Medication transcription errors at a tertiary healthcare facility in Uva province, Sri Lanka: A retrospective study

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Abstract

Introduction: Medication transcription is an error-prone process in healthcare settings with paper-based documentation. However, it is often preventable. In Sri Lanka, a uniform medication chart is not currently in use.

Objectives: To describe transcription errors with the aim of designing a standardized drug chart to minimize the transcription errors at a tertiary care facility in Uva province, Sri Lanka

Methods: This cross-sectional study was conducted in selected units at Provincial General Hospital, Badulla. All discharged patients after a minimum of 72 hours hospital stay were included. The drug charts of bedhead tickets were scrutinized for transcription errors.

Results: At the time of study, four types of charts were in use. In total 272 drug charts, the median number of drugs was 9 (Interquartile range - IQR 6-12). Median length of patient's stay was 4 days (IQR 3-6). We encountered at least one transcription error of medication details in 88.6% charts. Amongst, medication name transcription error was the most common (220, 80.9%) followed by route (114, 41.9%) and frequency errors (70, 25.7%). During transcribing drug names, majority of charts had spelling errors (203, 74.6%). Although there was a statistically significant association between number of prescribed drugs and presence of at least one medication transcription error ($p<.001$), there was no significant association to number of days of patient stay ($p=.99$).

Conclusion: The selected center has a significantly high prevalence of medication transcription errors. Hence, introducing a uniform medication administration chart is encouraged to minimize the opportunities for adverse patient outcomes.

Introduction

The drug administration process includes prescription, transcription, dispensing, administration, and monitoring [1]. All events are potential sources of errors, resulting in morbidity and mortality of patients [2]. With the well-known report titled "The Err is Human" published in 2000, medication errors have drawn the attention of researchers [3]. While errors at the prescription stage were extensively studied [4-8], research is scarce on transcription errors particularly in developing countries [4].

Medication transcription error is described as any discrepancy from the clinician's order when transcribed onto any patient-related documents [1]. During the transcription process, errors in the drug's name, formulation, dose, route, and regime can occur [9]. Furthermore, an ordered drug can be omitted or an unordered drug can be added [9]. This is a significant issue that requires attention, particularly in settings with handwritten paper-based documentation. Electronic databases have largely replaced paper-based documents in healthcare settings of developed countries, as technology has advanced. However, as a developing country, the majority of settings in Sri Lanka still practice paper-based handwritten documentation.

Hence, a standard unified medication chart is one of the proposed interventions to reduce errors in such settings, and it has been proven to be effective with drug prescriptions [10-12]. It is a cost-effective approach in the context of limited resources in developing countries. In Sri Lanka, however, a wide range of medication charts in various institution-based formats are currently in use. Drug

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charts differ between departments even within the same institution. In Sri Lanka, a standardized medication chart is not currently in use. We conducted this study to describe the transcription errors in drug charts with the aim of designing a standardized drug chart to minimize the errors.

Methods

Study design and setting

This cross-sectional study was conducted at Provincial General Hospital, Badulla. It is the largest tertiary care centre in Uva province of Sri Lanka with a bed capacity exceeding 2000 beds. From admission of a patient, an inpatient profile; Bed Head Ticket (BHT) is maintained throughout the patients' stay at the hospital. Clinicians make prescriber notes on BHT, which nurses manually transcribe onto a separate sheet known as drug chart. Latter is used by nurses to administer drugs and by clinicians in patient management.

Study population

All patients who got discharged after a minimum of 72 hours hospital stay were included. The BHTs of the discharged patients of the selected specialized units (Medical, surgical, paediatric, gynecology and obstetrics, nephrology, respiratory, neurology, psychiatry and orthopaedics) were scrutinized for transcription errors. Patients who were not prescribed any drugs or stayed less than 72 hours were excluded.

Data collection

Data were extracted from the BHTs of the patients over one-week period without approaching the patient concerned. A predesigned questionnaire developed based on literature was used for data extraction [13]. Data were collected on ward details, errors in patient details, and drug description errors on first drug chart. Furthermore, questions were included to assess transcription errors when transcribing drugs from first sheet to the second sheet, if multiple charts were used.

Data analysis

Statistical analysis was performed with SPSS for Windows version 25. Any discrepancy of any component of patient details and medication details were considered as transcription errors. If a transcription error in medication details was identified in at least one drug, it was recorded as an error. Number of drug charts studied were considered as the denominator when deriving percentages. A p-value <0.05 was considered significant in statistical analysis.

Ethical considerations

Since confidentiality and anonymity of the patient was preserved throughout the study, patient consent was waived off. Ethical clearance was obtained from the Ethics Review Committee of the National Hospital of Sri Lanka, Colombo. Further, the approval was obtained from the hospital management and the consultant in charge of selected units to access the patients' BHTs.

