PRESCRIBING PATTERN OF MEDICATIONS IN GERIATRIC PATIENTS VISITING OUTPATIENT DEPARTMENT AT A TERTIARY CARE HOSPITAL, KATHMANDU

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ABSTRACT

Background: The aging of the population is increasing, with frequent use of medicines. Comorbidities and more than two medications are common among the elderly, leading to inappropriate use of medication and potential health problems. **Objective:** The aim of this study was to evaluate prescriptions in elderly patients using WHO core indicators and Beer's criteria to identify polypharmacy and inappropriate prescribing practices. **Materials and Methods:** A prospective observational method was adopted for the analysis of medications prescribed in an outpatient department of a tertiary care hospital in Kathmandu, Nepal. It was conducted from November 2023 to February 2024 in 163 adults aged 60 years and older. The use of potentially inappropriate medications in elderly patients was analyzed using the updated Beer's Criteria updated until 2023, and drug interactions were checked using the "Drugs.com" Drug Interaction Checker. **Results:** Among 163 patients, the average number of prescribed drugs per prescription was 2.98. Cardiovascular drugs (18.9%) and gastrointestinal drugs (18.9%) were commonly prescribed fallowed by Musculoskeletal & NSAIDs (13.1%) in which Amlodipine, Pantoprazole and Aceclofenac respective class of drugs were prescribed. Approximately 42.3% of patients experienced at least one potentially inappropriate medication as per the Beers criteria. Poly-pharmacy was observed in 8% of total prescriptions. **Conclusion**: Polypharmacy is practiced with average 2.98 drugs per encounter and potentially inappropriate medications are frequently prescribed among elderly attending Outpatient Department.

KEYWORDS: *Geriatric*, *Beer's criteria, elderly, potentially inappropriate medicine.*

INTRODUCTION

Geriatrics are the most susceptible person of the society which needs more care and attention based on the nature of their illness, comorbidity and physiological factor. According to WHO Geriatric people ranges from age group of 65 years and above. Treating the elderly people is the most challenging aspect to the clinicians, as the age increases, multiple comorbid conditions arise which need to be taken into consideration in elderly patients.[1]

In Nepal 60 years and above age is considered as elderly. According to 2021 census of Nepal (National Population and Housing Census 2021 National Report, Reprint), National Statistics Office, 2023) 60 years or above population is 10.21 percent where as it was 5 % in 1951, 5.8 % in 1991, 6.5 % in 2001 and in 8.1 % in 2011 respectively.[2-3] With modernization and the increasing mobility of young people from the provinces to big cities and large urban areas or to foreign countries because of the expectation of better education, higher wages and lucrative facilities is creating social misbalance and bad impact in emerging economies like Nepal. Over the past few years, Nepal's welfare system and approaches have focused on issues such as population adaptation, maternal and adolescent welfare, and infection prevention. However, the current statistics on the elderly in Nepal imply new medical, social and economic problems that may arise if timely initiatives are not taken in this direction by program managers and decision makers. The shift of disease prevalence from infectious diseases to non-communicable disease poses threat to the existing health delivery system of Nepal. It is urgent to highlight the problems of the elderly and to explore strategies to improve their quality of life.[4]

Diseases continue to increase with age and older people are suffering from diseases that require many medications. In conjunction with the increasing age physiological changes, the pharmacokinetics and pharmacodynamics of drugs can change and cause adverse reactions, medication errors, increased emergency department's visits, and increased medical costs. Aging, pre-existing diseases, dietary habits, smoking, alcohol abuse and increased medication use are

factors that increase the likelihood of odd drug responses and medication errors. Thus, creating an ideal treatment regimen that meets the complex needs of the elderly requires careful and routine counseling.[5] Aging related pathophysiologic changes additionally make them more inclined to prescription blunder. The subsequent adjusted pharmacokinetics and pharmacodynamics because of these changes, makes them more helpless to the unfriendly impacts of medications. A high number of potential prescription errors were found during the analysis of prescribing in elderly. Some of them had great significance in treatment outcome.[6]

