JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

A STUDY ON THE PURSUITS OF PHARMACISTS IN INDIA TO REDUCE MEDICINE WASTE IN THE PHARMACEUTICAL SUPPLY CHAIN

[1]Dr. Sriya Jaiswal

[1]Ph.D,[1]University of Allahabad

ABSTRACT

The wastage of medicine has huge implications occurring at different levels of the pharmaceutical supply chain such as distributors, hospitals, healthcare facilities, patients and pharmacies, phasing out economically, socially and environmentally, to which there is an absolute need for medicine waste prevention strategies at each level of the supply chain, which can further help in reducing medicine shortages, revenue losses and environmental contamination. The present study seeks to identify various activities undertaken by pharmacists in India to reduce medicine waste and finding barriers to these activities at the pharmacist level so that these obstructions can be removed further for the proper implementation of waste-reducing activities. The existing literature discussed of several activities which, if performed effectively by pharmacists, can help to reduce medicine waste from the pharmaceutical supply chain. Moreover, this paper helps in identifying, there is no work done to study barriers to these activities in India.Thus,the study attempts to fill this void by exploring various activities undertaken by pharmacists in India to reduce medicine waste and barriers to these activities. This paper only studied the activities of pharmacies, whereas there are many other entities like stockists, distributors, patients, and hospitals in the pharmaceutical supply chain can also contribute effectively in minimizing medicine waste.

Keywords: Medicine Waste Management, Pharmaceutical, Pharmaceutical Supply Chain, Sustainability, *and Sustainable Development, etc.*

1. INTRODUCTION

According to a report published by World Health Organization (WHO), about 24.9 percent of healthcare expenses or 1.63 percent of worldwide GDP was spent on medicines in 2011. In Asia and likewise in India, a large share of people's personal expenditure is on medicines (Jafarzadeh, A et al 2021). During FY22, the total healthcare spending in India amounted to Rs. 4.72 lakh crore which was about 2.1 percent of the country's GDP. Medicines form the biggest chunk of out-of-pocket expenses with an average of 29.1percent among inpatients and 60.3 percent among outpatients (Dutta, 2022). A contrasting report published in 2017 specified that around 0.47 billion people in India struggle to get their essential prescribed medicines (John, 2018). Just in the same time, owing to a multitude of factors, many of the medicines lie unused or expired in the pharmaceutical industry which in turn translates to a financial, environmental and social burden to society.

World Health Organization (WHO) has categorized waste and by-products produced out of healthcare activities into various categories such as infectious waste, pathological waste, sharps waste, chemical waste, pharmaceutical waste, cytotoxic waste, radioactive waste and non-hazardous or general waste. Among all these wastes, pharmaceutical waste includes unused, expired and contaminated medicines and vaccines which are not required anymore (WHO, 2018). This waste contributes to medicine scarcity and increases the disposal cost of unused medicines (Hui T. et al, 2020). According to a report by Economic Times, medicine waste is a huge problem for all pharmaceutical companies as they incur a revenue loss to the tune of Rs 5 billion annually for its disposal. From the total 7 per cent margin that small and medium size companies in India make, almost 3 per cent is lost owing to expired medicines being returned to the companies for disposal from their retailers and stockists (Sangeetha G, Jan 2013). Millions of dollars and enormous time are spent in the pharmaceutical supply chain every year to manage expired or unused medicines (Al-Shareef et al, 2016). However, the resultant figures cited above are not very encouraging. Prevention of medicine waste requires the design and implementation of well-thought strategies in order to reduce its undesirable impacts (Smale, E. M. et al, 2021, Alhomoud Faten, 2020).The study states that there are several reasons behind the wastage of medicines. As per a report, a weak 'pharma supply chain'(PSC) takes the bulk share. Poor storage conditions, lack of proper stocking plans, poor temperature control systems and stock surplus can lead to medicine waste (Gebremariam, E. T., 2019). In the PSC, pharmacies follow conventional inventory management practices and order huge quantities of pharmaceutical products to meet customer orders. Demand uncertainty and limited shelf-life of medicines increase the chances of surplus inventory in the supply chain and landing up with a huge volume of unused/expired medicines (Tat, R., & Heydari, J. 2021). The former Chairperson of the CIPI, Mr. T.S. Jaishankar, in an interview recommended that greater alertness and sensitivity to this issue is required to be developed at the level of retailers and marketing people in the pharmaceutical industry. The Pharmacists can play a vital role in reducing medicine waste from PSC (FIP, 2015). Many researchers have explored medicine waste reduction activities at the pharmacist level in developed countries (Bekker , 2018) and in gulf countries (Alhomoud, 2020). Bekker (2018) suggested studying barriers

