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Regulation of Reverse Logistics of Pharmaceutical Products in United States: A Review.

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ABSTRACT

The quality of medicines, is directly associated with health of society. So it is very essential to effectively recall the medicines which have quality issues or loss of effectiveness, from the supply chain. Reverse logistics of Pharmaceutical products include collecting and recycling of drugs sent back to the manufacturers to ensure an environmentally safe method of recovery. Pharmaceutical supply chains are characterized by high level of wastage, spill over and also face the common issues of returns and recall of drugs. Due to the growth of unused medicines in the pharmaceutical industry, the disposal of these medicines is become a burning issue. For the recollection and recycling of expired or non-effective medicines, it is important that pharmaceutical companies implement the reverse logistics right from the beginning. Returns should be an ideal touch point for technology to support a safer pharmaceutical supply chain. Drug recall is a burden to companies and affects the reputation of company and customer dissatisfaction. An effective reverse logistic system will reduce the cost and can improve the supply chain visibility.

Keywords: Reverse logistics, Recall, supply chain

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INTRODUCTION

Reverse logistics refers to the process of managing products post the manufacturing stage. This flow of returned materials from consumer to retailer, retailer to distributor, or distributor to manufacturer, is also known as the reverse supply chain. [1]

Reverse logistics of Pharmaceutical products include collecting and recycling of drugs sent back to the manufacturers to ensure an environmentally safe method of recovery. It is a planned process of movement of goods in reverse direction in an effective and cost effective manner through an organized network. [2]

Difference between Forward Logistics and Reverse Logistics [3]

FORWARD LOGISTICS	REVERSE LOGISTICS
• Forecasting is straight forward	• Forecasting is more difficult
• One to many distribution points	• Many to one distribution points
• Quality of product is uniform	• Product quality is not uniform
• Product packaging is uniform	• Product packaging is not uniform
• Destination/routing is clear	• Destination/routing is unclear
• Disposition options are clear	• Disposition options are unclear
• Pricing is relatively uniform	• Pricing is dependent on many factors
• Importance of speed is recognized	• Speed often not considered priority
• Forward distribution costs are easily visible	• Reverse costs are less directly visible
• Inventory management is consistent	• Inventory management is not consistent
• Product lifecycle is manageable	• Product lifecycle issues are more complex
• Negotiation between parties is straight forward	• Negotiation is complicated by several factors
• Marketing methods are well known	• Marketing is complicated by several factors
• The process is more transparent	• The process is less transparent

Importance of Reverse Logistics in Pharmaceutical Industry

According to Healthcare Distribution Management (HDMA**)** 3-4% of products going out from pharmaceutical warehouses ultimately comes back .Some of them are redistributed and some returned for disposition and destruction by third party processor or manufacturer. Of this approximately 1.5-2% of pharmaceuticals manufactured will be returned for destruction with a credit back to the manufacturer's trading partners. [4]

The Pharmaceutical supply chains are characterized by high growth of unused medicines which mainly include expired medicicnes, returns and recalls due to safety and efficacy reasons. Recent publications show that companies currently spend upto 4% of cost of goods for functions like returns and reverse logistics.[5]

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Factors leading to drug recall are :

- Health Hazards
- Expiry and damages
- Mislabeled or poor packaging
- Counterfeits
- Product recalls due to Quality defects

Reverse logistics in pharmaceutical industry is extremely important from the economic, environmental as well as regulatory point of view. The fate of unused medicines (expired and recalled due to various reasons) is a prime concern that spans a broad range of issues like human and environmental pollution, water pollution, enforcement of law and healthcare industry. An effective reverse logistic system will reduce the cost and can improve the supply chain efficiency. Improper handling of unused medicines may be harmful for the living being in the system. Moreover an inefficient reverse process may lead to customer dissatisfaction and increases the chance for the diversion of drugs into the black market where expired drugs will be diluted and relabelled as saleable. This will badly affect the lives of the people and enhances environmental pollution, water pollution and issues in management of solid waste, enforcement of law and healthcare industry. So it is obligatory to recall the medicines which has quality issues or loss of effectiveness from the supply chain. Therefore, pharmaceutical companies must think about to develop an effective reverse logistic system which would helpful for them to track and trace all the activities related to the collection of unused medicines. [6]

Some important considerations for the reverse logistics of returned medications include,

- Security of the medications,
- Keeping costs down through technology and automation,
- Tracing the returns from the initial site down to their final disposition.
- Supply chain visibility [7]

Current Status of Reverse logistics in United States

The U.S. pharmaceutical market is the world's most important market. Together with Canada and Mexico, it represents the largest continental pharma market worldwide. The United States alone holds some 40 % of the global pharmaceutical market. Many of the global top companies are located in the United States. In 2014, six out of the top eleven companies were U.S. based.