A high number of potential prescription errors were found. Whilst many of these were minor and unlikely to had serious consequences, some were of potentially great significance and may represent only the tip of Iceberg.[6]

There are certain standards that can be used to recommend safe medications in geriatrics and to move away from the use of PIM medications. Among these rules, Lagers dimensions are the most commonly used standard treatment guidelines. Brews models were first developed in 1991 by Imprint H. Lagers, MD. It was designed to reduce the use of inappropriate prescriptions and prevent adverse effects, and to identify prescriptions to avoid these incidences in geriatrics. They are a unique set of evidence-based recommendations infallibly adapted for geriatrics in all care settings except hospice or palliative care. In principle, elderly patients should stay away from the number of PIMs. It provides guidance on the most efficient method to facilitate prescribing for the elderly. The model is used as a reference tool before starting, increasing or developing medications, or when conducting a comprehensive medication trial for more experienced patients.[7]

As per Lagers Standards PIMs are sorted into 3 gatherings.
Class A: Medications to be kept away from in geriatrics.
Class B: Medications which can worsen the sickness or disorder because of Medication illness or medication condition interaction.
Class C: Medications to be involved with Wariness in geriatrics.

It also includes DDIs that should not be used in geriatrics and drugs that should be avoided or reduced based on renal testing. As previously mentioned, it can be seen that despite the fact that geriatrics are important buyers of today's drug therapy, they are more powerless or at greater risk of side effect and drug interactions. In fact, the incidence of side effects in the elderly is classified as "a significant epidemic today." Therefore, it is important to follow specific guidelines, such as Brew's measures to recommend safe geriatric medications, to reduce these problems.[7]

OBJECTIVE
This article is an attempt to explore the different dimensions of aging and the health and health care needs of aging people by describing the collected data in relation to demographic characteristics, educational status, disease condition, drug prescribing practice, identification of PIM and potential Drug-Drug interactions.

METHOD AND METHODOLOGY
Quantitative research method was conducted where statistical, mathematical, or numerical analysis of data collected through data collection form was visualized into graphs, charts, and tables. It is a descriptive, cross-sectional study. The data were collected from the Outpatient department of Manmohan Memorial Teaching Hospital which is tertiary care hospital in Kathmandu. The sample size was calculated by taking prevalence 0.243 from the research article.[2] The sample size was 163 by added 25%.

Adequate and relevant literatures were reviewed to ensure the accuracy of information and validity of tools. Simple and understanding languages were used to get proper information from the respondent.

The research proposal was approved by institutional review committee of Manmohan Memorial Institute of Health Sciences and permission was taken from the hospital director. All collected data were used anonymously.

RESULTS AND DISCUSSION
Older people tend to take more drugs than younger people because they are more likely to have more than one chronic medical disorder, such as high blood pressure, diabetes, or arthritis. Most drugs used by older people for chronic disorders are taken for years.

1.1. Demographic characteristics
The demographic characteristics of the geriatric patients are shown in Table 1.

Table 1: Demographic characteristics.

Demographic Details		Percentage (N=163)
Gender	Female	51.50%
	Male	48.50%
Age Group	60-70	64.40%
	71-80	23.90%
	81-90	7.40%
	91 and above	4.30%
Literacy level	Illiterate	46.60%
	Below 10	39.30%
	SLC (SEE)	6.70%
	Higher secondary	3.70%
	Bachelor	2.50 %
	Master	1.20 %

Out of 163 prescriptions studied, 79(48.5%) belonged to males and 84(51.5%) were female patients, the number of female patients were slightly high by 4% different from study conducted in India by Boneh & Yadav,[8] Most of the patients were in the age group of 60-65years 62(38%), followed by 66-70 years 43(26.4%) and least were in themore than 90 years age group 1(0.6%). which is similar to study conducted in Adis Ababa, Ethiopia by Wegayehu et al., 2020.[11]

