

Research Article

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## A prospective study on medication safety in Geriatric patients according to Beer's criteria

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### Abstract

#### Keywords

Medication safety,  
Geriatric,  
Beer's Criteria.

**Objective:** The present study is aimed to assess medication safety and therapeutic inappropriateness in geriatric according to Beer's criteria.

**Methodology:** It is a prospective observational study conducted in inpatient all wards. The data collected in pre design data collection form for 190 patients age 65 years and over who are assessed for about 6 months. Analyzed data included drug utilization pattern, drugs related problem and potentially inappropriateness medication on the basis of 2012 Beers criteria.

**Result:** Out of 190 prescriptions 77 prescription involved interaction. 42.85% of prescription came under the class of major interaction, 57.14% prescription come under moderate interaction. 22.07% of interaction was found to be due to inappropriate prescribing medication according Beers criteria. Out of 190 prescriptions 36(19%) prescription constituted at least one inappropriate drugs in which sliding scale usage of Actrapid (short acting insulin) was having more number (11%) and second drugs was found as promethazine (2.63%).

**Conclusion:** This study recommended that use of PIMs is common in elderly patients, some of them associated with high degree of risk in terms of adverse drug reactions or worsening of the comorbidity. Evidence shows that commonness of inappropriate prescribing of medicines in elderly people is linked with increased morbidity and mortality, decreased quality of life and uneconomic.

### Introduction

The elderly population is increasing rapidly worldwide. About 55% community prescription dispensed in 2001 in UK was meant for elderly people. However, safe and effective prescribing of medicines in elderly continues to present a major challenge. In spite of the fact that elderly people are reported to be responsible for half the total drug usage, less than 5% randomized controlled trials have been designed for people over 65 years. With limited evidence available to guide prescribing for elderly, the prescribers tend to depend in data available

for younger subjects. Moreover elderly form a heterogeneous group due to various factors like Comorbidities, inter individual variability in the aging process and inter individual differences in age-related pharmacokinetic pharmacodynamics changes (Tamez-pena AL, et.al, Oct 2014).

Obviously inappropriate use of drugs is expected to be high in this population.

We can call safe prescribing when the drugs prescribed are correct in order with the disease condition and patient status. Therapy shows highest effectiveness with least side effects and ADR (Fu AZ, et.al, Nov 2004). Prescribing medication is always challenging in geriatric patients because of their altered physiological properties, such as pharmacokinetic parameter for older patients always gets affected with respect to their ageing. Because of this it become important to Optimizing drug therapy dosage for older person. The process of prescribing a medication is complex and it includes criteria like.

Potentially inappropriate medication (PIM) use in older adults has been associated with increased morbidity. Inappropriate medication can be defined as drugs that pose more risks than benefits to the patients. The risk of using these medications range from minor weakness, to orthostatic hypotension, prolonged sedation, falls and fractures , or even life-threatening events (Adriane Fugh-Berman, Jan 2000).

The Beers criteria The most widely used criteria, which were originally published in 1991, with updates in 1997, 2001, and 2003.1-4 Using the 2001 Beers criteria, the reported rate of inappropriate prescribing among elderly VA outpatients was 19.7% in fiscal year 2000 and 21.3% in fiscal year 2003(Hughes SG, Dec 1998).

In my study I have focused on all the parameters which are going to affect geriatric patient which includes drug prescribing according to Beers criteria, and drug related problems due to inappropriateness therapy.

## **Methodology**

It is a prospective observational study conducted in inpatient all wards. The data collected in pre design data collection form for 190 patients age 65 years and over who are assessed for about 6 months. Analyzed data included drugs related problem and potentially inappropriateness medication on the basis of 2012 Beers criteria.

Case Record, Treatment Chart, Lab Master, Patient/Patient Guardian Interview, Physician Notes, Patient Medication Rack, Nurses Comment, Internet Site (Micromedex).

The enrolled patient demographics and medically relevant information was noted in predefined data collection form .The collected data included demographic information, current diagnosis, medical history, medication history, medication prescribed (dose.

Route of administration, frequency, therapy duration, indication ,pharmacological classification), marketing categories (Generic or Branded) and laboratory investigations. The changes and the daily notes in the case sheets were followed until the patient was discharged.

Drug-Drug interaction were detected using previously developed online interaction checker (Micromedex) database and stockly's drug interaction book and classified them accordance with severity, mechanism of action and documented in the drug interaction report form.

The Beers criteria, prescription guidelines, Micromedex, Medscape, Reference articles and textbooks were used as the tools to analyze the prescription.

The data were stored confidentially and subjected to further analysis using appropriate software.

## **Results and Discussion**

Medication safety is the most important part of geriatric pharmacotherapy, which helps to improve patients health related quality of life and reduces the overall health care costs. Medication error, adverse drug reaction and drug interaction should be assessed along with the potentially in inappropriate medication usage criteria given by Beers.