to these activities at the pharmacist level so that these barriers can be removed further for the proper implementation of waste-reducing activities.

To the best of the studies undergone and the substance obtained to our knowledge is that there is no work done to study barriers to these activities in India. The current study attempts to fill this void by exploring various activities undertaken by pharmacists in India to reduce medicine waste and barriers to these activities.

2. OBJECTIVES OF THE STUDY

The fundamental objectives of the present study are to understand:

- Functioning of the pharmacists to reduce medicine waste.
- Understanding the exploration work done by researchers who suggested barriers to medicine waste reduction activities.
- Studies for proper implementation of waste-reducing activities at pharmacists level in countries.
- No work done by pharmacists in India to study barriers to these activities. The study attempts to fill this gap by exploring various activities undertaken by pharmacists in India to reduce medicine waste and barriers to these activities.

3. RESEARCH METHODOLOGY

The study of this research paper was done in two phases.

Phase 1 :The study aimed to identify several activities that shall be undertaken by pharmacists to reduce medicine waste in India.

Phase II : This was conducted to explore several barriers which pharmacists are facing while practicing these activities.

(a) In Phase I, an extensive review of literature was conducted to identify various activities that shall be undertaken by pharmacists. A total of 23 activities were identified. Further, this list of activities was analyzed by 6 subject matter experts in face-to-face interaction to identify activities relevant to the Indian scenario. Subject matter experts included 2 persons working in the pharmaceutical industry,2 pharmacists and 2 academicians with more than 15 years of experience. Interaction with subject matter experts helped to identify 12 activities which can be practised by pharmacists to reduce medicine waste in the Indian scenario.Table 1.

Table 1: Activities of Pharmacists to reduce Medicine waste in India.

S. No.	Phase	Activities
1	Pre-dispensing	Manage medication amount by stock rotation
2		Manage medication amount in stock by checking the expiry date
3		Limiting medicine storage amounts or inventory of medicines
4		Exchange near-expiry medicines with other pharmacies
5		Auditing medicines that are unused or expired
6	Dispensing	Review patient medication (Discuss needed quantity)
7		Educating patients on the prompt return of unused medicines and proper storage to improve the reusability of medicines
8		Dispense opened medication package
9	Post-dispensing	Re-dispense unused medicine returned by customers
10		Donate unused medicines returned by customers
11		Allow patients to return their leftover or unused medicines which are in good condition to the pharmacy
12		Allow patients to return expired medicine for safe disposal

(Source: Derived by Author from Literature Review)