1.2. Department wise Distribution
In this study, most of the enrolled patients were from the medicine department 78(47.9%) followed by orthopedics & Trauma 23(14.1 %), Uro- surgery 10(6.1%) and surgery 10(6.1%) as shown in figure.
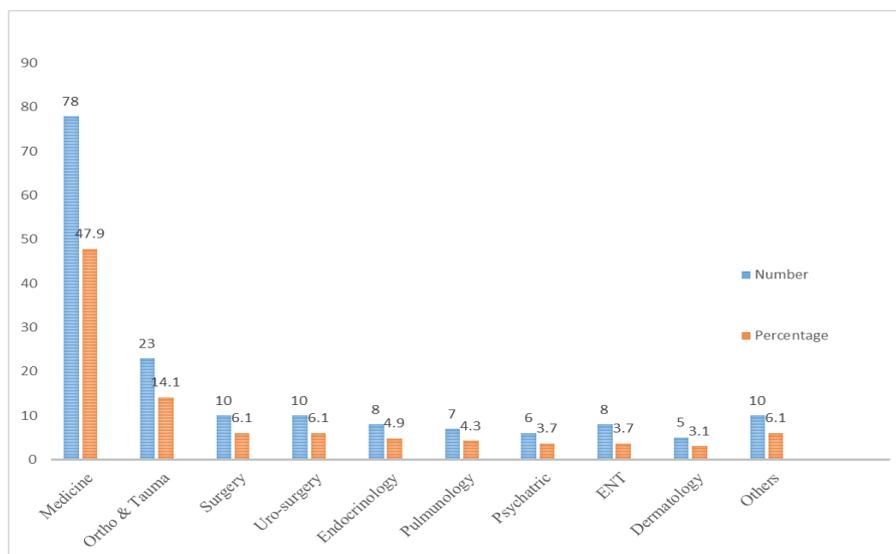

Fig 1: Distribution of patients.

1.3. WHO core drug indicator
Table 2 shown the analytical data as compare to the references given by WHO in the prescription.

Table 2: WHO CORE Drug indicator.

Prescribing indicators	Value obtained
Average number of drugs per prescription	2.98
% of drugs prescribed as generics	4.31
% of antibiotics per prescription	21.47
% of injections per prescription	1.84
% of drugs prescribed from WHO essential drug list	8.213

The average number of drugs per prescription was found to be 2.98 which is higher than WHO standard (1.8) and different from study conducted by Giri & Muhammad Khan, 2020.[9] A similar study done in India Show that 40% of medicine was prescribed from Essential drug list (EDL) but our finding shows that only 8.21% of drug was prescribed from EDL.[12]

1.4. Number of drugs per prescription
The given table show the total number of drug prescribed by the prescriber per geriatric patients which indicate the polypharmacy.

Polypharmacy is the leading causes of mortality and morbidity in the geratic population due to drug - drug interaction. It occurs when patients are using 4 or more drugs. The likely reason for polypharmacy in geriatric patients could be correlated with the primary disease with its associated comorbid conditions requiring various therapeutic agents. In this study, prescription contains 1-9 number of drugs. Most of the prescriptions contained 3 drugs i.e. 48(29.4%). Similar Studies had done by Bhaveshaikh N, et al in india show 36.51% which is less than our studies.[10]

Table 3: Number of drugs per prescription.

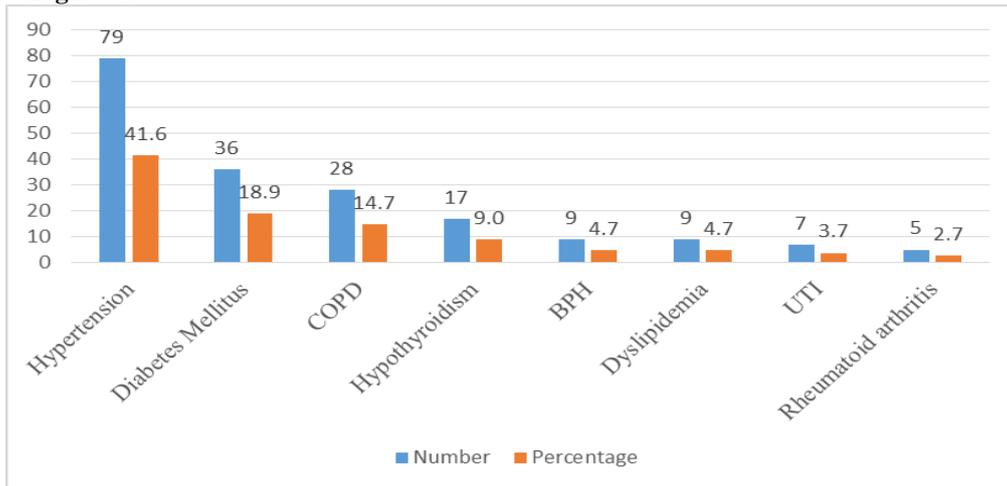| Drug	Number	Percentage
1-4	150	92
5-9	13	8

