Reconciliation of discrepancies in discharge medications from the medical wards of a tertiary centre

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ABSTRACT

Introduction: Medication discrepancies can lead to serious consequences, and is more likely to occur in elderly patients and patients with chronic disorders due to polypharmacy. Such errors can contribute to drug-related problems, medication errors, adverse drug events and jeopardise patients' health. The discharge period is a particularly vulnerable transitional interface as there is a higher risk of these discrepancies. The aim of this study was to assess the incidence of unintentional medication discrepancies during discharge of patients admitted to the medical wards of a tertiary referral centre. **Materials and Methods:** Data was prospectively collected over a period of three months (21st March to 21st June 2011). All the discharge prescriptions were carefully checked for errors: unintentional missed medication, inappropriate or missing dose and unexplained dosage increase or reduction which required intervention, missing or inappropriate duration, illegible handwriting and inappropriate formulation. The types of pharmacy intervention were classified into 'error', 'near-miss' and 'confirming'. Error is when a particular event had occurred in the ward prior to pharmacy intervention, near-miss is when there was intervention before a particular event had occurred, and an intervention was classed as 'confirming' when no changes were made in the actual prescriptions after pharmacy intervention. **Results**: There was a total of 845 discharge prescriptions consisting of 5,465 medications encountered during the study period. Overall, 18.7% (n=158) of the prescriptions required intervention, ranging from 11.8% to 22% per ward. The most common interventions was for unintended missed medications and dosage adjustments. Overall, 3% of all intervention required was classified as error whereas 49% classified as near-miss. Prescriptions from the Nephrology services required the most intervention. **Conclusions**: This study demonstrated the importance of conducting a medication reconciliation process in ensuring patients are discharged with the appropriate and correct medications. It is an effective way of reducing medication discrepancies and is an essential process for optimizing the safe and effective use of medicines.

Keywords: Medical errors, medications errors, adverse events, prescriptions errors

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INTRODUCTION

Medication errors can lead to serious consequences, such as serious adverse effects, hospitalisation and even death. They are one

of the leading causes of unintentional harm to patients in the hospital setting. [1] Medication delivery in the hospital environment is a complex process, consisting of prescribing, transcription, dispensing and administration of the prescribed medications. [2] Errors are more likely to occur in busy centres and in the setting of polypharmacy. Therefore, it is important that a proper system should be in place to screen for such errors.

Studies have shown that medications errors occur in as many as 53.6% of discharge prescriptions. It is estimated that approximately 46% of the medication errors occur on admission or discharge from a clinic or hospital, when prescriptions are written up. [2] Wong *et al*. showed that at least 41.3% of discharge prescriptions had at least one actual unintentional medication discrepancy. [3] Moore *et al*. found that 42% had one or more medication continuity errors, and the types of medications involved were cardiovascular (36.4%), gastrointestinal (27.3%) and pulmonary (13.6%). [4] In another study, 53.6% prescriptions had at least one unintended discrepancy and the most common error was the omission of a long-term medication. [5] Unroe *et al*. reported that 19% of the 23% errors or discrepancies identified through the reconciliation process on admission involved medications that were categorised as potentially high risk. [6] Rozich *et al*. found that more than 40% of medication errors are believed to be caused by an inadequate medication reconciliation process during transition of care. [7]

Medication reconciliation is a recognised strategy to reduce medication errors in the healthcare setting. [8] It is defined as the process of comparing a patient's medication orders to all of the medications that the patient had been taking. [9] This process comprises of five steps (Figure 1) and should be done at every transition of care. The systematic process would serve to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions. In fact, medication reconciliation is one of the requirements for hospital accreditation. [9] A study on cost-effectiveness analysis demonstrated that it is an extremely cost-effective strategy for preventing or reducing medication errors. [10]

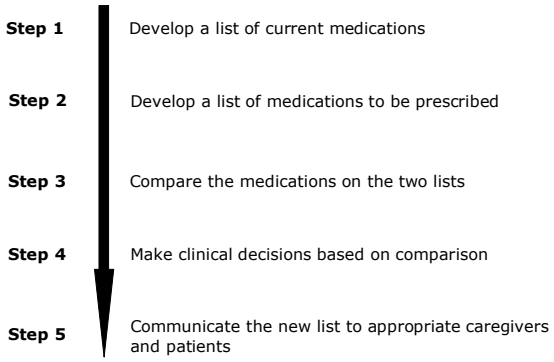

Fig.1: Steps in Medication Reconciliation. [9]

In our setting, we similarly encounter discrepancies in patients' discharge medications. The discrepancies are usually related to missed drugs (either unintended or undocumented, but intended to be stopped by the prescribers), inappropriate dose or dose changes during admission and at discharge, inappropriate duration and illegible handwriting which require intervention. However, we were uncertain of the exact extent of this problem as there is currently no published data available. The aim of this study was to assess the incidence of medication discrepancy at discharge from the medical wards of a tertiary referral centre in Brunei Darussalam.