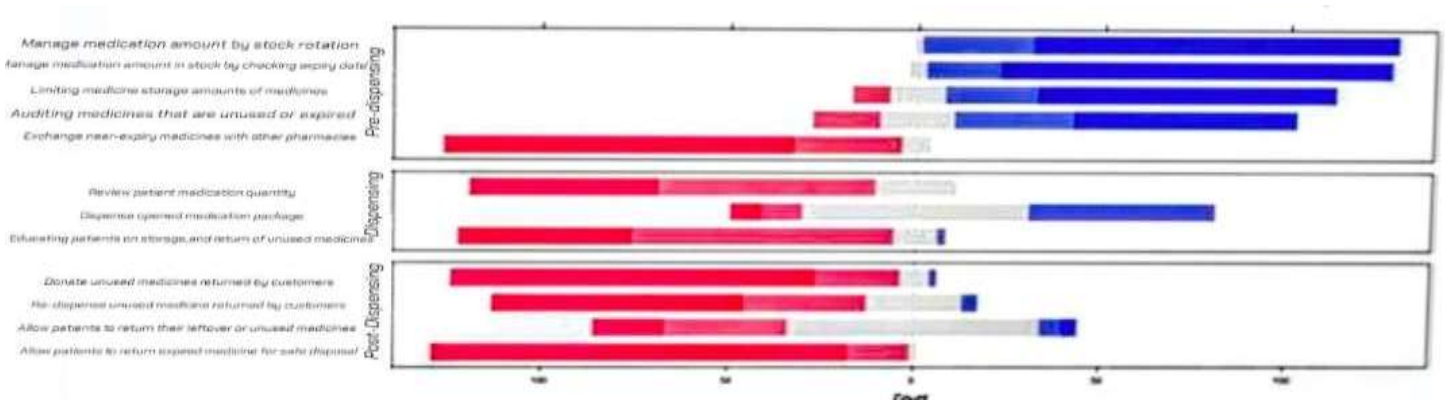
(b) In phase II, a questionnaire was prepared consisting of 3 sections namely pre-dispensing activities, dispensing activities and post-activities activities. Each section consists of a few close-ended ones where pharmacists were asked to indicate whether they follow these activities or not by responding on a Likert 5-point scale from 1 (to follow the activities).This was followed by open-ended questions to identify the reasons behind not practising these activities. 130 pharmacists from various parts of India filled up the questionnaire in face-to-face interactions or over the telephone. Data from the questionnaire were exported to excel and cleaned. R Studio software was used to analyze data. Diverging stacked bar chart (Figure 1) was created to analyze the extent to which each activity (Table 1) is followed by pharmacists. A Word Cloud was generated for each activity to identify the reasons for not following activities by pharmacists to reduce medicine waste.

4. DATA ANALYSIS AND DISCUSSIONS

During initial questions, the pharmacists responded that around 10-20 percent of the total medicine bought by them remains unsold or gets expired, which pharmacists return back to the company for proper disposal. Further questions in the questionnaire were based on activities practised by pharmacists to reduce medicine waste. Pharmacists responded to activities categorized into:

- ‘Pre-Dispensing’,
- ‘Dispensing’, and
- ‘Post-Dispensing’.

The study shows that majority of pharmacists follow pre-dispensing activities in comparison to dispensing and post dispensing activities, Figure 1.



(*Source: Author using Excel)*

Figure 1: Diverging Stacked Bar Chart, Activities practised by Pharmacists.

(i) Pre-Dispensing Phase

Under the phase it was accounted that 75-80 percent of the respondents agreed that they manage their stock by rotation and keep checking the expiry date of available medicines. 61 percent of the respondents indicated that they always kept less stock of medicines and 19 percent of the respondents were found to keep less stock to reduce the unsold stock of medicines.46 percent of respondents always audit the stock of medicines that are unused or expired and around 25 percent of the respondents often audited the stock of medicines. It was found that 75 percent of respondents never exchanged near-expiry medicines with other pharmacies and 22 percent of respondents rarely exchanged near-expiry medicines and rather preferred to return medicines with expiry within the next 2 months to the company. Majority of the respondents indicated that the major reason behind this is the restriction of exchanging near-expiry medicines by regulatory bodies. Drug inspector on regular visit to these pharmacies tally each batch of medicines and does not encourage exchange of nearby expiry medicines with the other pharmacies, Figure 2. Many times, customers and other pharmacists do not prefer to buy near-expiry medicines. Author using R Studio to generate Word Clouds.

(Source: Author using R Studio)

Figure 2: Barriers to Exchanging Near-Expiry Medicines with other Pharmacies.

Overall, in the pre-dispensing phase, out of 5 activities, 4 activities are practised by pharmacists in India and one activity namely exchanging near-expiry medicines is not followed by pharmacists.

(ii) Dispensing Phase

Around 38 percent of respondents reported that they never practise patient medication review whereas around forty-four percent of respondents rarely consider this activity. Majority of the respondents indicated that they dispense the quantity mentioned in the prescription by doctors as they are the right people to estimate the right quantity of medicines, Figure 3.