1.5. Diseases diagnosed

Fig 2: Distribution of diseases pattern.

In this study, total number of diseases diagnosed was 190, in which most of the patients were suffering from hypertension 79(41.6%), diabetes mellitus 36(18.9%). These findings were similar to the study carried out in Nepal by Kumaraswamy et al., 2023.[13]

musculoskeletal and joint drugs 43(13.1%) which is different from study conducted in Manipal Teaching hospital in Nepal by Giri & Muhammad Khan, 2020[9]. The detailed classification of drug prescribed is shown in Table 4.

1.6. Pharmacological classification of prescribed drugs
Most drugs prescribed were cardiovascular 62(18.9%) and Gastrointestinal drugs 62(18.9%), followed by

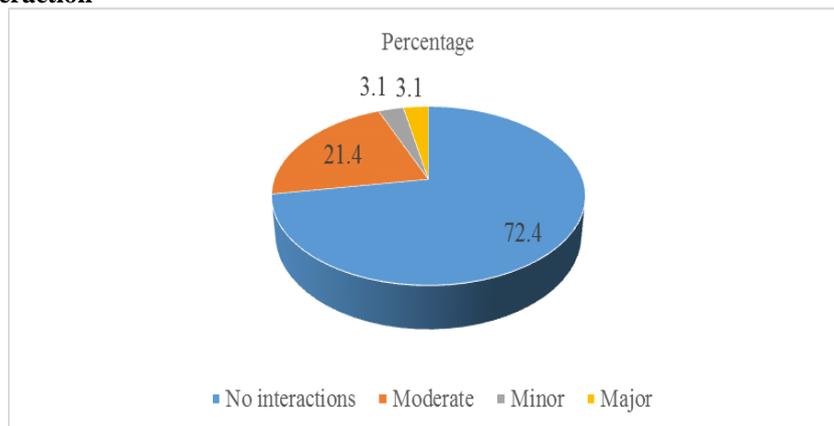| Table 4: Distribution of drugs		
Drug category	**Number (N=328)**	**Percentage**
CVS drugs	62	18.9
GI drugs	62	18.9
Musculo-skeletal & NSAIDs	43	13.1
Endocrine drugs	33	10.0
Drug used in infections	35	10.7
Respiratory drugs	30	9.2
ENT drugs	22	6.7
Neuro & psychiatric drug	16	4.9
Drug used in renal disease	8	2.5
Other group	17	5.1

1.7. Drug-Drug interaction

Fig 3: Drug-drug interaction.

Major interactions

i. Risperidone and Escitalopram: It can increase the risk of an irregular heart rhythm that may be serious and potentially life-threatening.

ii. Spironolactone and Losartan: It increases high levels of potassium which in severe cases can lead to kidney failure, muscle paralysis, irregular heart rhythm and cardiac arrest.

iii. Amitriptyline and Duloxetine: increases the risk of a rare but serious condition called the serotonin syndrome include symptoms such confusion, hallucination, seizure, extreme changes in BP, etc.

iv. Mirtazapine and Duloxetine: It can increase Serotonin Syndrome.

v. Amitriptyline and Escitalopram: It can also increase the risk of serious condition called serotonin syndrome.