MATERIALS AND METHODS

Setting: RIPAS Hospital is one of the tertiary referral centres in Brunei Darussalam. It is a 620 bedded hospital which covers all specialties apart from oncology, stroke and cardiac surgery. There are altogether 24 wards of which five are medical wards (wards 4, 19, 20, 21 and 22) where the study was conducted. The details of the wards are as follow; Ward 4 - neurology and respiratory (male and female) with 32 beds, Ward 19 - gastroenterology, cardiology, and oncology/haematology (female) with 28 beds, Ward 20 - endocrine, rheumatology and nephrology (female) with 22 beds, Ward 21 - gastroenterology, cardiology and oncology/haematology (male) with 32 beds and Ward 22 - endocrine, rheumatology and nephrology (male) with 22 beds.

Data Collection: Data was prospectively collected from the In-Patient Pharmacy of RIPAS Hospital over a period of three months (21st March to 21st June 2011). All discharge prescriptions (written on patients' outpatient medication cards) from the medical wards were reviewed. Outpatient medication cards are cumulative medication records of a patient which contain the named patient's diagnoses and medications to date.

All the discharge prescriptions were checked for medication discrepancy through comparison of patient's medications prior to their admission, during hospital stay and at discharge.

Types of pharmacy interventions were classified into three different classes: '**error**', '**near-miss**' and '**confirming**'. An intervention was classed as 'error' if a particular event had occurred in the ward prior to pharmacy intervention. [11] An intervention was classed as 'near-miss' if a pharmacist intervened before a particular event had occurred [11] and an intervention was classed as 'confirming' when no changes were made in the actual prescriptions after pharmacy intervention. The data collected were analysed using Microsoft excel.

RESULTS

Overall, there were a total of 845 discharge prescriptions consisting of 5,465 medications over the three month study period. Medication discrepancies occurred in 18.7% (n=158) of prescriptions which required some form of pharmacy intervention. This consisted of 249 medications. Discrepancies were highest in wards 4 and 22. The breakdown of medications dispensed per ward and the Errors recorded are shown in Table 1.

Among the 249 medications involved with the discrepancies, the nephrology service recorded the highest number of interventions

Table 1: The number of prescriptions, items and errors recorded per ward.

	Total number		Number of errors recorded	
Ward	**Discharge prescriptions**	**Medications dispensed**	**Prescriptions with error (%)**	**Medications with error (%)**
4	209	1,201	63 (30.1)	63 (5.2)
19	185	1,128	48 (25.9)	48 (4.3)
20	161	1,231	63 (39.1)	63 (5.1)
21	144	909	20 (13.9)	20 (2.2)
22	146	996	55 (37.7)	55 (5.5)
Total	845	5,465	158 (18.7)	249 (4.6)

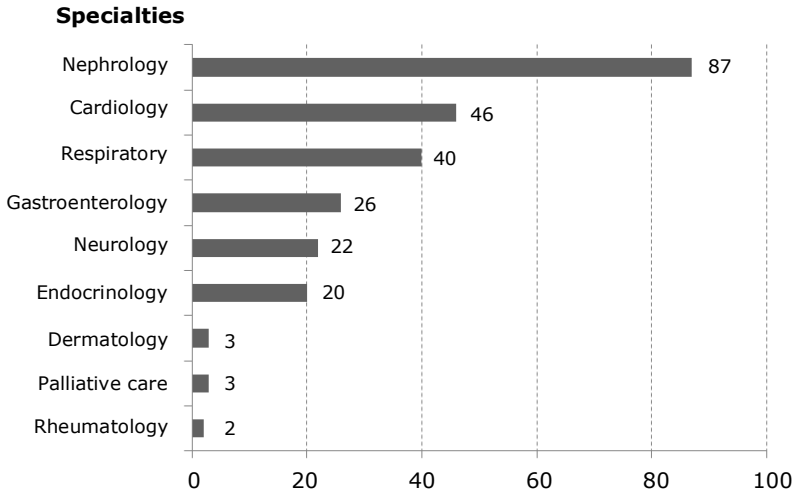

Fig. 2: The number of items or medication discrepancies encountered per specialty out of the total 249 items.

