



Research Article

IMPACT OF CLINICAL PHARMACIST INTERVENTIONS ON DRUG PRESCRIBING AMONG GERIATRIC PATIENTS IN A TERTIARY CARE TEACHING HOSPITAL

P. Lakshmi², K. Susmitha^{1*}, S. Nahida Parveen¹, M. Bhagya Lakshmi¹, D. Lokesh¹

¹ Pharm D Intern, Department of Pharmacy Practice, Sri Padmavathi School of Pharmacy, Tiruchanoor, Tirupati, Andhra Pradesh, India

² Assistant Professor, Department of Pharmacy Practice, Sri Padmavathi School of Pharmacy, Tiruchanoor, Tirupati, Andhra Pradesh, India

*Corresponding Author Email: susmithareddy218@gmail.com

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ABSTRACT

Since Older patients have multiple chronic conditions and often use poly pharmacy they are ideal patients for our study. Inappropriate prescribing is the major problem in our health care settings. Many factors like age, gender, inter current diseases, poly pharmacy and age related physiological changes contribute to inappropriate prescribing. The aim is to assess and evaluate the inappropriate prescribing and to promote clinical pharmacist interventions among Geriatric patients. The objectives are to assess and promote clinical pharmacist interventions in the elderly by using medication appropriateness index criteria. To evaluate the use of potentially inappropriate medications, prescription adjustment, discontinuing unnecessary drugs for older patients. A prospective study was carried out in a tertiary care teaching hospital on 200 patients for a period of 6 months. Patients aged 65 years and over were included in the study. Inappropriateness of medications was assessed using MAI criteria. Prescriptions of 200 patients containing 1358 drugs were assessed using MAI criteria. Overall, 146 (73%) patients had one or more MAI criteria rated as inappropriate, giving a total of 326 (24%) medications prescribed inappropriately. In total study population, 183 (13.5%) interventions are done. The majority of interventions are drug-drug interactions (60%) followed by untreated conditions (15%). The above results show high prevalence of inappropriate medications which may have negative impact on patient health and may prolong hospital stay. It also shows the importance of clinical pharmacist involvement in optimization of pharmacotherapy in geriatric patients.

Keywords: AGS-American geriatric society, MAI-Medication appropriateness index, PIMS-Potentially inappropriate medications

INTRODUCTION

Ages nearing or surpassing the life expectancy can be called as elderly or old age. According to WHO the people above 65 years of age are known as geriatrics. This is the last stage of any individual's life. Any person in this stage of ageing experience progressive worsening of all body functions which can lead to many physical and psychological abnormalities making their daily life activities troublesome.¹

Geriatrics faces many problems, which include health related problems, social support and economic problems. Their healthcare needs differ from younger people. Medication related problems in elderly are one of the most common preventable health related problems. The common problems in geriatric prescription are poly pharmacy and irrational use of medicines. Incidence and severity of adverse drug reactions are two to three times higher in elderly and majority of them are avoidable.¹

Because older adults have multiple chronic conditions and often use poly pharmacy, they are an ideal patient population for pharmacists' interventions.¹⁶ Approximately 20-40% of adults aged 65 and older in developed countries are prescribed with greater than or equal to 5 medications.

Poly pharmacy results in medication non-adherence and increases the risk of ADRs, dug-drug interactions, medication errors and using of potentially inappropriate drugs.²

Aging involves physiological changes that can lead to pharmacokinetic (such as increased half-life and serum concentrations of drugs) and pharmacodynamic changes, supporting the need for drug-therapy monitoring and dose adjustment, especially at this age range. The possibility of drug-induced damage, even when drugs are used at recommended doses and for the correct indication, is a major problem for elderly inpatients.²

Poly pharmacy and inappropriate medication also leads to adverse health outcomes including mortality, hospitalization, falls, cognitive impairment and therapeutic failure.³

Over the last few years the role of pharmacist has been improved with the implementation of clinical pharmacy activities. Now-a-days, pharmacist interventions are considered as important because they help in rationalizing the drug therapy and reducing the drug related problems¹⁰.

Many studies from the hospital settings suggest that involvement of clinical pharmacist in health care team could reduce mortality and improve outcome. Therefore it is necessary to identify the importance of clinical pharmacy activities³. The clinical pharmacists can provide patients with pharmaceutical care to identify, resolve, and prevent drug-related problems¹⁷.