Results

A total of 272 drug charts were studied. From the sample, 71 (26.1%) were from surgery department, followed by medicine (34, 12.5%), orthopaedic (31, 11.4%), paediatric (27, 9.9%), respiratory (20, 7.4%), psychiatry (18, 6.6%), nephrology (18, 6.6%), neurology (16, 5.9%), obstetrics (13, 4.8%), post-natal (12, 4.4%), and gynecology (12, 4.4%) departments. Median number of drugs on first drug administration chart was 9 (IQR 6-12) drugs while median length of stay of the sample was 4 (IQR 3-6) days. None of the charts had all the data including patient details and medication details correctly transcribed from the BHT.

Transcription errors in patient details

Errors during transcription of ward name, BHT number, patient name, gender, age, weight and allergy details were studied under patient details. At least one transcription error in patient details was found in 270 (99.3%) charts. Majority of errors were identified in allergy details (233, 85.7%) followed by weight (222, 81.6%) and gender (146, 53.7%) (Table 1). Allergy details were missing in 232 (85.3%) charts, while they were incorrectly transcribed in one (0.4%). Furthermore, at least one error in patient details such as ward name, BHT number, name, age, and gender was observed in 164 (60.3%) charts, affecting drug administration by the nursing officer. Among the factors influencing clinicians' pharmacotherapy decisions (age, gender, weight, and allergy details), at least one error was identified in 270 (99.3%) charts.

Transcription errors in medication details

Medication transcription errors included adding an unordered drug, omitting an ordered drug, and any discrepancy in medication details such as date given, name, dose, unit, route, and frequency. There were medication transcription errors in 241 (88.6%) charts. A single error was found in 86 (31.6%), two errors in 95 (34.9%), and more than three errors in 60 (22%) charts. Medication name transcription error was the most common, followed by route and frequency errors. (Table 1). Drug omissions, where a prescribed drug was completely omitted during transcribing, were observed in 19 charts (7%) while unordered drug was added during transcription in 5 (1.8%) charts. The majority of charts had spelling errors when transcribing drug names (203, 74.6%). Other errors discovered included the use of trade names instead of generic names (88.2%) and incorrect name transcription (38,14.0%) (Table 2).

Table 1. Transcription errors

Transcription component	*Number of errors (% of total charts)*
Patient details (N=272)	
Ward name	16 (5.9)
BHT number	3 (1.1)
Patient name	20 (7.4)
Gender	146 (53.7)
Age	14 (5.1)
Weight	222 (81.6)
Allergies	233 (85.7)
Medication transcription errors (N=272)	
Unordered drug	5 (1.8)
Drug omission	19 (7.0)
Medication details	
Date	2 (0.7)
Drug name	220 (80.9)
Dose	22 (8.1)
Unit	14 (5.1)
Route	114 (41.9)
Frequency	70 (25.7)

Table 2. Medication transcription errors

Medication transcription error	*Number of charts (% all charts) N=272*
Date of administration	2 (0.7)
Incorrect	2 (0.7)
Different formats within the same chart (Month/day or day/month)	35 (12.9)
Drug name	220 (80.9)
Incomplete	38 (14.0)
Trade name used	88 (32.4)
Spelling errors	203 (74.6)
Dose	22 (8.1)
Incorrect	4 (1.5)
Missing	18 (6.6)
Unit	14 (5.1)
Incorrect	2 (0.7)
Missing	5 (1.8)
Different from standard notification (ex: -g as gr)	18 (6.6)
Route	114 (41.9)
Incorrect	1 (0.4)
Missing	113 (41.5)
Frequency	70 (25.7)
Different formats (ex: -bd, BD, Bd)	67 (24.6)
Incorrect	1 (0.4)
Missing	2 (0.7)

Once only drugs were not clearly mentioned in 6 (8.3%) charts out of 72. Six charts (3.8 percent) out of 159 lacked specific mention of "as required" drugs. We identified a statistically significant association between number of prescribed drugs and presence of at least one medication transcription error ($p<.001$). However, there was no significant association to number of days of patient stay ($p=.99$).

Whilst analyzing 147 charts which included antibiotics, 44.2% (65) didn't indicate the duration of antibiotic administration, by numbering. Further 2% (3) charts lacked the time of administration. Antibiotics were not highlighted in majority (144, 98.0%).

Errors identified when multiple charts are used

In 24.6%) patients, multiple charts were used. All subsequent charts were not numbered as 1, 2, 3, and so on. Further, in 8 (11.9%) instances, charts were not attached in sequence. The errors identified when transcribing patient and medication details from first drug chart to the second drug chart are described in Table 3.