(Source: Author using R Studio)

Figure 3: Barriers to Reviewing Patient Medication Quantity.

Around 35 percent of the respondents never educate and 53 percent of respondents rarely educate patients on medicine waste and encourage them to properly store medicines and return unused medicines as soon as possible to pharmacies. Pharmacists are not aware that this practice can help in reducing medicine waste. One more reason behind it is that pharmacists do not want to encourage customers to return medicine as it would result in loss to the business if medicine remains unsold or if customers return medicines with near-by expiry, Figure 4. Majority of the respondents indicated that they dispense opened medication packages only of fast-moving medicines or over-the-counter medicines.

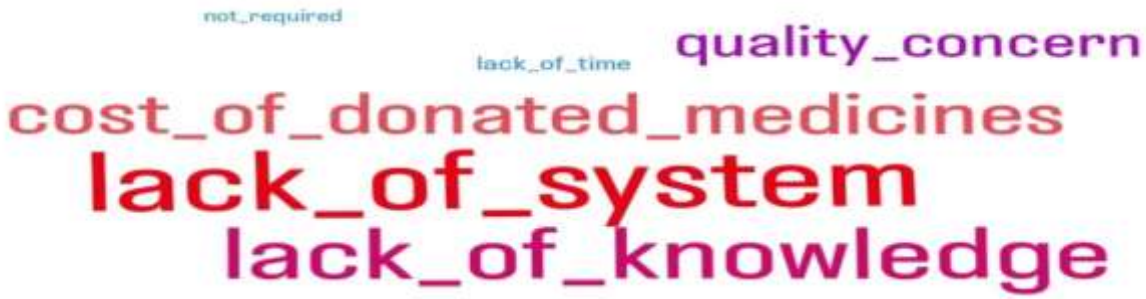
(Source: Author using R Studio)

Figure 4: Barriers to Educating Patients on Proper Storage and Prompt Return of Unused Medicines.

Overall, in dispensing phase, pharmacists only prefer to dispense opened medication packages of fast-moving or over-the-counter medicines. Review of patient medication quantity and educating patients are not practised by pharmacists.

(iii) Post-Dispensing Phase

Around 75 percent of respondents never donate unused medicines returned by customers. Majority of the respondents do not have knowledge about this activity and there is no proper system through which medicines can be donated. Pharmacies need to bear the cost of medicines in case of donation, which is a loss to the business.The quality of returned medicine is also a concern for some respondents when it comes to unused returned medicine donations, Figure 5.



(Source: Author using R Studio)

Figure 5: Barriers to Donating Unused Medicines returned by Customers.

About 52 percent of the respondents never re-dispense unused medicine returned by customers and 25 percent of respondents rarely re-dispense unused medicine returned by customers. As a practice, pharmacists do not find re-dispensing required and return these unused medicines to the company for proper disposal. Generally,medicines returned by customers have near expiry, which other patients do not prefer to buy. Most of the time pharmacists are concerned about the quality of returned medicines as they are not sure about the storage condition of medicines at patients' places. Majority of pharmacists indicated that re-dispensing of unused returned medicines is not encouraged by regulatory bodies ,Figure 6.

(Source: Author using R Studio)

Figure 6: Barriers to not Re-Dispensing Unused Medicines returned by Customers.

Around 25 percent of the respondents rarely allow patients to return their leftover end-of-use medicines and around 52 percent of the respondents sometimes allow patients to return unused medicines, which are in good condition. Pharmacists only allow returning medicines which are bought from their pharmacy and the medicine packet shall be intact. As a practice generally these returned medicines are sent back to the pharma company by pharmacists for proper disposal if not re-dispensed to other patients. Pharmaceutical companies only accept return of medicines from the batch which is sold to the same pharmacy and do not accept medicines with split packets. This results in loss to the pharmacies. Around 98 percent of respondents do not allow patients to return end-of-life medicine for safe disposal. According to most of the

respondents, customers do not come to return expired medicines to pharmacies. Pharmacists also do not find this activity important as this increases their workload. Pharmacists in turn return all expired medicines back to the pharma company. Pharma companies only accept medicines before 2 months of expiry or a maximum within 2 months after expiry, Figure 7.