Moderate interactions

i. Cefuroxime and Rabeprazole: Rabeprazole can decrease the absorption and blood levels of cefuroxime and make the medications less effective.

ii. Aspirin and Cilostazole: increase the risk of bleeding

iii. Flavoxate and Gabapentin : increase side effects such as dizziness, confusion, and difficulty concentrating

iv. Atenolol and Chlorthalidone: May lower blood pressure and slow heart rate.

v. Azithromycin and Salmeterol: can increase the risk of an irregular heart rhythm that may be serious and potentially life threatening.

After the analysis of prescription, it was observed that 45(27.6%) prescriptions have drug interactions and while 118(72.4%) prescriptions were no drug-drug interactions. Among 27.6% of drug-drug interaction, 3.1% had major drug interactions, 21.4% had moderate drug interaction, 3.1% had minor drug interactions which is minimum in comparison to study conducted by Kumaraswamy et al., 2023.[13]

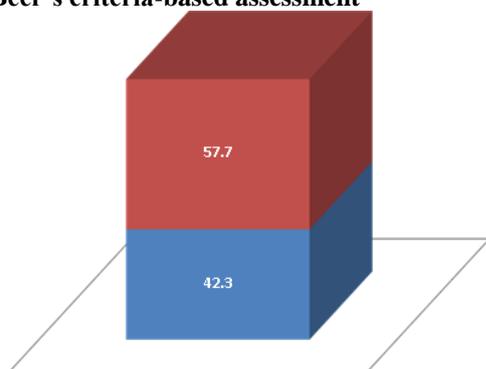**1.8. Beer's criteria-based assessment**

Fig 4: Beer's criteria-based assessment

■ Inappropriate medications
■ Appropriate medications

At least one case of PIM prescription was found in every

42.3% cases which is minimum in comparison to study conducted by Golla et al., 2019 in India[2] where 91.3% of prescriptions were inappropriate.

1.9. Inappropriate Medicines

The highly prescribed drugs which were considered inappropriate are PPIs 56.92% with Pantoprazole being highest prescribed PPIs followed by NSAIDs 13.83% with aspirin being highest prescribed NSAIDs, Antihistamines 10.76% with Chlorpheniramine being highest prescribed Antihistamines and other potentially prescribed medications in this study are given in the table below. Similar studies done in western India by Ambwani S Show, most frequently prescribed PIMs were proton pump inhibitor i.e 29.17% fallowed by 12.46%.[14]

Table 5: Inappropriate Medicines.

Inappropriate medications	Percentage (n=65)
Pantoprazole	24.62
Rabeprazole	21.53
Esomeprazole	10.77
Chlorpheniramine	6.16
Amitriptyline	4.62
Cyproheptadine	4.62
Aspirin	4.62
Ibuprofen	3.07
Insulin	3.07
Diclofenac	3.07
Rivaroxaban	3.07
Chlorzoxazone	1.54
Glipizide	1.54
Glimepiride	1.54
Ketorolac	1.54
Nitrofurantoin	1.54
Risperidone	1.54
Clobazam	1.54

CONCLUSION

Polypharmacy and potentially inappropriate medications (PIMs) are common in the elderly due to multiple comorbidities, posing significant health risks. Quick relief of symptoms often drives physicians and patients towards inappropriate drug use and irrational combinations.

RECOMMENDATIONS

Government has to organize the training, seminars and workshops for prescribers to prioritize rational drug use, emphasizing generic names and essential drug lists (EDL). Government should prepare the list of national lists of PIMs based on age is crucial for preventing adverse drug reactions in the elderly population. Inclusion of geriatric prescribing in medical course curricula and implementation of standard treatment guidelines is suggested.

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CONTRIBUTION OF AUTHORS:
1. **Dharma Prasad Khanal**: Concept of research, IRC and hospital director's approval and manuscript correction.
2. **Pharsuram Adhikari**: Finalize proposal, data form finalization, supervision of data collection, Data analysis and finalize Manuscript preparation.
3. **Anu Yadav**: Proposal preparation, Data collection, report writing and initial draft of manuscript

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