Table 3. Errors identified when multiple charts are used

Error	*Number of charts (% all charts)*
Not attached in sequence	8 (11.9)
Not numbered correctly as 1, 2, 3, ...	67 (100)
Patient identification details	18 (26.9)
Transcription errors in medication details	
Number of prescribed medications not equal in both charts	5 (7.5)
Name	5 (7.5)
Dose	0 (0)
Unit	0 (0)
Frequency	1 (1.5)
Route	3 (4.5)
Medication omitted in the first chart transcribed again onto second chart	4 (6.0)

Discussion

Although errors in the prescription stage have been extensively studied in both Sri Lanka and other countries, to the best of our knowledge, this is the first study to specifically describe medication transcription errors in Sri Lanka. In our setting, manual transcription of prescriber notes occurs in several steps from transcribing details onto patients' drug charts, monitoring charts, investigation forms, clinic notes, and discharge summaries. Because transcription is done manually and by eye-scanning,

human errors can occur at any stage and can have a negative impact on the patient. This is iatrogenic, and thus preventable. In our study, we focused on transcription errors that occur when transcribing prescriber notes onto the drug chart.

Accurate patient information is a fundamental requirement for clinical management. There was at least one transcription error in patient details such as ward name, BHT number, patient name, gender, age, weight, and allergy details in almost all drug charts (99.3%) in our study. Amongst, allergy details were not mentioned in 85.3%. In medical wards of Ethiopia, 5.2% of medication errors were due to the unavailability of allergy details [14]. This high rate of errors in primary aspects of pharmacotherapy may be attributed to a lack of understanding of the importance of the aforementioned details on medication administration, rather than a lack of pharmacology knowledge.

A systematic review in South East Asian countries reported transcription error rates ranging from 15% to 70% [15]. Furthermore, in a Swiss study, transcription errors accounted for more than half of the errors (53.3%) in the prescription-administration cycle [16]. A Sri Lankan study on prescribing errors at a secondary care hospital has encountered 12 instances among 400 patients where drug charts did not match the prescriber notes [8]. However, we observed a significantly higher prevalence of medication transcription errors (88.6%). This high error rate could be attributed to the high workload, time constraints, and limited nursing staff. In 2019, there have been 2.15 nurses per 1000 people in Sri Lanka, which is significantly lower to developed countries [17]. In the same year, 18 nurses per 1000 population were present in Switzerland [18]. Therefore, in Sri Lanka, the number of patients under the care of one nurse increases, as does the work load. Furthermore, according to a study conducted in public hospitals in Pakistan, long duty hours of nurses tend to increase errors [4]. More than 80% of nurses in Sri Lanka work 50-100 hours per week, which is significantly more than the average working hours per week [19]. Hence, long duty hours could be another factor contributing to the high transcription error rate in the selected tertiary care setting. However, the prevalence rates in our study differ significantly from the literature, which can be further attributed to the different methodological approaches and definitions used by the researchers.

In our study, the highest rate of discrepancy was identified in the medication name, which is consistent with the study in Pakistan (30.7%) [4]. A Sri Lankan study on prescribing errors has observed 7 out of 12 instances where wrong frequencies were transcribed onto drug charts[8]. However, frequency errors were the third most common in our study. On the contrary, unordered drugs were added in the highest number of transcriptions (123/310) in medical and surgical departments of Denmark [20]. However, only five charts in our study had an unordered drug added during transcription. The most common transcription error in a surgical department in Switzerland and a geriatric ward in Indonesia was drug omissions [26.7%, 35.2% of total errors respectively) [16]. We reported a lower rate (7.0%) of drug omissions during transcription. Drug omissions and adding unordered drugs are identified as primary sources of errors and may result in significant adverse consequences for patients [16]. We encountered lower rates of drug omissions and the addition of an unordered drug in our setting, which could be viewed positively.

Further, in our study, there was a significant association between the number of prescribed drugs and the presence of at least one medication transcription error ($p<.001$). Similarly, a Sri Lankan study done on prescribing errors has identified a significant correlation ($p<.001$) between the total number of prescribed medicines and the total number of medication errors [8].

Drug transcription errors are a recognized cause of adverse drug reactions in patients, resulting in morbidity and mortality [12,21,22]. Jenanne *et al* [23], identified that 60% of potential adverse drug events were related to transcription errors. Therefore, interventions to minimize transcription errors should be prioritized to enhance the quality of healthcare. Literature suggests a spectrum of interventions to minimize the transcription errors, ranging from enhancing the knowledge of healthcare staff to the introducing electronic databases into practice[5,12].

Limitations

We acknowledge that our study has several limitations. Even though we only studied one center, data from a multicenter study would be more reliable and generalizable. Furthermore, we did not include all of the specialized and intensive care units (ICU). ICUs were excluded because they used a separate uniform drug chart. However, additional research should include all of the units to provide a more precise description of the scope of the problem. In this study, we considered a chart to be erroneous if it contained at least one error. Therefore, our methodology may have either underestimated or overestimated the prevalence compared to the actual scenario. We recommend that future studies consider total errors in all drugs of drug charts when describing the prevalence.

Conclusion

In conclusion, we identified a significantly high rate of medication transcription errors in the selected tertiary care center. Furthermore, we discovered a higher rate of transcription errors in patient details. Hence, the implementation of a standardized medication administration chart is encouraged to minimize the opportunities for adverse patient outcomes. We recommend future studies address the causes of the high rate of medication transcription errors in Sri Lanka.

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Conflict of interests

There are no conflict of interests.

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