(Source: Author using R Studio)

Figure 7: Barriers to not taking the Return of End-of-Life Medicine for Safe Disposal.

Overall, in the post-dispensing phase, pharmacists sometimes prefer to take the leftover end-of-use medicines returned by patients. The rest of the activities are not preferred by pharmacists in the post-dispensing phase.

5. LIMITATIONS OF THE STUDY

- Limited Data and resources collected.
- The study has only analyzed responses from secondary sources, and has only analyzed responses from community pharmacists.
- No data has been collected from hospital pharmacies.
- It is possible that hospital pharmacies are practising other sets of activities and facing a different set of barriers other than what community pharmacies have revealed.
- Data collected from only 130 pharmacies of India.
- An extensive study can be possible with databases covering a larger number of pharmacies across India.
- There is the possibility that hospital in India are practising other sets of activities and facing a different set of barriers other than what community have revealed.

6. CONCLUSION

The research study demonstrates that amongst all three phases of medicine handling by a pharmacists viz, pre-dispensing, dispensing and post-dispensing, pharmacists in India, act mostly in the pre-dispensing phase in order to curtail medicine wastage. The activities perform by pharmacists in this phase to reduce medicine waste are managing medicine stock by rotation, maintaining less stock of medicines, auditing medicines which are unused or expired and dispensing opened medication packages. There are some significant activities which can contribute to reducing medicines which pharmacists do not practice at all. Pharmacists do not exchange near-expiry medicines with neighboring pharmacists. Regulatory bodies largely discourage such kind of practice and exchanging medicines is also not profitable for pharmacists. Pharmacists, also do not examine the medication quantity of patients during dispensing and encourage them to buy less quantity as they consider themselves less competent than the consulting doctors and are of the opinion that it is safer to rely on a doctor's advice since they have the best knowledge to decide on the quantity. Furthermore, discouraging patients to buy less quantity can result in a loss of sales for the pharmacy. Pharmacists in India do not practice educating patients on the appropriate storage of medicines and sensitizing them to promptly return unused medicines in good condition as they are not aware that this can help them to reduce medicine waste. Lack of knowledge and paucity of time are major hindrances to this practice. Pharmacists feel that such a return of unused medicine can result in their loss if these medicines remain unsold. In their feedback, pharmacists have stated that lack of knowledge and associated systems are the reasons for not donating unused medicine returned by the patients. Pharmacists have also expressed concerns about the quality of returned medicines. As a practice, majority of the pharmacists do not find re-dispensing essential and return these unused medicines to the company for appropriate disposal. Most of the time pharmacists are concerned about the quality of returned medicines as they are not sure about the storage condition of medicines at patients' places. Majority of pharmacists indicated that re-dispensing of unused returned medicines is not encouraged by monitoring bodies. Pharmacists indicated that largely, patients do not come to return expired medicines to their pharmacies for proper disposal as they lack knowledge in terms of proper disposal and medicine waste. Taking expired medicines back to returning them to the pharmaceutical company for appropriate disposal also increases the extra workload on pharmacies.

Various activities have been discussed in existing literature which, if performed effectively by pharmacists, can help to reduce medicine waste from the pharmaceutical supply chain. This paper helps in identifying several activities which Indian pharmacists perform and several other activities which pharmacists could perform but are not currently practicing. This is the first such work to the best of our knowledge which identifies barriers to several such good practices that pharmacists need to inculcate in order to reduce medicine waste. It is also one of the significant findings that apart from the pharmacists, customer awareness and customer participation are equally crucial to helping achieve medicine waste minimization. Governments can also play a pivotal role in developing an appropriate system for re-dispensing and donating unused leftover medicines.

There are certain limitations of this study as limited data and resources collected.

The study has only analyzed responses from secondary sources, and has only analyzed responses from community pharmacists. No data has been collected from hospital pharmacies. It is possible that hospital pharmacies are practising other sets of activities and facing a different set of barriers other than what community pharmacies have revealed.

