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Value and Types of Medicines Returned by Patients to Sultan Qaboos University Hospital Pharmacy, Oman

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قيمة وأنواع الأدوية المعادة عن طريق المرضى إلى صيدلية مستشفى جامعة السلطان قابوس –عمان

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الملخص: الهدف: من الممكن أن يؤدي تكرار الزيارات للأطباء وقلة الالتزام بالخطة العلاجية وتعديل طرق العلاج بعد الترقيد بالمستشفى إلى تراكم كميات من الأدوية في البيوت.هذه الدراسة تهدف إلى معرفة قيمة وأنواع الأدوية المعادة عن طريق المرضى إلى وحده العناية الثلاثية بعمان. **الطريقة:** تمت مراجعة كل الأدوية المعادة طوعا عن طريق المرضى إلى الصيدلية الرئيسية بمستشفى جامعة السلطان قابوس بين فبراير ويونيو 2003م وتم إحصاء قيمة هذه الأدوية بأنواعها والمبالغ المفترض توفيرها لو أن هذه الأدوية أعيدت إلى حلقة التوزيع . تم إتباع طريقة الفحص المباشر حسب اللوائح والأنظمة المعروفة لمعرفة فيما إذا كانت هذه الأدوية صالحة للاستخدام أم لا. **النتيجة:** ثلاثمائة وواحد وثمانون مريضا قاموا بترجيع أدويتهم (69% إناث). تم استرجاع 1071 دواءا (المتوسط لكل مريض 3.1 في الشهر) والذي يعادل مبلغا إجماليا وقدرة 20140 ريالا (المتوسط لكل مريض 10.6 ريالا) وبهذا يمكن توفير مبلغا قدره 5550 ريالا (متوسط المريض 2.9 ريالا). كانت الأدوية المستخدمة لعلاج القلب والأوعية الدموية أكثر الأدوية إعادة حيث بلغت (24%) بينما ساهمت الأدوية المستخدمة في علاج العدوى بأعلى النسب من مجموع التكاليف 61%). **الخلاصة:** بينت هذه الدراسة قيم وأنواع الأدوية التي يقوم المرضى بإعادتها إلى إحدى وحدات العناية الثلاثية في عمان.تعتبر الأدوية المستخدمة لعلاج القلب والأمراض المعدية من أكثر الأدوية المعادة وأغلاها سعرا.نقترح بأن يقوم أصحاب القرار والمهتمون بالرعاية الصحية في استحداث توعية صحية للطرق المثلى في استعمال الأدوية.

مفتاح الكلمات: أدوية، إمداد وتوزيع، وصف الأدوية، اقتصاد الرعاية الصحية، عمان.

ABSTRACT ***Objectives:*** Frequent physician visits, improper therapeutic adherence and treatment modification after hospitalisation could result in unused medicine accumulating at home. This study aims to examine the value and types of medicines returned by patients at a tertiary care unit in Oman. ***Method:*** All medicines voluntarily returned to Sultan Qaboos University Hospital main pharmacy between February and June 2003 were reviewed. The cost of these medicines and potential cost saving, if some were returned to the hospital distribution cycle, were computed. A method of determining by physical observation whether they can be recycled was developed based on institutional-based guidelines and criteria. ***Results:*** Three hundred and eighty one patients returned their medicines (69% female). The patients returned a total of 1071 drugs (mean per patient 3.1 per month) corresponding to a total cost of Omani Rials (OR) 20,140 (mean per patient OR 10.6) (1 OR = 2.58 US dollar). Potential cost saving was OR 5,550 (mean per patient OR 2.9). Medicines of the cardiovascular group were returned in greatest number (24%) while anti-infective drugs had the highest share of the total cost (61%). ***Conclusion:*** The study identified values and types of medicines returned by patients at tertiary care unit in Oman. Medications used for cardiovascular and infectious diseases appeared as the most frequent and the most expensive returned medicines. It suggests that health care providers in Oman should devise health education programmes to improve proper utilization of medicine.