(35%, n=87), followed by cardiology (18%, n=46) and respiratory (16%, n=40) services.

Unintended missed drug and wrong dosage were the most common error requiring pharmacy intervention accounting for 31% (n=78 items) each.

Salbutamol Metered Dose Inhaler (MDI), amlodipine, aspirin, atorvastatin, calcium carbonate or Titralac® (used as phosphate binders in nephrology) and omeprazole were the top six drugs which were unintentionally missed by the prescribers upon discharge.

Overall, 3% of the prescriptions that required intervention were classified as 'Error', 49% as 'Near miss' and the remaining 48% as 'Confirming'.

DISCUSSION

Medication reconciliation is performed with the intention of reducing medication errors and patient harm. It is also an essential process for optimising the safe and effective use of medicines. Medication reconciliation on admission is much simpler as it only involves comparison of patient pre-admission medications with the admission orders. Medication reconciliation for discharge is a more complex

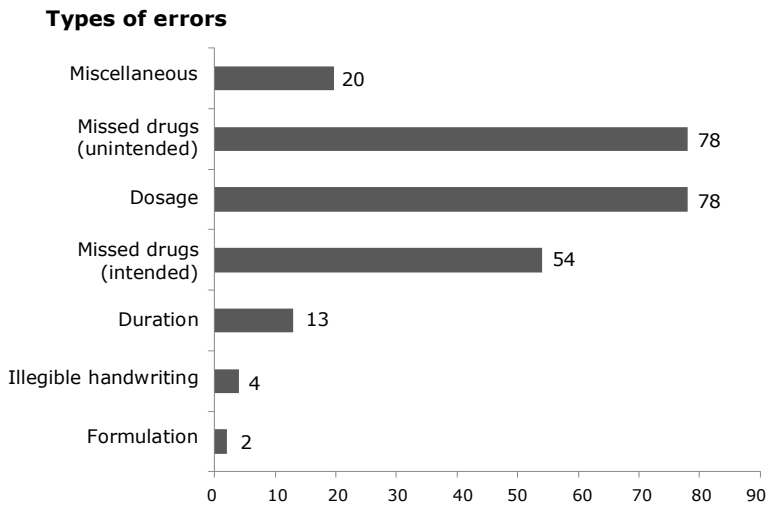

Fig. 3: The types of errors that required interventions.

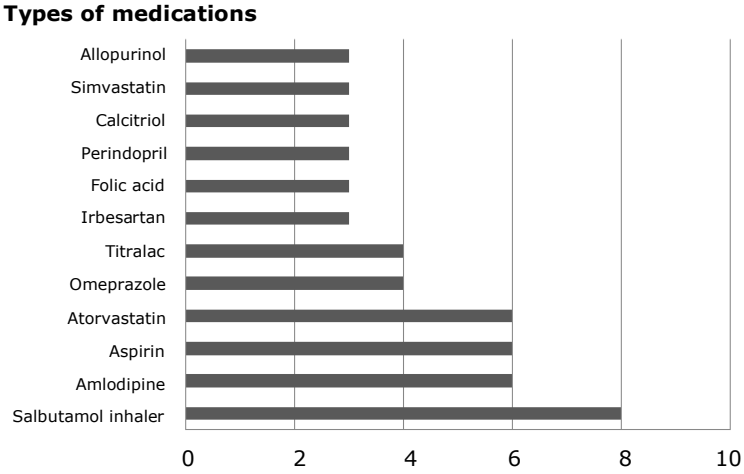

Fig. 4: The types of medications in prescriptions that required intervention.

process, in which comparison needs to be done for patient pre-admission medications, medications prescribed in the hospital and medications to be dispensed at discharge. [3] It is a formal process which involves partnership between healthcare professionals and patients to ensure an accurate and complete transfer of medication information at each interface of care. [1] Medication reconciliation at hospital discharge means that every newly -prescribed, continued, discontinued or modified medication and the reasons for these changes are communicated to the caregivers through proper documentation. [1, 12] It is important that a multi-disciplinary approach is practiced as such medication reconciliation at discharge include finalising post discharge medication regimens, developing discharge instructions for home medications, patient counselling and transmitting the updated medication list to the follow-up physician, including documentation on medications which are added or changed. [13]

