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A Study on Medication Return by Patients as an Estimation of Medication Wastage in Bintulu Hospital

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ABSTRACT

Introduction: Medicines are essential in a healthcare setting to improve patient's wellbeing. However, medication wastage poses a financial burden on the nation's economy. Medication return program was implemented by the Ministry of Health Malaysia (MOH) for the patient to return their unused or excessive medicines at home. This study was conducted in a public hospital in Sarawak and aimed to measure the extent of medication wastage and to explore the possible factors leading to medication wastage.

Methods: A prospective, observational study conducted via standardised surveillance form over a two months at the targeted collection points (Discharge Counter, Outpatient Pharmacy Department, Male Medical Ward, Female Medical Ward of Bintulu Hospital).

Results and discussions: Excessive quantity of medications supplied (21.40%) and regimen changed (21.40%) were the main factors for medication return. Majority disposed of their unused medicines by returning to the pharmacy (45.54%), followed by discarding to the rubbish bin (40.63%). Majority of the respondents (76.14%) stored

the medications at room temperature, including tablets, inhalers, cream or ointment. RM 12,912.36 worth of medications were collected. Cardiovascular medications (RM3839.47) were the highest cost of medications returned. Majority of the respondents (97%) agreed that returning medication to pharmacy helped to reduce wastage.

Conclusions: Results showed that medication wastage exists in Bintulu hospital. Health policy-makers should be informed and implement wastage reduction strategies.

Keywords: Medication return, medication wastage

INTRODUCTION

Medicines are substances used for prevention, diagnosis, cure, mitigation or treatment of disease (1). Medicines are essential in the healthcare system, and with proper management, it proves to improve patient's well-being and satisfaction. However, improper management of medicines leads to medicine wastage.

Medicine wastage, as defined by WHO, includes unwanted medications that expired, unutilised, spoilt and contaminated and need proper disposal manner (1). Furthermore, medicine wastage is classified into five types, namely non-compliance, intentional and unintentional non-adherence, non-preventable and preventable wastage (2). Minimising medicine wastage is the desirable goal to reduce the direct costs associated with unused medications and disposal management; and the indirect cost such as time used in prescribing, screening and dispensing the medicines to patients (3).

Many studies performed in developed countries were mainly on medicines returned to the pharmacies. These studies discovered that the volume and cost of medicines that were returned to the pharmacies only represent a small proportion of the overall medicine wastage. For example, only 23% in the USA and 22% in New Zealand of the unused medicines returned to the pharmacies (4). A study by Jassim et al. found a similar finding: an average of 15 medicines stored per household; out of which 45% was leftovers, and 23% kept for future use (5).

The quality of these medications is also debatable. A study done in Malaysia found that about 69% of medicines own by patient did not have names, while 91% of them did not have expiry dates (6). Another study conducted in Hospital Brunei Darussalam highlighted that the majority of the participants had unused medication at home (75.1%, n=189). However, in practice, only 18.6% of the participants returned the unused medicines to the pharmacy (7).

The economic impact of wastage prescription medication demonstrated the enormous monetary wastage at all level that is present in communities worldwide. For example, in an Egyptian hospital, the total wholesale value of drugs returned in one month was numbered to be 10,988.84 Egyptian pounds (≈ 1962.32 USD) (8). Then, another journal showed that in the community settings, about £37.6 million of drugs were discarded each year in the disposal programs provided by the community pharmacies in England (9).

Medicine wastage is multi-factorial. The NHS summarises the causes of medicines wastage can be due to redundancy on dispensing, stock-piling for future use, change in medication regimen or the resolution of the patient's condition, death of the patient, inappropriate prescribing duration and also unintentional or intentional non-adherence (2).

The data provided by several studies suggested the major contributing factors associated with medicine wastage were alteration in medication regimen, recovery of patient's condition and expired medicines. There was a study which showed that in 340 items returned to the pharmacists and GP, significant factors of returning medications were because of the change or stop in therapy and because the medicines prescribed for one month or longer (18).

Besides, there is a study done by Rhiannon Braund et al. on the prescribing pattern and its potential impact on medicine wastage. His study revealed that most of the returned medications were "STAT" dispensed items such as tablet Paracetamol and capsule Omeprazole (19).