Keywords: Drugs, supply and distribution; Prescriptions, drug; Health care economics; Oman.

Advances in Knowledge

This is the first study in Oman to review the value and types of unused returned medicines. It has identified possible areas where there is a need to monitor drug therapy: cardiovascular and infectious diseases. The study stimulates the need to conduct a country-wide, sustained campaign for returning unused medicines to pharmacies. This may

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lead to better understanding of why medicines remain unused by patients. Physio-chemical analysis of returned medicines should be looked into; this may help policy makers to review the issue of recycling of unused medicines. This study forms the basis for future research in this very important area of patient compliance with their prescribed medication. It also provides more data related to returned medication in Oman in particular and the Gulf region overall.

Application to Patient Care

Little was known about patients' adherence to their therapy or about over prescribing by attending physicians in Oman. This study indicated areas where increased interaction between physicians and their patients is needed. This study has identified that patients with cardiovascular disorders are more likely to require additional attention and monitoring of their therapy. If this were done, patient care could be improved. The study suggests the presence of large amount of unused medicines kept at patients' homes. There is a potential risk of accidental dosing and/or unintentional overdosing which could adversely affect patient care. Patient with chronic diseases should be encouraged to bring their medications every time they attend their clinics. This study has identified the need for policy makers to review the 3-months supply prescribing policy for outpatients.

A major health benefit to the general public in the Sultanate of Oman is the provision of health services at all government hospitals and health centres free of charge including free medications. The health care services in Oman are provided by the Ministry of Health (MOH). They are divided into primary, secondary (regional), tertiary levels. The MOH manages tertiary hospitals (4 hospitals), all located in the capital Muscat.[1] Sultan Qaboos University Hospital (SQUH) is a tertiary teaching hospital independent of yet working closely with MOH health care services. It accepts referred patients from and refers patients back to MOH managed services. SQUH and all government owned health care institutions dispense the free prescribed medicines from the pharmacies located within the respective health care facilities.

SQUH, a 350-bed tertiary teaching hospital, provides both general medical care and specialized treatment. In 2001, the hospital budget for the purchase of medicines was approximately three million OR. The hospital pharmacy spent 40% and 60% of its medicines budget for inpatients and outpatients respectively.[2] During that year, the pharmacy was dispensing an average of 300 prescriptions per day.[2]

The number of prescribed pharmaceutical items per prescription is continually rising and contributing to increase health care cost world wide. In England during 2001, there was 6.4% increase in prescription numbers and a total ingredient cost of £6.1 billion representing an expenditure rise of 6.9% from 2000.[3] The proportion of unused prescribed medicines is also increasing. In the year ending March 2001, 584.6 tons of unwanted medicines were returned to community pharmacies in England for destruction under Disposal of Old Pharmaceuticals (DOOP) scheme.[4] This represented an increase in s of 65% over the preceding four years compared with a rise of only 14% in prescription numbers during the same periods.[3] There have been a number of similar large and detailed studies undertaken in countries such as the USA, Canada and Sweden.[5, 6, 7] For example, the US study conducted by Morgan et al. found that the mean individual annual cost of wasted medication s was $30.47. Waste represented 2.3% of total medication costs in their study. The study concluded that the individual costs were modest, but if $30 per person represents a low estimate of average annual waste, the US total national cost for adults older than 65 years would top $1 billion per year.[7]

The availability of unused medicines in the home may unfortunately constitute a source of material for intentional or accidental poisonings. In the United Kingdom, in excess of 90,000 cases of poisoning associated with pharmaceutical products are treated in hospital each year.[8] Moreover, it is unclear how many medicines are disposed of through normal household refuse and the domestic sewerage system. The environmental impact of inappropriate medicine disposal by patients is a serious environmental issue.[8, 9]

One of the phenomena associated with the provision of free medications, in countries such as Oman, is frequent switching by the patient from one hospital to another or multiple visits to one hospital.[10] Added to this is the medication dispensing policy of SQUH, by which most patients with chronic disease are pre-