In USA, guidelines for drugs product recall are described under 21 CFR Parts 7, 107 and 1270. Recalls of pharmaceutical products have increased in recent years. and in 2016 a total of 8305 recalls were made by US Food and Drug Administration (FDA) according to data made publicly available by the FDA[.8]

Table 1: Pharmaceutical Product Recall by USFDA [9]

YEAR	TOTAL RECALLS
2016	8305
2015	9178
2014	836
2013	1225
2012	499
2011	444
2010	210

Product recalls clashes thousands of companies every year affecting: sales, testing customer relationships and disrupting supply chains. Drug recall is incubus for pharmaceutical companies. It effects the reputation of the company.So the companies require a proper system in place to deal with such circumstances.

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Table 2 :Major Drug Recalls and Financial Damage [10]

Drug	Company	Financial Damage	Recalled year
Tylenol (Analgesic, Antipyretic)	Jhonson & Jhonson	27.5% decrease in revenue from OTC drugs in USA	1982
Mibefradil (To treat Hypertension, Angina)	Rosche	$2.9 billion in sale within 4 years	2012
Valdecoxib (Bextra)	Pfizer	Over $2billion in legal awards and expenses	2005
Rofecoxib (Vioxx)	Merck	$6billion in litigation related expenses	2004
Cerivastatin (Baycol)	Bayer	Litigation related damages	2001
Fenfuramine/Phenteramine	Wyeth-Ayerst Laboratories	Award to victims close to $14 billion One of the most product liability cases in history	1997

Thus, it is increasingly important to implement a regulated and improved reverse logistical chain to provide a cost effective, track and trace options for the pharmaceutical supply chain. An efficient and effective Reverse logistics system is developed by many of the pharmaceutical companies. Most of the companies depend on the service of Third Party Logistic Providers (3PL). The return industry is adding "green" to the bottom line by offering pharmaceutical companies more sustainable and cost effective methods for shipping back unsold drugs from hospitals and pharmacies. There are business services and consulting firms specializing in medical waste disposal and pharma recalls in Canada. Experts concur that new and pending environmental requirements are a big reason why reverse logistics, once an afterthought in pharma, is now being taken quite seriously.

Most of the pharmaceutical companies in United States have developed effective tracking and trace methods like e-pedigree/serialization, Radiofrequency identification, 2D barcodes, holograms, Colour shifting ink, laser authentication and molecular markers for the complete collection of unused medicines from supply chain. In 2011 California assembly passed e-pedigree law which involve e-pedigree/serialization of all pharmaceuticals entering the supply chain. This method will help in the authentication of products in the field and during reverse distribution cycle of the supply chain. Prescription Drug Marketing Act which came into effect in 2006 mandates barcode identification on all unit dose packaging in addition to atleast two anti-counterfeiting protection in the packaging.FDA requires National Drug Code (NDC) number to be printed as a linear barcode. The Drug Supply Chain Security Act of Drug Quality and Security Act 2013 of US Federal,

provide a new framework for securing prescription drug supply chain and licensure standards for third party logistic providers.[11]

There is strong regulation of reverse distribution of controlled substances by US Drug Enforcement Agency.

The Controlled Substances Act (CSA) and its implementing regulations establish a framework through which the federal government regulates the use of controlled substances for legitimate medical, scientific, research, and industrial purposes, and prevents these substances from being diverted for illegal purposes. Unless specifically exempted by the CSA, any person who handles controlled substances or listed chemicals (such as drug manufacturers, wholesale distributors, doctors, hospitals, pharmacies, and scientific researchers) must register with the Drug Enforcement Administration (DEA) in the U.S. Department of Justice, which administers and enforces the CSA. Registrants must keep accurate and complete records of all transactions involving controlled substances. DEA registrants may need to dispose of controlled substances in their possession when they are expired, damaged, contaminated, or otherwise unwanted.

Under the CSA and DEA regulations, there are three different options for registrants to dispose of controlled substances.

- The distributor or dispenser may return the controlled substance to the pharmaceutical manufacturer who accepts returns of outdated or damaged controlled substances.
- The distributor, dispenser, or manufacturer may itself dispose of the controlled substances under procedures specified by federal regulation.
- The distributor, dispenser, or manufacturer may transfer the controlled substances to a "reverse distributor" to take custody of the controlled substances for the purpose of returning them to the manufacturer or arranging for their disposal.[11]

The United States Environmental Protection Agency (EPA) is finalizing revisions to the Resource Conservation and Recovery Act's (RCRA) hazardous waste generator regulatory program proposed on September 25, 2015. The objective of this rule include reorganizing the hazardous waste generator regulations to make them more user-friendly and thus improve their usability by the regulated community and to strengthen environmental protection; providing greater flexibility for hazardous waste generators to manage their hazardous waste in a cost-effective and protective manner. This final rule was effective on 30th May 2017 and approved by Director of Federal Register as on 30th May 2017.[12]

CONCLUSION

The reverse flow of any expired or unused medication must be very carefully regulated and documented to ensure proper disposal. It is also important to keep detailed documentation of these processes in order to take full advantage of potential revenue opportunities. Returns Processing– accepting expired or unsold product through appropriate returns goods services is key in mitigating supply chain vulnerability. In USA many Federal regulations were passed to ensure the visibility of pharmaceutical supply chain and handling of their proper return and disposal.

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