Review Article

Prescription Errors

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ABSTRACT

This article presents a review on prescription error in elderly person which defines as a failure in the treatment process that leads to or has the potential to lead harm to the patient. Prescription errors are among the most common medical errors harming at least 1.5 million people every year. Medicines can do a lot of good but they also have the potential to cause harm are one of the most common causes of patient harm and prescribing accounts for a large proportion of prescription error. This evidence scan examines strategies to reduce prescribing errors. It aims to find the reason of prescription error and make public aware about its effects. Include mistakes or inaccuracies when choosing and ordering treatments such as wrong doses or illegible prescriptions. Older person are greater risk of prescription error. Prescription errors compromise patient confidence in the health-care system and increase health-care costs. Health professionals and managers are always looking for ways to improve the quality and safety of healthcare. This document addresses medication errors—episodes in drug mis-adventuring that should be preventable through effective systems controls involving pharmacists, physicians and other prescribers, nurses, risk management personnel, legal counsel, administrators, patients, and others in the organizational setting, as well as regulatory agencies and the pharmaceutical industry.

Keywords: Elderly person, medicines, prescription, prescription error

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INTRODUCTION

WHAT IS A PRESCRIPTION:

Prescribing is the process whereby a doctor, nurse or other registered professional authorises use of medications or treatments for a patient and provides instructions about how and when those treatments should be used. Although the term commonly refers to orders for medicines, the concept can equally encompass laboratory tests, medical imaging, psychological treatments, eye glasses, eating and exercise regimes or other instructions to help optimise health and wellbeing [1,2].

Prescriptions are handwritten or computerised documents containing the patient's name and address, the date, the specific treatments prescribed and an authorising signature. They are a way for prescribers to communicate with pharmacists or others who in turn fill the prescription. Prescribers include doctors of various types and, in some countries, nurse practitioners, physicians assistants, dentists, podiatrists, optometrists, clinical psychologists and clinical pharmacists also write prescriptions [3,5].

PRESCRIPTION ERROR

A prescription error is a failure in the treatment process that leads to or has the potential to lead harm to the patient. Prescribing errors can take many forms, but commonly involve incorrect doses, illegible details or ordering inappropriate medications or drugs that may react with other medications already being taken. A study to develop a definition of prescribing errors in the UK concluded that transcription errors, failure to communicate essential information and the use of drugs or doses inappropriate for the individual patient were prescribing errors, but omissions and deviations from policies or guidelines were not. [6] Some also define prescribing omissions as errors, for example if a doctor fails to prescribe an

antihypertensive drug (ramipril) for someone who could benefit from it.

CLASSIFICATION OF ERROR: [7]

Errors are categorized as errors in prescription writing and errors in omission. Further it is categorized as:

- Errors in omission (when rate or dose, concentration, dosage, frequency, duration, rate of omission and when prescriber signature is missing)
- Abbreviated and nonstandard drug names.
- Errors in phone abbreviation, design, and names.
- Prescribing one tablet of drug when available in more strength than other tablet.
- Writing milligram when microgram was intented.

Common prescribing Errors in Older People: [8]

• Prescribing errors

-Polypharmacy (caregivers sometimes complicit) - Potentially inappropriate medications (PIMs)

- Potential prescribing omissions (PPOs)

-Failure to recognise need for palliative pharmacotherapy

• Reconciliation errors

• Compliance errors

- Packaging, presentation, formulation

- Failure to detect cognitive problems

• Economic errors

- Failure to prescribe generics

- Focus of 'new, improved' drugs

RATIONAL OF STUDY:

Prescription error is a significant problem in health care in many countries. In a report from the United States of America (USA), Prescription errors represent 20% of medical errors despite recent efforts to reduce them. In Australia, the older populations have higher reported rates of medication incidents due to higher levels of medication intake and increased likelihood of being admitted to hospital (hospital statistics being the main source of medication incident reporting) than other age groups.

Prescription Errors and Adverse Drug Events/Effects

A large number of adverse drug events/ effects (ADE) in long-term care settings are caused by preventable errors. A case-control study assessed the incidence of and risk factors for ADE in long-term care settings in the USA. The results indicated that 42% of identified ADE were judged preventable [9].

Adverse Drug Reaction (ADR)

"Any noxious, unintended and undesired effect of a drug, excluding therapeutic failures, intentional or accidental poisoning, and drug abuse."