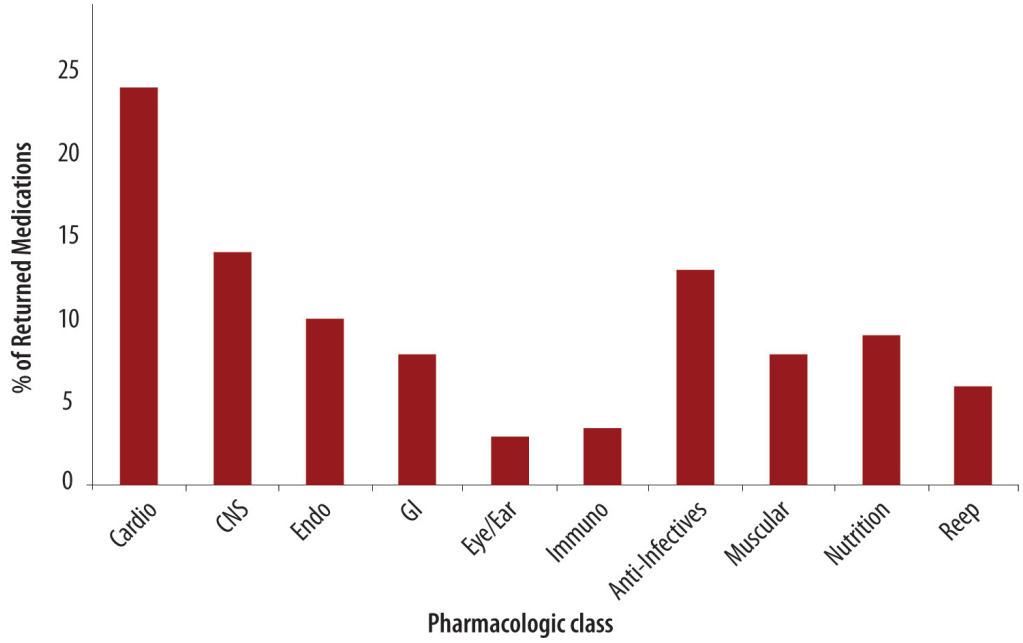

Figure 1: ***Distribution of most returned medications by pharmacological class.***
Cardio: cardiovascular system, CNS: central nervous system, Endo: endocrine, GI: gastrointestinal, Immuno: immunosuppressant, Resp: respiratory system, Musclar: musculoskeletal

scribed a three-month supply.

In an attempt to tackle medicine waste, SQUH Pharmacy has awareness campaigns. In an effort to improve compliance, notices were posted in strategic patient waiting areas requesting patients to return unused medicines to the pharmacy department for disposal. This is a passive ongoing campaign. The returned medicines are sorted and disposed by incineration at the SQUH facility. These returned medicines represent financial loss, possible treatment failure and/or over prescription.

This study was initiated to address some of these issues. The goals of the study were to compute the types and values of unused medicines; assess the potential cost saving if medicines were returned to the distribution cycle and develop criteria aimed at recycling some of the returned medicines based only on a physical examination of them.

METHOD

The study was performed in the SQUH Department of Pharmacy between February and June 2003 when co-author, Khaid Al-Siyabi, was a third year pharmacy student at Dalhousie University, Canada and doing experimental learning at SQUH Pharmacy.

Returned medicines received by pharmacy staff, were used for the study. The patient name, drug name, strength, dosage form, date of dispensing and quantity returned were all documented. Medicines were included if they had SQUH patients' labels. This process was to insure that all items were SQUH items and were in the SQUH formulary. Those items without SQUH patients' labels were excluded.

Due to the lack of clear international definitions and guidelines on which medicines could be considered reusable and safe in an outpatient setting,[11,12,13] the Department developed its own guidelines and criteria taking patient safety into account. Medicines were qualitatively assessed to determine if they could be theoretically recycled based on dosage form, physical and chemical features [Table1].