Currently, there are 90 million people in India aged over 60 years and as this number grows, it will become increasingly important for pharmacist to contribute for rational and safe medication use in the elderly.

Clinical pharmacist interventions

An intervention which results in the correction of a prescribing/transcribing error or the provision of pharmaceutical advice which optimises patient care.

Types of interventions

- Untreated condition
- Adverse drug reaction
- Improper drug selection
- Sub therapeutic dose/under dose
- Failure to receive medication
- Overdose
- Drug interactions
- Medication adherence

Medication appropriateness index (MAI)

Inappropriate prescribing of medications is common in older adults that results in adverse effects, morbidity and increase in health care cost.¹¹ While there are multiple measures of potentially inappropriate prescribing, the Medication Appropriateness Index (MAI) is one of the most common implicit approaches published in the scientific literature.⁷ Thus, assessment of medication appropriateness has become increasingly important because of the increasing risk of adverse events associated with poly pharmacy and inappropriate prescribing.¹² IMP has been classified as under prescribing, misprescribing or overprescribing.¹⁵

MAI is an instrument that evaluates the elements of prescription and is applicable for various no. of medications, clinical conditions and scenarios. This MAI was developed by a clinical pharmacist and geriatric doctor based on literature review of medication evaluation scales and assessment measures and was validated by Samsa *et al.* In MAI instrument, prescription is evaluated for drug relate problems according to the key criteria:

- Effectiveness
- Indication
- Concentration
- Dosage and instructions for proper administration of medication
- Drug interactions
- Convenience/practicality
- Therapeutic duplicity
- Drug-disease interactions
- Treatment duration
- Cost of the drug compared with agents of the same efficacy and safety^{6,8}

The MAI does not detect drugs that are not provided to patients that is nothing but omitted drugs. The pharmacist's role has evolved from time to time, from traditional drug dispensing to involvement in direct patient care to promote pharmaceutical care with a focus on improving medication appropriateness and preventing drug related problems.

Medication appropriateness is a combination of different elements of evidence-based medicine with professional opinion. Clinical pharmacists concise medication use and improve

patient's care by working as a part of multidisciplinary team in different settings, like hospital ward, intensive care units and community-based physician group practices.

Moreover, there are few studies that show the importance of clinical pharmacist in the emergency department (ED). The ED in general acute teaching hospitals is a busy environment where provision of optimal care is a challenge. It has been shown that the people in ED are more prone to receiving suboptimal medication compared to the others in inpatient and ambulatory care settings. Identifying and characterising inappropriate prescribing at the ED would show the importance of clinical pharmacist activities in this setting and it would be the next step for improving the patient health care.

METHODOLOGY

Study design: Prospective observational study

Study site: Department of general medicine, SVRRGGH, Tirupathi

Study period: 6 months

Study population: 200

Study criteria:

Inclusion criteria:

- In patients and out patients of general medicine with age above 65 years old.

Exclusion criteria

- Patients who are not willing to participate in the study.
- Except inpatients of general medicine of age above 65 years old, others are excluded from the study.
- Terminally ill patients were excluded.
- Psychiatry patients who were not responded.
- Patients who are unable to give written informed consent.

Ethical committee approval

The study was approved by institutional ethical committee of Sri Padmavathi School of pharmacy SPSP/2018-2019/PD03. The informed consent was taken from the patients and the study was in accordance with ICH GCP guidelines.

Study materials:

- Patient data collection form
- Informed consent form
- Patient information leaflets
- Micro medex

Data collection method

A prospective observational study was conducted in inpatient Department of general medicine, SVRRGGH, Tirupathi after getting the institutional ethical committee approval. A specially designed Performa was used for collecting data which includes patient demographics, chief-complaints, past medical and medication history, diagnosis, co-morbidities, lab investigations, medications prescribed for each patient. The data was obtained from the patient case profile forms and direct interviews. After collecting the data regarding treatment regimen,

inappropriateness was reviewed on the basis of medication appropriateness index criteria.

