"Evaluation Of Screening Tool Of Older Persons' Prescriptions/Screening Tool To Alert To Right Treatment And Beers Criteria Practice In Geriatric Patients."

Chauhan Sneha Arvind[1], Patel Deep[2], Anas Jamsa[3*]

[1,2]Dept. of Pharmacy Practice, Parul Institute of Pharmacy & Research, Parul University, Vadodara, Gujarat
[3]Assistant Professor, Dept. of Pharmacology, Parul Institute of Pharmacy & Research, Parul University, Vadodara, Gujarat*

***Corresponding Author:** Anas Jamsa*
**Assistant Professor, Dept. of Pharmacy Practice, Parul Institute of Pharmacy & Research, Parul University, Vadodara, Gujarat. Phone No.:9924583633, Email Id: anas.jamsa19107@paruluniversity.ac.in*

KEYWORDS
Beers criteria, Geriatrics, Potentially inappropriate medications (PIMs), Rational drug use, Polypharmacy.

ABSTRACT
1. INTRODUCTION: Given that seniors make up most drug users, rational drug use is especially important in this population. The growing incidence of pathological medical disorders makes this topic especially important for the healthcare industry. The pharmacokinetic changes and possible susceptibility to specific medications, especially those that influence the central nervous system and can cause adverse drug reactions, cause elderly persons' medication responses to differ. Owing to several comorbidities, older people are more likely to engage in polypharmacy, or the use of five or more medications. This increases the risk of adverse drug reactions (ADRs) and drug interactions, which can lead to inadequate therapy and extended hospital stays. Mark H. Beers created the crucial Beers Criteria in 1991 as a set of recommendations for safe medication prescription in the elderly. Their goals are to identify drugs that should be avoided, limit inappropriate prescribing, and prevent adverse drug reactions (ADRs). To optimise medicine selection, these evidence-based recommendations are applied in all care settings, except for hospice and palliative care.
2. AIM: "Evaluation of Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment and Beers criteria practice in geriatric patients."
3. OBJECTIVE
• Assessing Adherence to Beers Criteria Standards in geriatric patients.
• To evaluate specific adverse drug responses (ADRs) linked to different prescription regimens used.
• To determine the association between number of PIMs prescribed with total number of drugs prescribed.
4. METHOD: Data were gathered from 153 individuals, all of whom were older than 65. and used Google Forms to examine and understand. This study will ascertain the prevalence of PIMs as well as the relationship between the total number of prescription drugs prescribed.
5.RESULT: The study found that 58.16% of patients were male, with 41.83% female. The majority were aged 65-70. The majority were admitted to general medicine, followed by cardiology and pulmonology. Hypertension was the most prevalent condition, followed by ischemic heart disease and type 2 diabetes. A study found that 13.07% of prescriptions were filled with 12 medications, indicating polypharmacy in older patients. Polypharmacy was prevalent (67.02%). Most prescriptions contained 4 or more PIMs; pantoprazole was prescribed to 89.1% of patients being the most prescribed PIMs. Diuretics were prescribed to 46.50% of patients, with furosemide being the most prescribed diuretic. R=0.498 indicates a medium positive association between the quantity of prescription medications and PIMs.
6. CONCLUSION: The fact that every prescription under consideration contained at least one PIM suggested that the hospital's prescribing practices were illogical. This study emphasizes how important it is to make doctors and chemists knowledgeable about standards or criteria, such as the Beers criterion and STOPP/START criteria to practice safer prescribing practices for senior patients.

INTRODUCTION

Hepatic Ensuring reasonable drug prescription is the first step towards rational drug use [1]. Because older people make up most drug users compared to other age groups, rational drug usage is even more important in their case [2]. Elderly people who are over 65 are referred to as geriatrics patients. Due to the increased incidence of chronic diseases and pathological health conditions in the elderly, geriatric drug prescribing is becoming a more important topic in healthcare discussions [3]. Compared to younger folks, elderly patients

react differently to drugs. This is due to the pharmacokinetics of them changing over time. Additionally, elderly individuals may be susceptible to drug classes [4,5]. These medications include benzodiazepines, which affect the central nervous system and are linked to adverse drug reactions (ADRs) include postural sway and fall risk [5]. Among the conditions that affect or are likely to affect the elderly are Alzheimer's, Parkinson's, vascular dementia, stroke, vision impairment, cataract and macular degeneration, atherosclerosis, heart failure, coronary artery disease, diabetes, arthritis, osteoporosis, fractures, cancer, and incontinence. This means that more medicines are needed to complete the course of treatment. Elderly people with diminished financial means, nutritional issues, and a variety of ailments have lower rates of dosage compliance [6]. Elderly people experience several pharmacokinetic and pharmacodynamic alterations. Therefore, the therapeutic range provided for non-elderly patients' therapeutic drug monitoring is not a reliable indicator of geriatric patients' toxicity or efficacy [7,8,9].