Two licensed pharmacists confirmed the selection process carried out by the investigator. The drugs were classified according to the classification index of the British National Formulary.[14] All data were entered into a Microsoft Excel programme for analysis and drug costs were computed using the acquisition cost in OR, provided by the Pharmacy Department during the time of the study.[15]

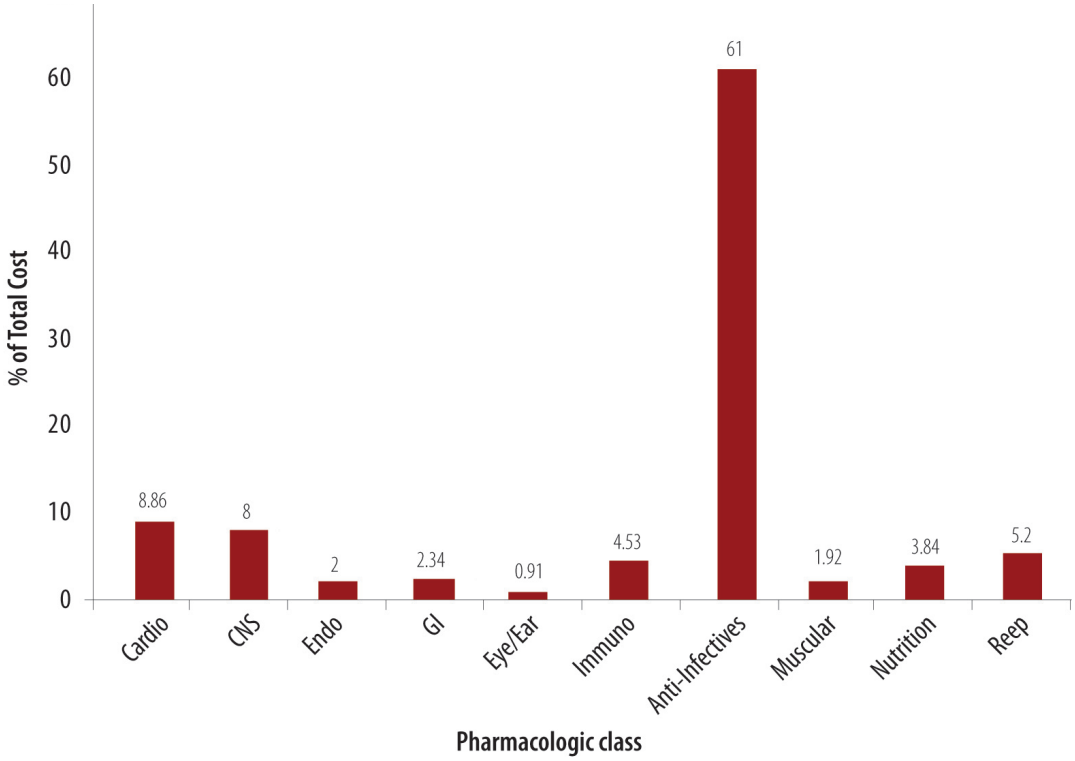

Figure 2: ***Percentage cost of most returned groups of medications (OR)***

Cardio: cardiovascular system, **CNS:** central nervous system, **Endo:** endocrine, **GI:** gastrointestinal, **Immuno:** immunosuppressant, **Resp:** respiratory system, **Musclar:** musculoskeletal

RESULTS

Three hundred and eighty one patients, of whom 263(69%) were female, voluntarily returned their medications. A total of 1,171 items were returned to the pharmacy, an average of 3.1 medications per patient. Among these, 99 drugs were excluded.

Cardiovascular drugs were the most common pharmacological group of returned drugs representing 24% of the total returned medications. Central nervous system drugs were the second most returned medications with 14% [Figure1].

The remaining 1,072 drugs represented a total cost of OR 20,140, an average of OR 10.6 per patient per month during the time of the study. The anti-infective drugs represented the highest share of the total cost (61%), followed by cardiovascular (7%) and central nervous system (CNS) drugs (7%) [Figure 2].

