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Adherence to the Australian National Inpatient Medication Chart: the efficacy of a uniform national drug chart on improving prescription error

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Abstract

Background In 2006, the National Inpatient Medication Chart (NIMC) was introduced as a uniform medication chart in Australian public hospitals with the aim of reducing prescription error.

Purpose The rate of regular medication prescription error in the NIMC was assessed.

Methods Data was collected using the NIMC Audit Tool and analyzed with respect to causes of error per medication prescription and per medication chart. The following prescription requirements were assessed: date, generic drug name, route of administration, dose, frequency, administration time, indication, signature, name and contact details.

Findings A total of 1877 medication prescriptions were reviewed. 1653 prescriptions (88.07%) had no contact number, 1630 (86.84%) did not have an indication, 1230 and 675 (35.96%) used a drug's trade name. Within 261 medication charts, all had at least one entry, which did not include an indication, 258 (98.85%) had at least one entry, which did not have a contact number and 200 (76.63%) had at least one entry, which used a trade name.

Discussion The introduction of a uniform national medication chart is a positive step, but more needs to be done to address the root causes of prescription error.

Introduction

Medication errors are a common cause of preventable patient morbidity and mortality. Drug therapy errors occur in 5% to 20% of all drug administrations in Australian hospitals [1]. Recent figures show that more than 70 000 hospital admissions each year are associated with an adverse drug reaction, resulting in 8000 deaths and $350 million in direct hospital costs [2]. Fifty-one per cent of these adverse events are considered preventable while nearly 20% result in permanent disability or death [3]. Errors can occur at any point of the medication management cycle but the majority occur during prescribing (Fig. 1) [4]. In fact, approximately 50% of the errors, which result in patient harm, are associated with the prescribing process [2].

Ensuring a hospital inpatient receives accurate and safe therapy is a complex process involving multidisciplinary coordination between doctors, pharmacists and nurses. A critical element of this pathway is communication during the prescription of medications. Research demonstrates that improving and standardizing medication charts improves the safety of the prescribing process in hospitals, leading to safer and more effective patient care [5].

Previously, Australian hospitals used a wide variety of medication charts, with some hospitals using multiple charts for the prescription of medications [2]. In 2006, the Australian Council for Safety and Quality in Health Care, in conjunction with a national working party and Queensland Health, developed a standard medication chart designed to reduce the potential for errors in medical management cycle. This standard medication chart is known as the National Inpatient Medication Chart (NIMC; Fig. 2).

The prescription of regular medications is a vital aspect of patient care in hospital, as it incorporates important therapy prior to hospitalization with treatment, which has commenced in hospital. Without effective regular therapy, inpatient care would be severely compromised, leading to significant health and socioeconomic consequences. For this reason, the NIMC guidelines include several requirements for the proper prescription of regular medications in Australian hospitals. According to the guidelines, a medication order is only valid if the medical officer completes all the required fields, which comprise of the following: date, generic name, route of administration, dose, frequency and administration time(s), indication, signature, name and contact details [6].

Prior to the implementation of the NIMC, a pilot study was conducted to assess its efficacy. This pilot study demonstrated improvements in areas such as the documentation of adverse drug reactions (improved from 21% to 50%), incorrect drug dosage (decreased from 7.4% to 3.9%), incorrect drug frequency (decreased from 7.2% to 4.8%) and prescriber identification (increased from 41% to 79%).

To our knowledge, this is the first study conducted in a regional hospital assessing the efficacy of the NIMC in correct medication prescription, analyzing the areas on the medication chart with poor compliance and outlining the reasons for incomplete or incorrect prescriptions.

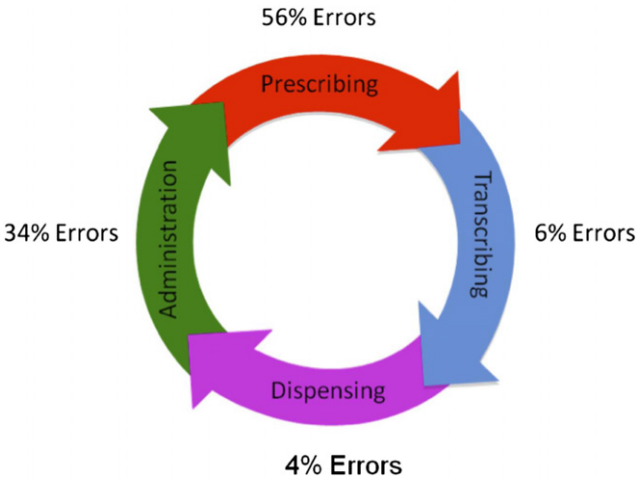

Figure 1 Errors in the medication management cycle.