Severe ADR

- Immediate discontinuation of suspect drug
- Required resuscitative or antidote treatment
- Caused or contributed to hospitalization
- Caused or contributed to death

Type of Drugs

A systematic review containing 29 studies also revealed that drugs commonly associated with ADE included cardiovascular drugs, analgesics, and hypoglycaemic agents. [10] Other common medication errors associated with preventable ADEs include failure to prescribe prophylaxis for patients continuously taking non-steroidal anti-inflammatory drugs, or anti-platelet drugs to prevent gastrointestinal toxicity, lack of monitoring of diuretic or hypoglycaemic, and anticoagulant use cause over-or under diuresis, hyper- or hypoglycaemia, and bleeding [11].

Cause of Errors

In a USA study the most common cause of medication error (22%) was lack of knowledge of the drug, (eg. lack of awareness of medication interactions, incorrect dosages, incorrect mixing, and overly rapid infusions.) The second most frequent cause was the lack of information about the patient (14%), (eg. inappropriate medication for that patient.) There is limited Australian data on the causes of these errors in a hospital setting, however for prescription errors, approximately 2% of all prescriptions have the potential to cause an adverse event with the most common causes being the inappropriate or unclear dose, missing dose, or the directions for use were unclear or absent [12].

A RATIONAL STUDY OF INPATIENT RECORD

A retrospective study was conducted in medical ward of Dhulikhel Hospital (DH) Kathmandu University Teaching Hospital (KUTH). A total of 305 medical record files

files of elderly inpatients aged 65 years and older was studied.

Data collection and data elements

Data collection occurred once for each patient. Patient parameters (name, age, gender, diagnosis, comorbid condition/s, medication history and duration of hospitalization) and drug parameters (name of drug, strength, frequency, duration together with starting and ending date, dosage form and rote of administration) were extracted from medical records files using data collection.

RESULTS

A total of 305 inpatient files were studied. 211 (69%) patients were male and 204 (67%) patients were younger elderly (6574 years). Most patients presented with acute medical problem on a background of chronic illness. BPH was the most common (17%) reason for hospitalization of elderly patients.

Prescription pattern

A total of 2985 (2155 during hospital stay and 830 on discharge) drugs were prescribed to 305 patients (average exposure of 9.8±3.23 drugs/ patient). 84% of drugs were prescribed by generic name. More than half (55%) of drugs belonged to tablet dosage form. 187different types of drugs were prescribed to elderly patients. Ranitidine was the most frequently prescribed drug (19% of all drugs) followed by Diclofenac (12%) and Ciprofloxacin (5%). The (**Table 1**) shows drug use indicators found from study.

Prescription error

The study found a total of 1233 errors in prescription writing. (**Table 2**) shows types of error detected and the frequency of occurrence.

Table 1: Pattern of WHO core drug use indicator

Prescribing indicators	Findings
Average number of drugs per encounter	9.8%
Percentage of drugs prescribed by generic name	84%
Percentage of encounter with an antibiotic prescribed	18%
Percentage of encounter with an injection prescribed	30%
Percentage of drugs prescribed from national essential drugs list	75%
Percentage of prescribed from WHO essential drugs list	55%

Table 2: Inappropriate prescribing as determined by Beer's criteria

DRUGS	Hospital stay			Discharge			TOTAL
	*ID**	*CD**	*Total ID*	*ID**	*CD**	*Total ID*	
diazepam	57	2	59	0	0	0	59
ketorolac	54	0	54	0	0	0	54
phenagran	47	0	47	0	0	0	41
pentazocine	14	0	14	0	0	0	14
Others	6	3	9	2	3	5	14
	178	5	183	2	3	5	182

ID: independent of diagnosis; CD: considering diagnosis

Ignoring Drug-Drug Interaction

A total of 114 chances of potential drug drug interaction were found, an average of 0.37 drug interaction per patient. The prescribed to 88 patients had at least one potential drug interaction.

Top 4 drug- drug interactions

DRUG COMBINATION	OCCURENCES
Meperidine inj and promethazine inj	40
Ketorolac inj and diclofenac inj	28
Gentamycin inj and cefotaxime inj	5
Isoniazid oral and rifampicin oral	4

Errors in commission:

Potentially inappropriate medication use:

At least one potential inappropriate medication was prescribed to 145 patients (53%) as determined by Beer's criteria. Of the 2985 drugs prescribed, 182 (6%) were potentially inappropriate for elderly. Diazepam was most frequent inappropriate medication prescribed.

