hope of "scoring" a presription to continue their addiction. While there are preventative measures in place, like registries of offenders, the practice persists. Coninciding with this question, it would be of great use to ascertain the incentive for physicians to enable the misuse of drugs, gaining a repeat source of revenue.

This paper seeks to understand the interplay of addicts and physician search, in hope of policy remedies which are more effective than a list. Further, the analysis of prescriber responsibility is also of great importance. Being able to understand how morals and fiscal incentives contrast in this case could help to implement policy which negates the opportunity for prescribers to mis-prescribe a sensitive drug. Finally, this paper will look to gain an insight into potential rehabilitation remedies which may help take the onus off both addicts and physicians.

1.2 Problem Statement

To ascertain the interplay between physician and addict behavior, it would be of interest to model physician WTP, in a sense, with their reputation. That is, how much risk are physicians willing to onboard for the profits associated with increased and repeat prescriptions? This would be interesting for many reasons, since physicians have many reasons to uphold their standing from liability, licensure, and even word of mouth advertisement. The last one may be increased as addicts see a pathway to drug access, but that would also increase liabilty and risk of loss of their licensure.

For addicts, it is interesting to inquire about their search cost allocation, as well as habit based expenditure on health. Tolerance necessarily grows with prolonged use of drugs, thus modeling this sort of depletion of both search and health budgets is of interest to understand the impact on patients of finding a willing prescriber.prescriber

From these two avenues, I think there is a worthwhile question to answer. That is, what is the risk threshold physicians will take on in exchange for profit as well as understanding time and health costs applied to addicts once they find a willing prescriber.

1.3 Contributions

1.4 Paper Organization

2 Related Work

2.1 Previous Approaches

2.2 Limitations of Existing Work

3 Methodology

3.1 Theoretical Framework

Agents and Functions

There will be two classes of agents in this model, physicians and addicts.

$$\text{addicts} \in \mathcal{A} = \{a_1, a_2, \ldots, a_n\}$$
$$\text{physicians} \in \mathcal{M} = \{m_1, m_2, \ldots, m_m\}$$

The objective function of the addict is given by:

$$\max_p \sum_{t=1}^{T} \delta_i^t p_i d_{i\not\in(d=1)} \gamma_i^t$$
$$\text{s.t.}$$
$$p_i d_i \gamma_i^t = s_i$$
$$s_i = x_i vj + t + r_i x_i = \gamma_i^t \cdot w_i$$

Where δ_i^t is discount factor of addicts, γ_i^T is a tolerance parameter, indicating how deeply addicted the agent is, p_i is utility from prescriptions, d_i is an indicator for if doctors precscribe or not, s_i is a search cost comprised of x_i, a willingness to pay parameter, v_j, a visit cost for each doctor, t, a fixed time cost, and r_i a risk cost of being reported for the behavior. x_i is comprised of one's tolerance scaling their wealth to determine how much they're willing to pay for a chance at drugs.

The objective function of the prescriber is:

$$\max_x x_j \cdot v_i$$
$$\text{s.t.}$$
$$x_j \cdot v_i = i_i$$
$$v_i = p_j x_j - x_{-j} - r_i$$

Where i_i is the cost of insurance for a physician. All other variables are defined above.

Comparative Statics and Counterfactuals

Understanding how willingness to pay and price of a visit affect the equilibrium would be of importance, as these would have a direct effect on the equilibrium matching. For a counterfactual, I am interested in modeling some sort of rehabilitation "punishment" for being caught searching. This would be of policy relevance due to the ongoing national drug epidemic. Further, I think another comparative static of interest would be the risk probability changing, and responses of both addicts and prescribers.

Equilibrium and Demand/Supply Behavior

Addicts will have monotonic demand, demanding more and more until death due to tolerance parameter γ_i^t. Physicians will demand new patients until $r_i = p_j x_j$, or until they are not willing to take on any more risk in exchange for monetary gain. Equilibrium is achieved when all doctors are matched to either an addict or nothing. Preference ordering of doctors will be dependent on risk tolerance and WTP of addicts. For addicts, preferences are determined by willingness to prescribe and proximity. To accomplish these facets, I will need to specify a matching algorithm and a search function for addicts.

To-Do

Still under consideration are how to model things like the risk probability, utility from prescriptions, and if the penalty of being caught as an addict removes them from the mechanism or if it just makes search cost increase.

3.2 Problem Formulation

3.3 Proposed Approach

4 Experimental Evaluation

4.1 Experimental Setup

4.2 Datasets

4.3 Results

4.4 Analysis

5 Discussion

5.1 Interpretation of Results

5.2 Limitations

5.3 Future Work