Methods

Medication charts for review were selected from three medical and three surgical wards at Gosford Hospital.

The compliance rate with the NIMC was audited by measuring the degree to which prescribers completed the individual fields in the NIMC, as required by the Office of Safety and Quality in Health Care. Incorrect prescriptions were recorded according to error type using the NIMC Audit Tool [7]. The following components of the NIMC 'regular medications' section was assessed for incorrect completion: date, generic name, route of administration, dose, frequency, administration time(s), indication, signature, name and contact details. These criteria were similar to those of the pilot study conducted prior to the implementation of the NIMC [8].

Data were collected with respect to causes of error per medication prescription (i.e. error(s) on a single prescription) and per medication chart (i.e. error(s) on a medication chart as a whole). If a single medication prescription or medication chart contained an incorrect prescription, the cause(s) of that error was recorded (e.g. contact details not given). If an error was repeated on multiple entries on the same chart (e.g. multiple entries did not have contact details), the error was recorded only once per chart. Medication error was measured as the number of incorrect responses for each criterion, expressed as a percentage of the relevant denominator.

After the initial data collection, we attempted to overturn incorrect prescriptions in the hospital by using a 'plan-do-check-act' (PDCA) cycle. A two-pronged approach was utilized, using posters hung at every ward, staircase and thoroughfare in the hospital and a memorandum sent via email to all medical staff. Two weeks after the intervention, medication errors were again assessed as outlined above.

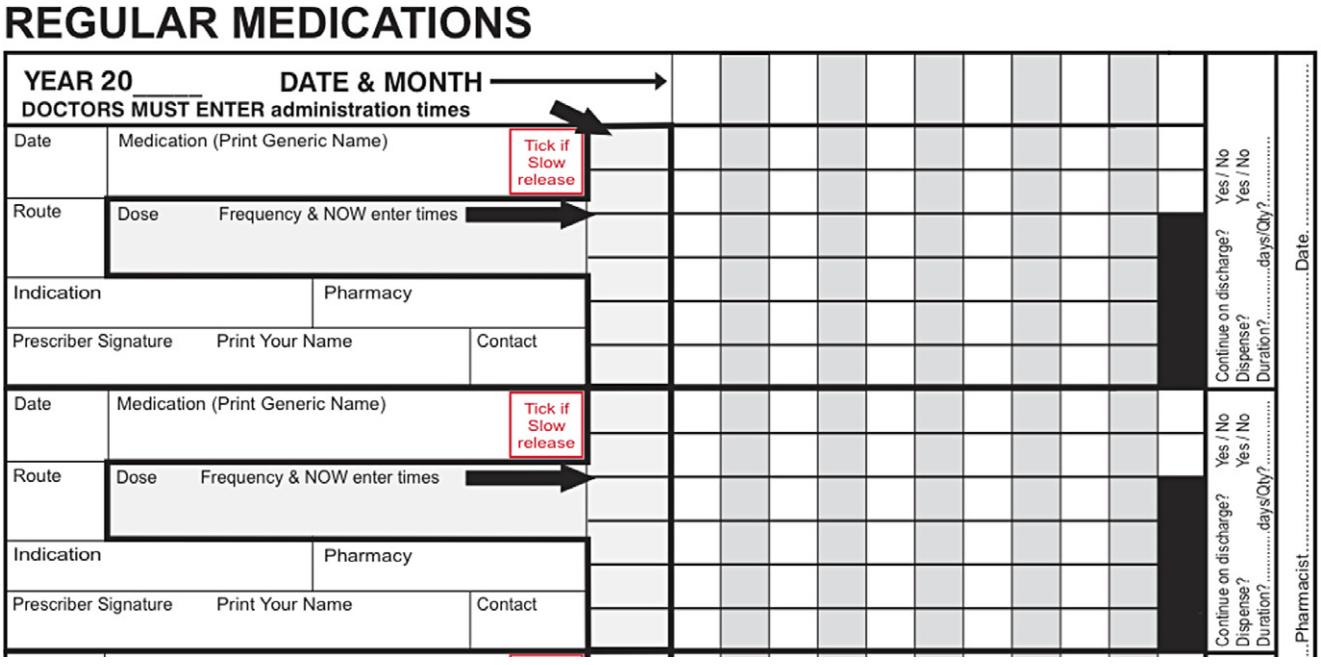

Figure 2 NIMC: regular medication prescription section.