1. PHARMACOKINETIC AND PHARMACODYNAMIC CHANGES IN ELDERLY PATIENT:

1.1 PHARMACOKINTIC CHANGES:

Table 1.1: Age-related changes in pharmacokinetics:

Absorption o Gastric pH o Secretory capacity o Gastrointestinal blood flow	Unchanged o Increased o Decreased o Diminished
Distribution o Plasma albumin o Protein affinity o α1-acid glycoprotein	 o Diminished o Diminished o Increased
Metabolism o Size of liver o Hepatic blood flow	 o Decreased o Decreased
Renal function o Glomerular filtration rate o Renal plasma flow o Filtration fraction	 o Decreased o Decreased o Increased

1.1.1 Absorption

When the gastric mucosa of older people with intact gastric mucosa atrophies, the stomach pH rises due to reduced acid secretory capacity and GI blood flow. However, the absorption of food and medication remains constant in these patients [10,11]. The ionisation and solubility of some medications may be impacted by the frequent elevated stomach pH seen in the elderly. Changes in motility can also be explained by decreased acidity, which causes the stomach's contents to empty into the duodenum more quickly [12,13]. There has been evidence of an age-related decrease in GI motility, although it is unclear how this discovery would affect drug absorption in practice [14]. Because elderly people typically have less first-pass extraction, some medications with high rates of first-pass metabolism might have improved bioavailability [15-19]. Although older adults have not been as thoroughly investigated for other modes of administration, some researchers have discovered a lower rate of antibiotic absorption from the place of administration of an intramuscular injection [20,21].

Table 1.2: Age-related physiologic alterations that may have an impact on pharmacodynamic responses through kinetic changes:

Alterations in body composition	
Body fat	Increased
Lean body mass	Decrea
Total body water	sed
	Decrea
	sed
Changes in cardiovascular function	
Resting heart rate	Decreased
Stroke volume	Slight decrease
Cardiac output	Slight decrease
Central nervous system function	
Blood supply to the brain	Diminished
Reflex responses	
Baroreceptor reflex activity	Diminished
Renin-angiotensin-aldosterone system	
Plasma renin Urine	Diminished
aldosterone	Diminished
Sympathetic innervation to juxtaglomerular	Diminished
Cells	

This finding might have important therapeutic implications, especially for infections treated with injectable antibiotic dosages in long-term care facilities [22].

1.1.2 Distribution:

Drug disposition can be impacted by age-related changes in the composition of the body in a variety of ways. The three most significant ones are a loss in lean body mass, a rise in body fat, and a reduction in total body water [23-25]. For lipid-soluble medications, these changes may lead to an increase in volume of distribution (Vd); for water-soluble pharmaceuticals, the outcome may be the opposite [26,27]. Serum albumin levels in the elderly do not change or can drop by 15–20%, while the amount of total plasma protein stays the same [28,29]. Because albumin plays a large role in plasma protein binding, a decrease in albumin levels can lead to an increase in the medication's pharmacodynamically active component, the free drug fraction [30,31]. Acid glycoprotein (AAG) α1 tends to accumulate with age and binds mainly to lipophilic basic medicines [32]. When there is an acute sickness, like a myocardial infarction, the number of medications that bind to AAG increases [32,33]. AAG may be more actively attached to propranolol or lidocaine (lignocaine) in this situation, increasing the amount of free medication. Once the acute stress subsides and the acute phase reactant, AAG, lowers, this binding may revert to normal in a few weeks or months.

1.1.3 Hepatic Metabolism:

Not all pharmaceutical compounds undergo the same decline in the ageing liver's capacity to metabolize them [32,34]. Age-related changes in the liver's structure and function have been documented; two of the most significant include the liver's size decreasing both absolute and in relation to body weight, as well as the liver's regional blood flow being lowered [11,14,35]. With little to no change in the conjugative processes (phase II, conjugation), the most common modifications are to the microsomal mixed-function oxidative system (phase I, oxidation, and reduction) [36,37]. On the other hand, there have also been instances of liver microsomal monooxygenases' numbers and activity remaining constant as people aged [38]. The differences between the clinically apparent decrease in medication clearance and the unchanged metabolic activity in vitro are likely caused by interindividual variability and the challenge of obtaining representative liver samples from participants in good health [37]. Even with these modifications, standard liver function tests do not provide aberrant findings when illness is not present [30,26,39].