Data collected from only 130 pharmacies of India. An extensive study can be possible with databases covering a larger number of pharmacies across India. There is the possibility that hospital in India are practising other sets of activities and facing a different set of barriers other than what community have revealed.

The research paper only studied the activities of pharmacies, whereas there are many other entities like stockists, distributors, patients, and hospitals in the pharmaceutical supply chain can also contribute effectively in minimizing medicine waste. The future studies can focus on identifying waste-reducing activities of other entities of the pharmaceutical supply chain.

REFERENCES

[1] Sangeetha G (2013). Expired drugs cost the pharma sector Rs 500cr/yr. Business Standard, https://www.business-standard.com/article/companies/expired-drugs-cost-pharma-sector-rs-500cr-yr-107052500025_1.html

[2] Al-Shareef, F., El-Asrar, S. A., Al-Bakr, L., Al-Amro, M., Alqahtani, F., Aleanizy, F., & Al-Rashood, S. (2016). Investigating the disposal of expired and unused medication in Riyadh, Saudi Arabia: a cross-sectional study. International Journal of Clinical Pharmacy, 38(4), 822-828. https://doi.org/10.1007/s11096-016-0287-4

[3] John, D. (2018). Why India's Poor Buy Essential Medicines from Private Pharmacies. [online] Indiaspend.com. https://www.indiaspend.com/why-indias-poor-buy-essential-medicines-from-private-pharmacies 86299/#:~:text=An%20estimated%20469%20million%20people,medicines%2C%20according%20to%20the%20WHO [Accessed 15 July 2022].

[4] Bekker, C. L., Gardarsdottir, H., Egberts, A. C., Bouvy,M. L., & Van den Bemt, B. J. (2018). Pharmacists 'activities to reduce medication waste: an international survey. Pharmacy, 6(3),94. https://doi.org/10.3390/pharmacy6030094 Acharya, Akash and M.Kent Ranson (2005),"Health Care Financing for the Poor. Community Based Health Insurance schemes in Gujarat", Economic and Political Weekly, September, Vol. XL, No 38, pp.17-23.

[5] Gebremariam, E. T., Gebregeorgise, D. T., & Fenta, T. G. (2019).Factors contributing to medicines wastage in public health facilities of South West Shoa Zone, Oromia Regional State, Ethiopia: a qualitative study. Journal of Pharmaceutical Policy and Practice, 12(1), 1-7. https://doi.org/10.1186/s40545-019-0192-z

[6] Alhomoud Faten (2020), "Don't let medicines go to waste"—a survey-based cross-sectional study of pharmacists' waste-reducing activities across gulf cooperation council countries, Frontiers in Pharmacology, 11, 1334

[7] Hui, T. K., Mohammed, B., Donyai, P., McCrindle, R., & Sherratt, R. S.(2020). Enhancing pharmaceutical packaging through a technology ecosystem to facilitate the reuse of medicines and reduce medicinal waste. Pharmacy, 8(2), 58. https://doi.org/10.3390/pharmacy8020058

[8] Jafarzadeh, A., Mahboub-Ahari, A., Najafi, M.,Yousefi, M., & Dalal, K.(2021). Medicine storage, wastage, and associated determinants among urban households: a systematic review and meta-analysis of household surveys. BMC Public Health, 21(1),1127. https://doi.org/10.1186/s12889-021-11100-4

[9] Smale, E. M., Egberts, T. C., Heerdink, E. R., van den Bemt, B. J., & Bekker, C. L. (2021). Waste-minimizing measures to achieve sustainable supply and use of medication. Sustainable Chemistry and Pharmacy, 20, 100400. https://doi.org/10.1016/j.scp.2021.100400

[10] Tat, R., & Heydari, J. (2021). Avoiding medicine wastes: Introducing a sustainable approach in the pharmaceutical supply chain. Journal of Cleaner Production, 320, 128698. https://doi.org/10.1016/j.jclepro.2021.128698

[11] Sumi Sukanya Dutta (2022). Medicines take lion's share of personal healthcare spending in India; study finds MoneyControlhttps://www.moneycontrol.com/news/trends/medicines-take-lions-share-of-personal-healthcare-spending-in-india-study-finds-8601911.html