The total cost of potentially reusable medications was OR 5,550 (27.6% of the returned medicines cost), an average of OR 2.9 per patient per month.

DISCUSSION

This was an observational study, the first of its kind to be reported in Oman. In Arabian Gulf countries, there have been similar studies addressing the economic impact of unused medicines and patients' perception of safe medicine disposal.[16, 17] Hisham et al. found that families in Saudi Arabia and other Gulf countries spent a total of US$ 150 million on medications that were never consumed. These results came from a predominantly Saudi based questionnaire study.[16]

Our study found that, on average, each of the 381 patients returned three medicines at an average total cost of OR 10.6. This was a passive and voluntary exercise carried out in a tertiary teaching hospital. There are 15 government run hospitals available in Oman and patients have access to all of them as well as access to all other health centres. Patients may have been dispensed medicines whenever they had contacts with physicians. Hence, we consider this study reveals only the tip of an iceberg.

The study identified both possible therapeutic failure and/or over prescription. Nearly one in five of the returned medicines were for cardiovascular therapy. It

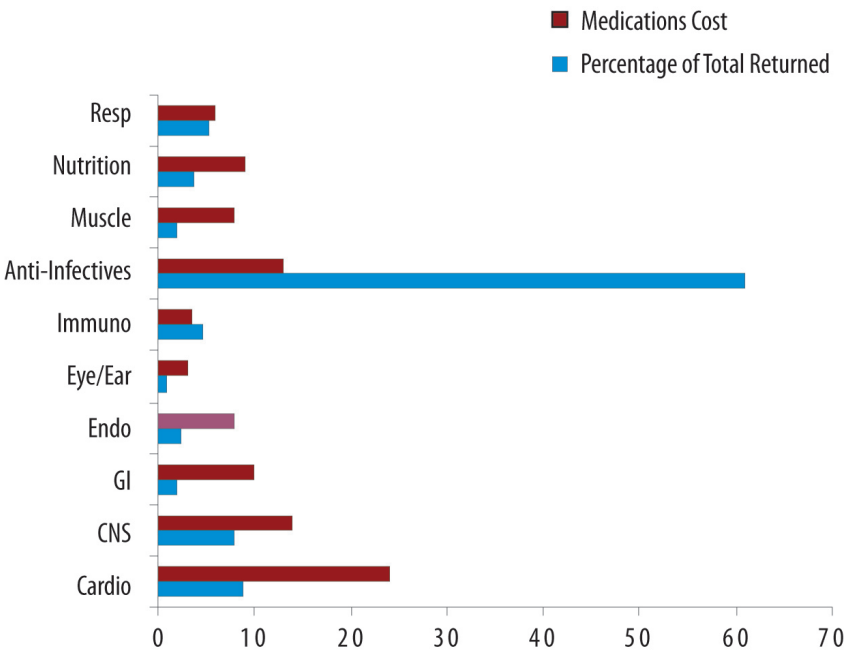

Figure 3: ***Percentage distribution of pharmacological groups, both quantity returned and cost***

Cardio: cardiovascular system, **CNS:** central nervous system, **Endo:** endocrine, **GI:** gastrointestinal, **Immuno:** immunosuppressant, **Resp:** respiratory system, **Muscle:** musculoskeletal

is not clear if this result reflected a pure treatment failure, therapy modification or that this class of medication was prescribed more frequently than other classes hence the higher percentage of returns.

Cost wise, the anti-infective group of returned drugs was the highest (61%). One patient returned an anti-viral drug (Valciclovir) costing OR 800. This item increased the overall total cost of anti-infective drugs.

From the clinical perspective, this study identifies the disease conditions to which health care providers need to pay more attention before repeat prescribing/dispensing. Large amounts of unused medicines in patients' homes increase the risk of self-medication, the sharing of medications amongst those with similar symptoms, the use of expired medicines and the use of different brand of similar drugs leading to accidental over dosage.[18, 19]

The study emphasizes the need for a detailed dialogue prior to prescription so that patients and their physicians are in agreement and also the need to monitor the use of medicines, especially when modifying regimens. It is important to give clear and appropriate directions during patient counselling. The best way is to insist that patients bring all of their medicines with them whenever they visit a health care facility.