Table 3: Principal characteristics of study population taking inappropriate medication versus that not taking inappropriate medication

	Inappropriate medication use	**Appropriate medication use**	**Odds ratio**	**95%interval confidence**	**P value**	**Statistical significance**
Age in years (65-75) 75+	*96* *49*	*108* *52*	*1* *0.943*	*0.59-1.52*	*0.811 3*	**No**
Gender Male female	*103* *42*	*108* *52*	*1* *1.18*	*0.72-1.92*	*0.502*	**No**
Number of medication prescribed ≤5 ≥5	*7* *138*	*36* *124*	*1* *5.72*	*2.5-13.0*	*≤0.00 0.1*	**Extremely**

DISCUSSION

Polypharmacy, defined as the use of five or more medications ,occurs in20-40% of older people . The prevalence of polypharmacy in 76 % of patients in our study is very high. In a study carried out by Joshi et al 16 in one of the other teaching hospitals in Nepal the incidences of polypharmacy in elderly inpatients were found to be similar (73%). It is, however, essential to determine the potential benefits of polypharmacy in particular settings before dismissing it as entirely inappropriate. Though deprescribing is difficult, prescriber's feedback, pharmacist-led medication reviews, encouraging general practitioner to withdraw medication in older patient have been tried to reduce polypharmacy [13].

Rational drug prescribing is defined as the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost 19. Since, WHO has recommended that average number of drug per prescription should be 2.0, 20 result of our study reflects polypharmacy. The recommendation by

WHO is not applicable to inpatient. Since majority of elderly patient in our study have undergone surgery, and average length of stay was also higher which mean more medication prescribed and administered.

Ignoring drug-drug interaction can cause important injuries and clearly affect the process of treatment or even cause serious or fatal problems for the health of patient, thus evidencing the need of constant evaluation of these events in order to prevent them. The lack of hospital pharmacist in majority of hospitals of Nepal means many of drug interactions go unnoticed and might have led to innumerable harm and adverse reactions.

REDUCING PRESCRIBTION ERRORS

Medicines can do a lot of good but they also have the potential to cause harm. Prescription errors are one of the most common causes of patient harm and prescribing accounts for a large proportion of medication errors. This evidence scan examines strategies to reduce prescribing errors.

Most studies about reducing prescribing errors have been undertaken in hospital. The three most commonly researched approaches are, in order of frequency: computerised tools, training to improve prescribing and expanding professional roles to identify errors.

Computerised tools

Electronic prescribing and computerised decision support have been studied extensively but there are mixed findings. Most studies suggest computerised tools can reduce prescribing errors but some suggest unintended negative consequences. Emerging evidence suggests that to be successful, human factors such as workflow features, tool design and context need to be considered.

Educational strategies

Educational initiatives tend to focus on stopping errors before they occur. Strategies include:

– group training sessions
– individual education visits
– letters and printed materials
– audit and error reporting systems
– improvement projects and collaboratives.

All of these initiatives have had some success, but there is not enough evidence to say which strategies work best.

Professional roles

Studies of expanding professional roles tend to focus on how pharmacists can identify any errors before patients are harmed, including:

– Checking for errors as prescriptions are received at the pharmacy or on wards – medicine reconciliation or reviews

– Individual or group education sessions.

Most research suggests that engaging pharmacists in these ways can be beneficial, but few studies have explored the best ways to integrate pharmacists into teams and the interprofessional factors to be considered. Combining education, enhanced professional roles and computerised tools may help to reduce prescribing errors most effectively.

Reducing errors after prescribing

One-to-one education

Various types of individualised education have also been studied for reducing the impact of errors or identifying errors before they harm patients. In Australia, direct feedback to clinicians was tested to reduce errors from polypharmacy or drug interactions in older people. GPs were sent information about the at-risk patient, relevant clinical guidelines and a personalised covering letter. There was a reduction in the average number of medications prescribed for each person following the prescriber feedback. [14] Similarly, researchers in Canada examined whether follow-up letters from pharmacists to doctors following inappropriate prescriptions would improve prescribing for people in long-term care. The educational letters briefly described potentially inappropriate prescriptions and suggested alternatives. 38% of potentially inappropriate prescriptions were changed by the doctor following a letter [15]. Researchers in the US tested whether a computerised drug review database linked to a telepharmacy intervention reduced inappropriate medication use in 23,269 people aged 65 years or older. Computer alerts triggered telephone calls to doctors from pharmacists with training in older people's medicine who could discuss substitution options. As a result, 24% changed to a more appropriate drug [16]. Education may also be informal and result from interactions between staff members. Researchers in the US assessed the views of pharmacy directors, medical centre executives and pharmacists about the value of pharmacist residency training programmes. Participants believed that residency programmes had many benefits and that these outweighed costs. They thought that pharmacy residents helped to reduce prescribing errors by educating prescribers and checking prescribing. [17] Patients have been targeted for education in a small number of instances. In one study, 913 US outpatients with potential prescribing errors were identified and randomly assigned to provider feedback or usual care. However, after one year there was no difference in adverse drug events [18].