METHODS

A prospective, observational study conducted using a standardised surveillance form over two months at the targeted collection points (Discharge Counter, Outpatient Pharmacy Department, Male Medical Ward, Female Medical Ward of Bintulu Hospital). We retrieved the data of the medication cost from the Pharmacy Information System (PhIS) of Bintulu Hospital. This study was registered with the National Medical Research Register (NMRR-18-909-39610) and ethical approval for this study obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia.

RESULTS

We recruited 176 respondents in this study. The respondents comprised of 79 (44.89%) male and 97 (55.11%) female. Bumiputra respondents made up 108 (61.36%) of the total respondents while Chinese, Malay, and India made up 23.30%, 14.20% and 1.14% respectively. Age distributions and the education level of the respondents were as shown in Table 1.

Table 1: Demographic Information of Participants (n=176)

Demographic characteristics		Frequency (%)
Gender	Male	79 (44.89)
	Female	97 (55.11)
Race	Chinese	41 (23.30)
	Malay	25 (14.20)
	India	2 (1.14)
	Bumiputra	108 (61.36)
Age	< 21 years	12 (6.82)
	21-30 years	14 (7.95)
	31-40 years	27 (15.34)
	41-50 years	22 (12.50)
	51-60 years	37 (21.02)
	60-70 years	34 (19.32)
	>70 years	30 (17.05)
Education	No school	53 (30.11)
	Primary	41 (23.30)
	Secondary	49 (27.84)
	Diploma/STPM	22 (12.50)
	Degree	11 (6.25)

Majority of the respondents reported the medication return was because of the excess quantity of medications supplied (21.40%) and change of regimen (21.40%); followed by 13.38% of whose doctor instructed them to stop taking the medications and 10.37% of them obtained the medications from multiple sources or because of the concern of the effectiveness of the medications.

Other factors that contributed to medication return were the patients did not understand the reason to take the medications (4.68%), they experienced undesirable side effects or allergic reaction (4.01%), spoilt medications (2.34%) and medications owner passed away (1.67%).

Moreover, returning the excess medications to the pharmacy (45.54%) was the most prevalent method for disposal of the medication and followed by discarding to the rubbish bin (40.63%). The finding also revealed that patients discarded medications by burying (4.46%), burning (2.23%), giving to close relatives or friends (0.45%) or throwing into the sink (0.45%) or river (1.2%) or valley (0.45%). There were three respondents claimed that they never have excess medications.

On the other hand, majority of the respondents (76.14%) stored the medications at room temperature, including tablets, inhalers, cream or ointment. 18.94% of them also stored medications such as insulin in the fridge. However, 4.17% and 0.76% of the medications were exposed to heat and moisture, respectively.

Nearly 97% of the respondents shared similar views which 69.32% strongly agree, and 28.41% of them agreed that returning medication to pharmacy played a significant role in reducing medication wastage. Only 4 out of 176 respondents had a neutral opinion on reducing medication wastage by returning to pharmacy. Table 2 shows the participants' responses on the questionnaires.

Table 2: Participants' Response Analysis

	Frequency (%)
1. Which of the following that best describes your reason to return medication? (n=299)	
Medication is stopped by the doctor	40 (13.38)
Medication has expired	27 (9.03)
Changed to another medication	64 (21.40)
Broken/spoiled medication	7 (2.34)
Medication owner has passed away	5 (1.67)
Experienced unpleasant side effects/allergic reaction	12 (4.01)
Felt that medication is not effective/not necessary	31 (10.37)
Unsure of why to take the medication	14 (4.68)
Obtained medication from multiple sources	31 (10.37)
Excess quantity supplied	64 (21.40)
Changes in brand	0
Other	4 (1.34)
Does not like to take medications	*3*
Admitted to ward	*1*
2. How do you usually dispose your unused medication? (n=224)	
Sink	1 (0.45)
Flush down to the toilet	6 (2.68)
Rubbish bin	91(40.63)
Bury	10 (4.46)
Burn	5 (2.23)
Return to pharmacy	102 (45.54)
Give to friends/relatives	1 (0.45)
Others	8 (3.57)
Never have excess	*3*
River	*4*
Valley	*1*
3. How do you usually store your medications? (Please state the type pf medication. Eg: inhaler, tablet, syrup, insulin) (n=264)	
Room temperature (eg: cupboard/cabinet)	201(76.14)
Tablet	*159*
Syrup	*7*
Inhalers	*24*
Cream/Ointments/Lotions	*10*
Eye drop	*1*
Cold temperature (e.g., refrigerator)	50 (18.94)
Tablet	*4*
Insulin	*26*
Syrup	*8*