Equally, from the economic perspective, the study provided a quantitative estimate of wasted resources due to medicines voluntarily returned and unused. Interestingly, while part of this waste was related to non-use of medications for treating chronic diseases (e.g. cardiovascular drugs), an important proportion of this waste was related to non-use of highly expensive drugs especially of the anti-infective class [Figure 3]. It could be very cost-effective to employ clinical pharmacists' skills in specialized clinics, which are involved in prescribing these two pharmacological classes of drugs, in order to monitor the appropriate use of these medications. Studies had proven the value of pharmacists in such specialized clinics.[19-23] The current study also suggests that it could be economically viable to establish physico-chemical analyses for returned medicines. The availability of a biochemical analytical facility in the College of Science on the Sultan Qaboos University campus would enable this development. In this way, it could be confirmed whether returned medicine could be returned to the distribution cycle or not.

Finally, from the health care perspective, the magnitude of the problem emphasizes the need for inter-

Table 1: ***Drug characteristics that allow or preclude reuse for outpatients***

Recyclable medications	Non-recyclable medications
1. Intact, solid oral dosage forms	1. Compounded or reconstituted drugs
2. Medications in multi-dose sealed containers that are dispensed pursuant to an order for an individual patient or resident and from which no doses have been withdrawn.	2. Drugs that require refrigeration
3. Each item should have expiry date of more than six months	3. Drugs those are adulterated or misbranded
4. Each package of the solid dosage form has to be sealed by the manufacturer.	4. Drugs which have had their integrity, packaging or labelling compromised (e.g., through environmental damage such as water damage, crushing, a broken seal, a torn or marked label and originally dispensed
	5. Expiry date of less than six months
	6. Ampoules for parenteral medication in single-dose sealed containers
	7. Suppositories and suspensions

vention to avoid both health risks and waste of money. Different kinds of policies can be explored,[23, 18] such as patient counselling by pharmacists at the time of dispensing and drug utilization reviews applied to outpatient or inpatient healthcare settings,[25] may decrease drug prescription and consumption, improve medication use and could save money.[18]

This study leads to some serious some important and serious recommendations for research and action: the need to explore similar exercises in other hospitals and health centres, carry out an active promotion of returning unused medicines to all pharmacy facilities, explore reasons for the return of medicines unused and the need to counsel patients before seeing a physician and during the dispensing process.

LIMITATIONS

This study has some major limitations. First, all drugs returned were considered to be SQUH's items if the returned medicine had an SQUH patient's label. Some of medications dispensed from other hospitals could have been mixed with SQUH items. This may have resulted in an overestimation, during the study, of the number of drugs returned to SQUH and their cost. We do not believe, however that the number was so high as to have a major effect on the overall estimate of the number and cost of items. This study did not investigate the reasons why patients were not using the medications. One study published by Anders, [26] studied the reasons and the relative importance of why medicines were returned unused to Swedish pharmacies. He concluded that the four main reasons for returning unused medicines to pharmacies were (1) the medicines were too old, (2) the user had died, (3) there was no need for the medicine any more and (4) the therapy had changed. These reasons made up 75% of all reported reasons.[26] Finally, the cost of returned Valciclovir in the anti-infective group represented an extreme in this group and skewed the total cost of this group.

CONCLUSION

The study identified a substantial waste of medicines posing a danger to the family and the environment. The study also identified both possible therapeutic failure and/or over prescription. Patients with cardiovascular and anti-infective medications need to be targeted for the possible improvement in their medication use. Pharmacist counselling and drug utilization reviews will improve patients' compliance. Other cost-saving measures may also be found. Methods for analysing returned medicines should be adopted as this has the potential of making a substantial saving to this and other hospitals. Further studies, such as survey of patients who have returned medications, should be carried out. This need for revision of the 3-months supply prescribing policy for outpatients is an important issue raised by this study.

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