Study conducted by Zaveri HG et.al in March 2010 on 407 patients of these, 216 (53.07%) were males and 191 (46.93%) were females. The age of patients ranged from 65 years to 85 years. The present study evaluated the demographic clinical characteristic by the collected case showed that numbers of male geriatric patients are more than female geriatric patients 51.57 % and 48.42 % respectively. The age group was most reported at hospital was from 65-69 years showed total admission of 52.63% patients and the age group showed least admission was 86-90 years which was 7.89 % .

In the present study pharmacokinetic drug interaction (64.49%) were most commonly observed than pharmacodynamics drug interaction (35.06%). About 22.07% prescription contains drug interaction because of PIM's. [Table 1]

**Table 1: Table showing drug interaction in geriatric prescriptions**

Parameters		Male		Female		Total	
		n	%	n	%	n	(%)
Severity	Major	19	24.67	14	18.18	33	42.85
	Moderate	21	27.27	23	29.87	44	57.14
	Total	40	27.27	37	48.05	77	100
Pharmacokinetic Interaction	Absorption	10	12.98	12	15.58	22	28.57
	Distribution	1	1.29	2	2.59	3	3.89
	Metabolism	9	11.68	7	9.09	16	20.77
	Excretion	2	2.59	7	9.09	9	11.68
	Total	22	28.54	28	36.35	50	64.49
Pharmacodynamics Interaction	Synergism	6	7.79	7	9.09	11	14.28
	Antagonism	3	3.89	2	2.59	5	6.49
	Neutralization	5	6.49	4	5.19	9	11.68
	Total	14	18.17	13	16.87	27	35.06
Interaction due to inappropriate medication (Beer's criteria)		7	9.09	10	12.98	17	22.07

According to the study conducted by Delafuente JC (2003) pharmacokinetic interaction were most commonly observed in geriatric patients. Drug interactions are often clinically unrecognized and responsible for increased morbidity in elderly patients. Prudent use of medications and vigilant drug monitoring are essential to avoid drug-drug interactions.

Study in Japan showing the prevalence of potentially inappropriate medication use independent of disease or condition was 356 (21.1%) out of 1669 patients

study showed the use of ticlopidine as the highest PIM's prescribed (6.3%) (Niwata S et.al 2006). In 1996, 21.3 % ( 95% confidence interval, 19.5%-23.1%) of community dwelling elderly patients in United State received at least 1 of 33 potentially inappropriate medication, (Zahan C et.al, 2001). During present study it was found the prevalence of potentially inappropriate medication use was 36(19%). In present study out of 190 prescription Insulin dosing as sliding scale was the highest PIM's prescribed (12.3%). [Table 2]

**Table 2: Therapeutic inappropriate according to Beer's Criteria**

Drugs	Patient gender				Total	
	Male		Female			
	n	%	n	%	N	(%)
Actrapid (short acting insulin)	6	3.15	15	7.89	21	11.05
Hyoscyamine	0	0	1	1.05	1	0.52
Spirolactone	2	1.05	0	0	2	1.05
Promethazine	2	1.05	3	1.57	5	2.63
Lorazepam	1	0.52	1	0.52	2	1.05
Clonazepam	0	0	1	0.52	1	0.52
Diltiazem	0	0	2	1.05	2	1.05
Zolpidem	0	0	1	0.52	1	0.52
Amiodarone	0	0	1	0.52	1	0.52
Sub-total	11	5.77	25	13.64	36	19

Potentially inappropriate medications (PIMs) continue to be prescribed and used as first-line treatment for the most vulnerable of older adults, despite evidence of poor outcomes from the use of PIMs in older adults (American Geriatric Society, 2012). Since its inception in 1991, the Beers criteria for potentially inappropriate medication in older adults has been an important evidence-based resource for healthcare providers working to reduce the risk of adverse drug reaction and ADR –associated hospitalization and reducing length of stay in acute care. Beers criteria medications directly accounted for 12.9- 14.0% of total inappropriate prescribing in older adults, as comprehensively measured by the MAI, with consistent findings drawn from 2 independently collected patient samples. In keeping with prior criticism, using Beers criteria as a measurement tool thus failed to capture more than 85% of inappropriate prescribing in older adults, (Brian LC et.al, 2011). Elderly people with cerebrovascular and psychiatric disorder have 7.3 and 5.3 times higher chances of using potentially inappropriate medications respectively, than those unaffected by these illness, (Lima TJ et.al,2013).

## Conclusion

This study recommended that use of PIMs is common in elderly patients, some of them associated with high degree of risk in terms of adverse drug reactions or worsening of the comorbidity. Evidence shows that commonness of inappropriate prescribing of medicines in elderly people is linked with increased morbidity and mortality, decreased quality of life and uneconomic. This study has been limited to only one specialty. More studies in other specialties and Beers criteria utility extended beyond direct measurement of a limited set of inappropriate prescribing practices by serving as a clinically meaningful proxy for other inappropriate practices. Research should explore both the quality dimension and the intervention targeting applications of the Beers criteria, chiefly when integrated with other indicators.

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