Table 2: (*con't*)

	Frequency (%)
3. How do you usually store your medications? (Please state the type pf medication. Eg: inhaler, tablet, syrup, insulin) (n=264)	
Cold temperature (e.g., refrigerator)	
Cream/Ointments	*4*
Eye drops/Ointments	*6*
Suppository	*2*
Expose to sun/heat (e.g., car, near window/kitchen stove)	11 (4.17)
Tablet	*8*
Inhalers	*2*
GTN	*1*
Expose to moisture (e.g., Bathroom)	2 (0.76)
Cream	*2*
4. Returning medication to pharmacy can help to reduce medication wastage (n=176)	
Strongly Agree	122 (69.32)
Agree	50 (28.41)
Neutral	4 (2.27)
Disagree	0
Strongly Disagree	0

The medications collected for four months valued RM12,912.36. Table 3 shows the price and percentage of returned medications according to pharmacological categories.

Among the 11 pharmacological categories, cardiovascular medications were the highest cost, with RM3,839.47 worth of medications returned, contributing to 29.73% of the total price. Other medications such as for asthma/respiratory system, genitor-urinary system/hormones, and endocrine system at 16.5%, 15.3%, and 12.7% respectively.

All collected medications wsorted according to storage condition, physical appearance and the expiry dates. As much as 78% of the medications channelled back to the medication supply chain to be reused, while the remaining 22% discarded.

The discarded medications included three costly medications, namely 270 tablets of expired dutasteride 0.5mg & tamsulosin 0.4mg combination tablets, 182 tablets of expired esomeprazole 40mg tablets, and 9 Insulin Glargine prefilled pens returned at

room temperature, costing a total of RM1,673.40 (about 60% of discarded medications).

Table 3: Price of Returned Medications according to Pharmacological Categories

Categories	Price (RM)	Percentage (%)
Cardiovascular	3839.47	29.73
Asthma/Respiratory system	2128.01	16.48
Genito-urinary system/Hormones (O & G)	1980.87	15.34
Endocrine	1638.94	12.69
Nutrition & Blood Disorders	976.85	7.57
Gastrointestinal	969.66	7.51
Analgesics/Musculoskeletal	631.56	4.89
Neuropsychiatry, Antiepilepsy, Antiparkinson	511.58	3.96
Oncology/Hematology	178.05	1.38
Antihistamine, Nasal & Oropharynx Spray	55.67	0.43
Other (External preparation)	1.70	0.01
Total:	**12912.36**	**100**

We have also summarised the top 10 medications of the highest total price (Table 4) and the highest quantity returned (Table 5) out of over 150 medications of various formulations and strengths collected. The anticoagulant, dabigatran of both 110mg and 150mg strengths, costing RM1,621.53 (12.56% of total medications returned) was the top of the rank, followed by leuprolide acetate prefilled syringe, tiotropium bromide 18mcg inhalation capsule (Handihaler), and esomeprazole 40mg tablets, all of which branded original products.

Table 4: Highest Total Price/Medication (Top 10 Medications)

Ranking	Medication	Quantity (Tabs)	Unit Price (RM)	Total Price (RM)
1	Dabigatran Etexilate 150mg Capsule	330	3.87	1277.10
2	Leuprolide Acetate 11.25mg Injection	1	982	982.00
3	Tiotoprium Bromide Inhalation 18mcg Capsules	215	3.67	789.05
4	Esomeprazole 40mg Tablet	274	1.87	512.38
5	Calcium Polystyrene Sulphonate Powder 5g	516	0.95	490.20
6	Gliclazide 80mg Tablet	2861	0.14	400.54
7	Amoxicillin 500mg & Clavulanic Acid 125mg Tablet	105	3.80	399.00
8	Metformin HCI 500mg Tablet	4550	0.08	364.00
9	Dabigatran Etexilate 110mg Capsule	89	3.87	344.43
10	Morphine Sulphate 10mg Controlled Release Tablet	150	2.14	321.00
			Total	5879.70