An effective medication reconciliation process involves a multi-disciplinary approach that consists of physicians, pharmacists and nurses. [12, 14] The level of involvement of healthcare providers may vary from one health institution to another, depending on local policy. [12]

Our study found that 18.7% of the discharge prescriptions required pharmacy intervention. This is much lower than the rates reported by other studies with rates ranging between 41% and 56.3% of discharge prescriptions that had at least one actual unintentional medication discrepancy. [3, 15] However, it is possible that in our study, early intervention had already taken place in some cases prior to patient discharge (during pharmacist ward round or when the inpatient treatment charts were sent to the pharmacy for claiming of non-ward stock medicines) and not reported. These interventions conducted while the patients were still warded were not included in this study.

Our results showed that 31% of the interventions was related to unintentionally missed medications. Among the medications, salbutamol MDI, amlodipine, aspirin, atorvastatin, calcium carbonate (used as phosphate

binders in nephrology) and omeprazole were the six most common medications that were unintentionally missed by the prescribers upon discharge (i.e. the drugs were restarted again upon discharge after pharmacy intervention). Long-term medications which were withheld temporarily during admissions were one of the main causes for unintentional missed medications during discharge. This is in agreement with the study by Cornish *et al*. [5] Unintentionally missing out a medication during transcription of the discharge prescriptions was also common, particularly for those patients with multiple medications.

Our study also showed that 22% (54 items) of the interventions were under the classification of '*missed medications but were intentionally stopped by the prescribers*'. After contacting the prescribers, these medications were either confirmed to have been stopped or withheld until the next review. Medications which required pharmacy intervention were typically long-term medications that patients were already on prior to their admission, but withheld during admission or discharge, and/or medications that were prescribed during admission but not prescribed or continued upon discharge. Medication which was continued on admission but eventually stopped on the ward and not prescribed during discharge did not warrant an intervention in this study as it was assumed that the said medication should be stopped for good. The top three medications which required intervention in this category were amlodipine, atorvastatin and atenolol respectively.

Documentation of stopping a particular medication in a discharge prescription is considered good prescribing practice as it not only provides information to the pharmacists, but also to other prescribers who will review the patient during their next clinic visit.

In total, 78 items required interventions on dosing and of these, 8% were classified as 'errors', where the errors had already occurred while the patient was on the ward prior to pharmacy intervention. One example of such an error was a patient who was on digoxin 0.0625mg three times a week prior to admission, and was prescribed 0.0625mg once daily in the ward and continued upon discharged. The dose was however amended to three times weekly after pharmacy intervention. A total of 37% of the interventions was classified as 'near-miss' i.e. the dose of the medications was changed after pharmacy intervention. These were classed as 'Near miss' because the interventions were made prior to the errors occurring. The remaining 55% of the interventions did not result in any changes to the dosage post-intervention. Compulsory pharmacy intervention undertaken due to illegible handwriting and missing details on dose were also considered as 'Errors'.

Other types of discrepancies which warranted pharmacy interventions were related to pharmaceutical formulation (1%); illegible handwriting (2%), duration of therapy (5%), with the remaining 8% comprising miscellaneous interventions. Miscellaneous interventions consisted of verifying prescriptions (medication and strength variations, dosage) and prescription of medications not listed in the national standard drug list.

In our study, 3% of the overall pre–scriptions that required intervention were

classified as error, 49% classified as 'near-miss' with the remaining 48% classified as 'confirming'.

There is much room for improvement on the prescribing practice of discharge prescriptions in some specialties, especially those that required a high number of pharmacy intervention in this study. Nevertheless, in the course of carrying out this study, a number of prescribers were seen to be adopting good prescribing practice as seen from their prescriptions. Sharing these with other prescribers could help to motivate them to embrace similar good practices, particularly the importance of documenting any intended drug to be stopped on discharged. This baseline study can be used to heighten the awareness on the importance of medication reconciliation performed by the prescribers when prescribing patients' home medications.

One of the limitations of our study is that the data collection was only performed for five medical wards. Thus, the study does not reflect the percentage of medication discrepancies occurring in the whole hospital.

In conclusion, our study demonstrated the importance of a proper medication reconciliation process conducted by healthcare providers in ensuring patients are discharge with the appropriate and correct medications.

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