Department of pharmacy practice, SPSP, Tiruchanoor, TPT

Therefore, the aim of this study was to apply the Medication Appropriateness Index (MAI) by a clinical pharmacist to identify issues of inappropriate prescribing amongst patient's admitted.⁹

RESULTS

Table 1: Distribution based on Age

Age (Years)	No. of patients (n = 200)
65-70	147 (73%)
71-75	31 (15%)
76-80	14 (7%)
81-85	5 (3%)
>85	3 (2%)

Among 200 patients, majority of people are between age group of 65-70 (73%), followed by 71-75 (15%), 76-80 (7%), 81-85 (3%) and >85 (2%)

Table 2: Distribution based on Gender

Gender	No. of patients (n = 200)
Male	142 (71%)
Female	58 (29%)

Among 200 patients majority of the patients are male (71%) followed by females (29%)

Table 3: Distribution of diseases with co-morbidities

Type of diagnosis	No. of patients (n = 200)
Diseases with co-morbidities	128 (64%)
Diseases without co-morbidities	72 (36%)

The above table shows that the majority of patients have multiple diseases (64%) followed by Single disease (29%)

Table 4: System wise classification of diseases

System affected	No of patients (n = 200)
CNS	45 (22.5%)
CVS	39 (19.5%)
RESPIRATORY	26 (13%)
OTHERS	24 (12%)
LIVER	22 (11%)
GIT	20 (10%)
ENDOCRINE	12 (6%)
RENAL	12 (6%)

Among 200 patients majority of patients are suffering with CNS diseases (22.5%) followed by CVS (19.5%), Respiratory (13%), Endocrine (6%), others (12%), Liver (11%), GIT (10%) and Renal (6%)

Table 5: No. of drugs per prescription

Drugs per prescription	No of patients (n = 200)
1-3	10 (5%)
4-6	80 (40%)
7-10	100 (50%)
>10	9 (5%)

Among 200 patients majority of the patients have 7-10 (54%) drugs per prescription followed by 4-6 (37%), >10 (5%) and 1-3(4%)

Table 6: Assessment of pharmacist interventions done among the study population

Type of intervention	No. of patients (n = 200)
Drug interactions	132 (66.5%)
Untreated condition	30 (15%)
Medication adherence	15 (7.5%)
Failure to receive medication	8 (4%)
Adverse drug reaction	6 (3%)
Improper drug selection	5 (2.5%)
Over dose	2 (1%)
Sub therapeutic dose	1 (0.5%)

Among 183 interventions majority are drug interactions (66.5%) followed by untreated condition (15%) and medication adherence (7.5%)

Table 7: No. of interventions done per prescription

No of interventions per prescription	No of patients (n = 200)
1	129 (79%)
2	30 (19%)
3	2 (1%)
>3	1 (1%)

In majority of people single intervention is done (77%) followed by 2 interventions (21%), 3 interventions (1%) and > 3 (1%)

Table 8: Pharmacist interventions

TYPE OF INTERVENTION	RESULTS	NO OF PATIENTS
Untreated condition	a. Breathlessness	11
	b. Fever	3
	c. Vomiting	3
	d. Facial puffiness	2
	e. Edema	2
	f. Body pains	2
	g. Cough	2
	h. Hematemesis	1
	i. Constipation	1
	j. Nasal congestion	1
	k. Loose stools	1
l. Bleeding piles	1	

Medication adherence	a. Poor compliance to hypertensive medications	8
	b. Vit.B complex	4
	c. Poor compliance to hydrocortisone	1
	d. Poor compliance to anti diabetic drugs	1
	e. Poor compliance to TB drugs	1
Failure to receive medication	a. Montelukast	2
	b. IFA	2
	c. Mannitol	1
	d. Hypertensive drugs	1
	e. B complex	1
	f. Cilostazol	1
Adverse drug reaction	a. Propranolol- asterixis	2
	b. Prednisolone - giddiness	1
	c. Prednisolone - pedal edema	1
	d. Pantop -constipation	1
	e. Enalapril -cough	1
Improper drug selection	a. High fever-not prescribed any antibiotics	1
	b. Instead of Amlodipine, Atorvastatin was given to treat hypertension	1
	c. The patient is resistant to Amikacin but they prescribed it.	1
	d. Fluconazole was prescribed in gastritis condition	1
	e. Instead of Atenolol Metoprolol is more effective in geriatrics	1
Over dose	a. More than 3 hypertensive drugs were given in a patient.	1
	b. Ondansetron was given both tablet and injection form.	1
Sub therapeutic dose	c. Ambroxyl –the patient had complaints of cough but it was prescribed once in a day.	1
Drug interactions	d. Major	16
	e. Moderate	97
	f. Minor	19