Table 5: Highest Quantity/Medications (Top 10 Medications)

Ranking	Medication	Quantity (Tabs)	Unit Price (RM)	Total Price (RM)
1	Metformin HCI 500mg Tablet	4568	0.08	365.44
2	Gliclazide 80mg Tablet	2949	0.14	412.86
3	Calcium Carbonate 500mg Tablet	1658	0.03	49.74
4	Ferrous Fumarate 200mg Tablet	1227	0.25	306.75
5	Amlodipine 10mg Tablet	1173	0.10	117.30
6	Amlodipine 5mg Tablet	1139	0.05	56.95
7	Perindopril 4mg Tablet	1006	0.07	70.42
8	Frusemide 40mg Tablet	895	0.05	44.75
9	Metoprolol Tartrate 100mg Tablet	839	0.18	151.02
10	Atorvastatin 40mg Tablet	821	0.21	172.41
	Total	16275	-	1747.64

DISCUSSION

Change in medication regimen, excessive quantities supplied from the pharmacy and termination of medications by physicians were the main contributing factors of returned medications.

Lorna Marie West did a similar study; also found that medication change was the main factor attributed to medication wastage (23). A significant association found between alteration or termination of medication regimen and excessive quantities supplied to the patients. Excessive medicines also resulted from the accumulation of the previous medications when changes arose or termination in the treatment regimen due to unsuitability or resolution of the patient's condition. Besides, some physicians tend to prescribe medication for a longer duration. An example of such over-prescription is having a prescription that is valid for another few months after the patient's next follow-up appointment, during which another new prescription will be given.

Another factor that might be contributing to the problem was that government hospitals subsidised patients for their medications. Therefore, patients tend to accumulate medication supplies, even though they had sufficient stocks left. Furthermore, a panel of experts from Malta highlighted that patients were likely to overstock the medications as they were afraid of running out of medicines when they need it (23).

Apart from that, some respondents felt that medication was ineffective or unnecessary and, they obtained medication from multiple sources. According to a study conducted by Hugtenburg JG, patient-perceived ineffectiveness was one of the top causes of medication wastage (24). However, appropriate counselling regarding the necessity for undergoing treatment and medicines could correct patient-perceived ineffectiveness. While obtaining medications from multiple sources can be a very thorny issue to handle. Most of the patients turned up in another healthcare facility when they defaulted follow up in the facility they were supposed to. Furthermore, some patients returned expired medications to the healthcare facility. This reason gave an impact on the patients' adherence to their treatment and medicines.

Majority of the respondents cited medication return program as their go-to method for medication disposal. The patients are most likely did not return any excess medications

when the regimen changed. The main reason is out of four collection points, only outpatient pharmacy is available after the research period.

Many subjects were unaware of returning medicines to the pharmacy unit. According to a study by Ming TL.et al., less than 50% of the respondents know about safe medication disposal, and about 65.6% of them were significantly more willing to return the medication to pharmacy or doctor at a proper assigned location compared to those who are without knowledge of such places (22). This finding indicated there is a clear need to create public awareness about issues on safe medication disposal. Thus, emphasis should be placed at the point of screening and dispensing by inquiring patiently whether patients still have balance at home that are still viable to be used individually over the dispensing counter.

Other measures to reduce medication wastage include, but not limited to, organising campaigns to raise public awareness, placing posters at various information corners all around the hospital, and dispensing of smaller quantities.

LIMITATIONS

Data about actual expenditure on medications per month or per year was not available, obtained or measured, thus this research was unable to conclude the cost of medication wastage concerning the actual expenses.

CONCLUSION

In conclusion, high medication wastage is due to multiple factors such as excess supply, frequent change in medication regimen, patient's non-compliance, and unawareness of the medications return program. Therefore, corrective measures should be done to the medication supply system to minimise the supply of excessive quantity. Besides, more awareness campaigns to educate the public about proper medication storage and disposal methods to reduce the detrimental impacts on the environment is crucial. While pharmacists who are in an ideal position in promoting medication return program; they should encourage patients to return any excess or expired medicines. We can optimise the use of medication returned and minimising the cost pertaining to the medication discarded.

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