Group education for trainees

Researchers in Canada evaluated a computer training module to improve third-year pharmacy student's ability to identify and correct prescribing errors. The module helped increase the identification of errors. [19] In the US, first-year pharmacy students took part in laboratory simulations to help identify and prevent medication errors, including prescribing errors. Following simulations and role plays, students' knowledge and awareness of medication errors improved as did their confidence in recognising and preventing errors and

communicating about them. [20] However, studies like these tend not to follow up to examine the impact on reducing prescribing errors in practice.

E-prescribing

Hospital care

E-prescribing is also known by the terms computerised physician order entry (CPOE), computerised provider order entry or computerised pharmacist order entry (in the US where pharmacists may transcribe prescribers' handwritten orders into a computer system). This is an electronic process for entering instructions about patient treatment. Orders for medication, equipment or other treatments are communicated over a computer network to various medical staff and departments such as pharmacy, laboratory or radiology who are, in turn, responsible for filling those orders. Before e-prescribing systems were available, in the US doctors traditionally wrote out or verbally stated their instructions for patient care, which were then transcribed by nurses or ancillary staff before being actioned. It was thought that such handwritten notes may result in more errors and delays [21] and, as a result, the US Institute of Medicine recommended e-prescribing be implemented as standard [22].

E-prescribing systems aim to reduce delay in accessing medication or treatment, reduce errors related to handwriting or transcription, allow orders to be made at the point of care or off-site and simplify inventory and charging processes. The systems often have decision support tools built in whereby the system automatically checks for duplicate or incorrect doses or tests, provides alerts to let the prescriber know that a dose is too high or may interact with other medications, or highlights clinical guidelines or other ways to improve evidence-based treatment. This section includes studies about e-prescribing systems with and without inbuilt decision support tools (often the distinction is not made clear in the studies). The next subsection examines research about the impacts of decision support tools themselves. A large number of studies have found benefits from e-prescribing, and it is commonly suggested that such tools can reduce prescribing errors by around a half [23,24]. For instance, a systematic review found that 23 out of 25 studies about e-prescribing which reported on the medication error rate found improvements. Six out of nine studies that analysed the effects on potential adverse events found reduced risks. Four out of seven studies that analysed the effect on actual adverse drug events found reduced risks. Studies of locally developed systems, those comparing e-prescribing to handwritten prescriptions and studies using manual chart review to detect errors, found greater improvements [25].

Studies from many parts of the world with diverse health systems have found that e-prescribing systems can reduce prescribing errors. For example, researchers in England assessed e-prescribing in a nephrology outpatient clinic at a paediatric hospital. The overall prescribing error rate was 77% for handwritten items and 5% with e-prescribing. Before e-prescribing, 73% of items were missing essential information and 12% were judged illegible. After e-prescribing was introduced, 1% of items were missing essential information and there were no illegibility errors. The number of error-free patient visits increased from 21% to 90% [26].

CONCLUSION

The drug prescription pattern suggests the need to establish rational drug therapy. Geriatric polypharmacy is prevalent. A high number of potential prescription errors were found. Whilst many of these were minor and unlikely to have had serious consequences, some were of potentially great significance and may represent only the tip of iceberg. The study has highlighted the need to pay attention to prescription writing and reduce the practice of inappropriate prescribing through provision of appropriate unbiased information to healthcare professional. Further comprehensive studies medication error are necessary to anticipate the scale of problem and the economic factor.

Summary of key themes in studies about reducing prescribing errors

Factor	Findings
Training	One-to-one educational visits can improve prescribing [27-28]
	Individualised educational letters have shown promise [29-30] as have follow-up telephone calls from pharmacists [31]
	Training sessions and simulations for students improve confidence in identifying errors, but impacts on error reduction are uncertain [32-35]
	Education sessions for professionals have reduced prescribing error rates [36-38] Improvement programmes and learning networks have positive outcomes but each varies considerably. [39-41] The process of monitoring and reporting errors may be a key part of this [43-44]
Roles	Pharmacists checking medication orders can identify prescribing errors [45-48] but not all findings are positive [49]
	Pharmacists circulating on wards can identify and reduce prescribing errors, especially when coupled with education [50-51]
	Medicine reconciliation by pharmacists has mixed findings [52] but there are some positive trends [53-54]
	Introducing pharmacist initiatives as part of a multifaceted intervention may work well [55-56]
Tools	E-prescribing systems have been found to reduce prescribing errors, [57-72] though not all studies are positive [73-80]
	There are mixed findings about alerts and prompts [81-83]
	Human factors issues such as the design of systems, workflow, alert type and context may be key success factors when implementing tools to reduce prescribing errors [84-94]

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