Table 1.3 Drug metabolism in the liver in the elderly:

Phase 1 (preparative reactions) Oxidation Hydroxylation Dealkylation Reduction Nitro reduction	Alprazolam, quinidine, warfarin, carbamazepine, ibuprofen, imipramine, desipramine, phenytoin, propranolol, and barbiturates. Amitriptyline, chlordiazepoxide, diazepam, flurazepam, diphenhydramine, lidocaine (lignocaine), pethidine (meperidine), theophylline, and tolbutamide. Nitrazepam
Phase 2 (synthetic reactions) Unchanged in the elderly Conjugation Acetylation Methylation	

A list of medications and the procedures associated with metabolizing them in the elderly is shown in Table III. For instance, the glucuronide and sulphate routes are used to conjugate paracetamol (acetaminophen), and there have been no observed alterations in the rate of conjugation in the elderly [40]. Conversely, due to the slower rate of demethylation, desipramine has a considerable extension of the half-life of elimination (t1⁄2β) and a decrease in plasma clearance [32,41]. Hepatic enzyme induction in the elderly is an additional topic of investigation. Whether drug induction is a significant phenomenon in older adults is still up for debate. Research has indicated that older smokers had a decreasing antipyrine clearance with age [42]. However, the antipyrine t1⁄2β in senior males was unaffected by rifampicin (rifampin), a recognized powerful inducer of microsomal activity [43].

1.1.4 Excretion and Renal Function:

As people age, their glomerular filtration rate (GFR) steadily decreases [44,45]. The renal plasma flow also decreases more dramatically at the same time, by over 50%, which causes the filtration fraction to increase dramatically with ageing [44,45,46]. Ageing is also associated with a decrease in reabsorptive capacity and a loss of tubular function [44,47]. Because of their decreased muscle mass, older persons' serum creatinine levels may be misleading when assessing their renal function [46,48]. To get a more precise estimate of GFR, one can assess the endogenous creatinine clearance [45]. On the other hand, creatinine clearance may overstate GFR due to tubular secretion of the drug [49]. Despite this drawback, creatinine clearance can be a highly helpful tool for modifying the dosage of medications that are excreted in the kidneys [50]. Compared to younger people, older people use nonsteroidal anti-inflammatory medications (NSAIDs more than three times as often [51]. Furthermore, the harmful effects of these medications on the kidneys put the elderly at particular risk [52,53]. Further nephrotoxicity may arise from NSAID-induced suppression of renal vasodilator prostaglandins in addition to the previously described alterations in kidney function [54]. While ageing remains a risk factor for the decline in renal function, other factors that can make the situation more complicated include the co-administration of diuretics, nephrosclerosis brought on by hypertension, congestive heart failure, general anaesthesia during surgery, and other poor perfusion states that are common in older patients [55,56].

1.2 General Pharmacodynamic Changes in the Elderly:

While pharmacokinetic alterations brought on by ageing are widely recognized, pharmacodynamic alterations are less thoroughly studied. Dynamic investigations present challenges to the development and validation of suitable drug response measures, as opposed to the comparatively straightforward kinetics approaches that involve multiple collection of blood samples and the estimation of plasma drug concentrations [57]. Through a variety of processes, pharmacodynamic alterations can happen at many sites from the drug receptor contact. Homeostatic regulation, signal transduction pathways, receptor quantity and affinity, and cellular responses all influence pharmacodynamic responses [30]. For this reason, investigations on intrinsic drug sensitivity must inevitably encompass the intricate sequence of events including drug delivery and reaction [58]. Animals are usually better at detecting the site of abnormality than people are, and it can be difficult to extrapolate findings from animal research that occasionally seem contradictory to humans because of differences in technique and between species. On the other hand, it is now feasible to identify whether the problem is post receptor or

receptor (including second messenger system) using in vitro and animal models [57]. Due to ageing, younger and older individuals often respond to drugs differently even when the concentration is the same [30]. In general, drug receptiveness decreases with ageing, and molecular mechanisms underlie this tendency [18].

