

# PRESCRIPTION DRUG SHORTAGES AND SUPPLY CHAIN MANAGEMENT

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## ABSTRACT

Escalating prescription drug shortages is one of the major challenges in the US healthcare systems. This paper analyzes the interplay of various factors for the drug shortage problem. Many of the factors are supply chain management related. Recommendations on improving drug supply chains are proposed to address the causes and mitigate the symptoms.

## INTRODUCTION

In recent years, prescription drug shortages have become a growing problem to healthcare systems globally and especially in the United States, which has caused increased concern [4]. The U.S. market for pharmaceutical products amounted to US\$ 347.1 billion in 2011 and represented the largest share on the global market for drugs [5]. Despite this market sophistication, shortages of prescription drugs have raised major concerns in the United States in recent years. Since 2005 the number of shortages has more than tripled, thereby considerably increasing the frequency and the adverse effect on patients [10]. The number of pharmaceutical products not deliverable has increased to about 300 different drugs at the beginning of October 2013 [9]. The range of affected products reaches from basic drugs to really important drugs for surgeries, emergency treatments and chemotherapy but concentrate in the areas of oncology, anti-infective, cardiovascular, central nervous system and pain management.

Wechsler [11] conducted a survey and found that nearly every hospital suffered from at least one shortage, while 50% faced more than 21 drugs missing on their shelves. The drugs, most frequently mentioned as being in short supply, are injectables [3]. Study showed no correlation between the appearance of drug shortages and the geographic location [8].

Several impacts are experienced by hospitals as well as by patients due to drug shortages. Facing shortages, physicians often try to use substitutes of drugs in short supply, which they may not be conversant with and may lead to medication errors. For example, hydromorphone, that is seven times stronger than morphine, was administered at the same dosage and led to at least two deaths [6]. Furthermore there is a risk that “second or third choice products may also be less clinically effective [10]. Substitutes may also lead to undesirable secondary effects that delay recovery and result in extended hospitalization [7]. In some cases, surgeries or treatments even have to be postponed and physicians need to decide which patient needs the drugs the most [2].

Drug shortages impose a heavy workload and huge financial burden on the healthcare system and hospitals. As pharmacists and others have to deal with the shortage and find ways to circumvent the problems, it causes an estimated \$216 million additional labor costs [8]. Furthermore survey showed 98% of hospitals recorded increased material cost. Hospitals pay on average 11% more for those shortage drugs, which cumulates at \$415 million additional cost per year. These conditions also promote the emergence of gray markets on which an average of 650% mark-up could be paid for scarce pharmaceuticals [10]). The hazard of gray markets is that drugs cannot be traced back to their origin [10]

Along with lack of traceability comes the danger of receiving counterfeits. Which in some cases did not contain the active agent [1]. Hence, the prevention of drug shortages remains a very critical issue.

The growing problem of drug shortages is determined by the interplay of various factors. On the one hand, it can be caused by natural disasters, epidemics or regulatory issues. But on the other hand, a large array of problems is caused by the stakeholders of the complex healthcare supply chains. Disruptions of the supply chains can therefore occur at various stages. This study uses four supply chain processes (Plan, Source, Make, and Deliver) from the SCOR model to analyze the causes of the national prescription drug shortage crisis and provide recommendations to address the issues.

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