Table 9: Classification of drug –drug interactions based on severity

Type of interaction	No of interactions (n = 132)
Major	16 (12%)
Moderate	97 (74%)
Minor	19 (14%)

The above indicates, majority of interactions are moderate interactions (74%) followed by minor (14%) and major (12%)

Table 10: Assessment of medication appropriateness among prescriptions

Medication parameter	No. of drugs (%)
Appropriate drugs	1032 (76%)
In-appropriate drugs	326 (24%)
Total drugs	1358 (100%)

The above table indicates that among 1358 prescribed drugs 1032 are appropriate and the remaining 326 drugs are inappropriate

Table 11: Total inappropriate drugs for each criterion of MAI

Question	Drugs with an In-appropriate MAI criterion (n = 326)
1. Drug indication	14 (4%)
2. Effectiveness	11 (3%)
3. Correct dosage	5 (2%)
4. Correct directions	12 (4%)
5. Practical directions	11 (3%)
6. Drug-drug interaction	240 (74%)
7. Drug-disease/condition interaction	6 (2%)
8. Duplication	20 (6%)
9. Duration of therapy	4 (1%)
10. Expense	3 (1%)

The major category of inappropriate prescribing was drug interactions (74%) followed by drug duplication (6%), drug indication (4%), correct directions (4%), efficacy of drug (3%), practical directions (3%), drug-disease interaction (2%), correct dosage (2%), duration of therapy (1%) and expense (1%).

DISCUSSION

Geriatrics is one of the most increasing special populations in the world. The special care in their medication should be very much needed in-order to avoid drug related problems. Optimization of medication regimens in elderly people is challenging due to quiet less evidence for potent interventions. Our study reveals the need of pharmacist to make recommendations for rationalized drug therapy among elderly.

The present study was conducted in a government general hospital. Total 200 patients were included in the study. Among them 142 (71%) were males and 58 (29%) were females and most of the patients were found to be in between the age of 65-70. These findings were similar to the Mahesh Kumar *et al.*, (2016)¹³

studies were they reported the occurrence of DRPs is more in male patients than female. This could be due to the reality that high numbers of male patients were stayed in the hospital in that study period.

In the overall study population, majority of the people are suffering with CNS diseases (21%) and many people have comorbidities (64%). The number of drugs per prescription are 7-10 (50%) in maximum number of patients which is in contrast with study conducted by Eva Delgado Siveria *et al.*, (2015)¹⁸.

In total study population, 199 (14.65%) interventions are done. The majority of interventions are drug-drug interactions (66.5%) followed by untreated conditions (15%). In majority of people single intervention is done 129 (79%) followed by 2 interventions

30 (19%) and 3 interventions 2 (1%) which is similar to the study conducted by L Cortejoso *et al.* (2016)³.

This study evaluated medication appropriateness among geriatric patients using MAI criteria. Treatment charts of 200 patients, including 1358 medications were assessed using these criteria. Overall 146 patients had one or more medications with one or more MAI criteria rated as inappropriate, giving a total of 326 (24%) medications prescribed inappropriately which is similar to the study conducted by Lorna Marie WEST *et al.*, (2012)¹⁴.

Various factors like gender, age, duration of hospital stay, inter-current disease and poly pharmacy are the contributing factors for prescribing potentially inappropriate drugs.

By suggesting alternative therapies for these PIMs and updating the practitioner regarding new therapies can provide safer treatment for geriatric patients. Education to elderly patient regarding their treatment therapy will increase their level of understanding towards their therapy will increase their level of understanding towards their treatment regimen.

CONCLUSION

The pharmacist interventions will have positive effect on prescribing in older adults, ensuring that they receive effective, safe and efficient drug therapy. The current practice in hospital is associated with greater poly pharmacy and inappropriate medication use. The data presented here in reiterate the importance of a clinical pharmacist practicing in the hospital. The inclusion of pharmacists as part of a multidisciplinary team can assist in appropriate prescribing, as well as in the implementation of standard operating procedures and evidence-based guidelines to be used in the hospital.

It is also necessary to improve the geriatric care, as this age group possess risk for many diseases and medication use. In future a multidisciplinary approach, steps to be taken involving physicians, nurses and pharmacists has a team for bringing out rational drug use in geriatric population.

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