Results

The audit of all medication charts in hospital showed a significant rate of prescription error. There was not a single medication chart in the hospital, which had all regular medication prescriptions correctly completed.

A total of 1877 medication prescriptions were audited. As seen in Table 1, the most common medication errors were the absence of contact details (88.07% of prescriptions) and indication (86.84% of prescriptions). The least common causes of error were dating and signing each prescription. Implementation of the PDCA cycle with posters and memoranda yielded a decreased prescription error rate across most categories.

Similarly, of the 261 medication charts audited, all had at least one prescription with no indication, 99% with no contact number, 88% with no name and 77% with a trade name instead of a generic name (Table 2). Implementation of our intervention yielded moderate improvements, with a decrease in medication error of up to 7.68% in the provision of prescriber name.

Discussion

Current medication prescription error is not commonly associated with a lack of knowledge about dosing, route of administration or frequency of medications. In fact, the sections most commonly omitted are the more basic aspects of prescribing medications, such as the provision of name and contact details. This suggests that errors in medication prescriptions are more associated with a lack of understanding of the importance of each section and the time limitations of medical officers rather than a deficiency of knowledge about the drugs themselves.

The causes of prescription error identified in the study are extremely important aspects of patient care. Prescribing a drug without recording the indication or not providing a name and contact detail can significantly compromise patient care. For example, if questions arise regarding a certain drug, the prescriber is not known and thus cannot be contacted. In addition, if drugs are required to be re-charted by an on-call medical officer who does not know the patient, it is vital that the indication for the prescription is recorded in previous charts.

Another important cause of prescription error identified was the use of drug trade names instead of generic names. The issue of trade names is one that is deeply ingrained within medical circles, propagated with outpatient general practitioner (GP) management and each presentation to hospital. A recent Australian study showed that 90% of GPs use a clinical software package in their practice – 98% of whom use it for prescribing medications [9]. Many of these packages use the trade name rather than the generic name of medications. This can significantly endanger patient safety as the generic equivalents or drug classes of some trade

Table 1 Causes of error per medication prescription

	Number of prescriptions (pre-intervention) $n = 1877$	Percentage of total (%)	Number of prescriptions (post-intervention) $n = 1817$	Percentage of total (%)	Change (%) in error rate
Causes of error					
Contact number	1653	88.07	1486	82.01	6.06
Indication	1630	86.84	1468	81.02	5.82
Name	1230	65.53	1087	59.99	5.54
Drug name	675	35.96	545	30.08	5.88
Dose	8	0.43	6	0.33	0.1
Frequency	6	0.32	4	0.22	0.1
Route	2	0.11	2	0.11	0
Times	2	0.11	1	0.06	0.05
Date	1	0.05	0	0	0.05
Signature	1	0.05	0	0	0.05

Table 2 Causes of error per medication chart

	Number of charts (pre-intervention) $n = 261$	Percentage of total (%)	Number of charts (post-intervention) $n = 271$	Percentage of total (%)	Change (%)
Causes of error					
Contact number	258	98.85	259	95.57	3.28
Indication	261	100	271	100	0
Name	230	88.12	218	80.44	7.68
Drug name	200	76.63	202	74.54	2.09
Dose	6	2.3	5	1.85	0.45
Frequency	5	1.92	3	1.11	0.81
Route	2	0.77	2	0.74	0.03
Times	2	0.77	1	0.37	0.4
Date	1	0.38	0	0	0.38
Signature	1	0.38	0	0	0.38

names are not well known to medical staff. An example of this was seen in our study, where a patient had a beta blocker (metoprolol) charted for atrial fibrillation while already on the calcium channel blocker verapamil. The verapamil had been charted using the trade name 'Isoptin', which was not realized by the prescriber and thus placed the patient at risk of complications, such as heart block.

The intervention achieved a moderate reduction in prescription error. However, many of the common medication errors persist at a dangerous level. An adequate improvement can only be achieved if a coherent system within and between inpatient and outpatient care is established. Thus, the following changes must be considered to increase correct medication prescription and reduce the potentially serious complications associated with prescription error, in addition to the introduction of a national medication chart:

- Annual review of the success of the NIMC via clinical auditing.
- Educate staff regarding the purpose of each section of the NIMC and the importance of correct prescribing technique.
- Placing a pharmacist in every hospital ward to review drug prescriptions.
- Altering clinical software programs to include both trade name and generic name of medications.
- Incorporating prescribing technique and correct usage of the NIMC into the medical curricula of Australian universities.

The introduction of a uniform national medication chart throughout Australian hospitals is a positive step to reducing prescription error on a national level, though more needs to be done to address the root causes of these errors.

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