Table 1.4 Age-related modifications on physiological responsiveness and receptors:

Receptor	**Tissue**	**Physiological change**	
Muscarinic	Brain	Diminished memory	Diminished
Parathyroid hormone	Kidney	Diminished activation of vitamin D	Diminished
β-adrenergic	Heart	Rate and contractility	Slight decrease
α1-adrenergic	Liver	No change in glycogenolysis	Diminished
Opioid	Brain	Anorexia, hypodipsia	Diminished

Table 1.5 Receptor concentration changes associated with ageing:

Drug	**Level of change**
Thyroid prolactin, GABA, α-adrenergic, β-adrenergic, dopaminergic, glucocorticoid, insulin, gonadotropin, androgen, oestrogen, opioids, and benzodiazepines	Decrease
Prolactin, serotonin, GABA, thyroid, glucocorticoids, ginga, α- and β-adrenergic, opioids, benzodiazepines, androgen, oestrogen, insulin, gonadotropin,	Unchanged
Hormone, insulin, gonadotropin, opioid, benzodiazepine, dopaminergic, α-adrenergic, and β-adrenergic	Increase
GABA = γ-aminobutyric acid.	

For senior individuals, the Cockcroft-Gault formula is used to determine dosage recommendations [58,59]. Because of changed pharmacokinetics or decreased homeostatic responses, several medications, including sedative hypnotics and analgesics, have a greater effect on older people. As people age, their average blood pressure increases. Symptomatic orthostatic hypotension became more common. Blood glucose levels two hours after a meal rose by roughly 1 mg/dL for every year that a person over 50 lived. Elderly people have trouble controlling their body temperature and have a low threshold for hypothermia [6,60-62]. Drug therapy for the elderly can extend their lives and improve their quality of life. There is a significant danger of both positive and negative consequences when elderly people utilise medications. Understanding the medication taken by the elderly allows us to minimize the amount of prescription medications, simplify the regimen when numerous drugs are recommended, and maybe anticipate suspected adverse drug responses and interactions [6]. Adverse drug responses (ADRs) frequently result in unfavorable clinical outcomes for elderly patients, and polypharmacy and incorrect dosing are well-known risk factors for these events [63]. To solve this issue, a dosage reduction or the cessation of potentially inappropriate drugs is required [64]. Aside from this, elderly people are susceptible to polypharmacy because they have numerous comorbidities. Five or more drugs are used in patients with polypharmacy, a condition that is frequently seen in those 65 years of age or older [67]. As the number of prescriptions rises, drug interactions and adverse drug experiences (ADEs) are likely to occur. The higher incidence of ADRs and DDIs associated with polypharmacy makes prescribing practices problematic over time, potentially resulting in ineffective therapy, prolonged hospital stays, and excessive treatment expenses [65- 67]. Prescription drug administration for the elderly needs to be done with extreme attention and care to avoid the above dilemmas. When giving medication to senior citizens, there are some guidelines that need to be adhered to:

A. Questions to be asked during admission.

B. Avoiding unnecessary polypharmacy.

C. Safe prescribing habits.
D. Adverse events.
E. Review of medications during discharge [68].
Many nations have established guidelines for prescribing possibly inappropriate medications to the elderly as a clinical reference. In relation to potential inappropriate medication usage by older adults, the American Geriatrics Society published the Beers Criteria [69]. Physicians, educators, researchers, medical administrators, and regulators regularly utilise the University College Cork Screening Tool to Alert to Correct Treatment Criteria (STOPP/START Criteria) and Screening Tool of Prescriptions for Older People [70]. Both have as their main concern the safety of drug use among the elderly. Based on data from the literature, they employ the Delphi validation method to determine which medications are appropriate, reach an expert consensus, and create a list of drugs that are not recommended for senior patients.

2. BEERS CRITERIA:
The Beers Criteria were established in 1991 at the Medical College of California, Los Angeles by late physician Mark Beers, MD, and colleagues with the intention of finding drugs for which possible harm outweighed predicted benefit and thus ought to be excluded in the residents of nursing homes [71]. The American Geriatrics Society (AGS) Beers Criteria for Potentially Inappropriate Medication (PIM) Use in Older Adults serves as a clear list of PIMs that are best avoided in older adults in general and in those with particular diseases or syndromes, prescribed at reduced dosage or with caution, or closely monitored. The Beers Criteria Confusion, falls, and mortality are just a few of the negative health outcomes that PIMs have been linked to [72,73]. Steering clear of PIMs is one-way older people can reduce their chance of unfavourable consequences. Explicit criterion interventions have been demonstrated to be a crucial part of initiatives aimed at lowering the use of unsuitable medications [74,75]. One of the most widely read resources regarding the safety of administering drugs to older adults is the AGS Beers Criteria for PIM Use in Older Adults. The establishment of quality indicators, geriatric clinical treatment, teaching, and research all make extensive use of the AGS Beers Criteria. The same five broad orders that were utilized in the Beers criteria were also used by the expert panel to group the criteria.
1. Medications considered as potentially inappropriate.
2. Drugs that might not be suitable for people with specific illnesses or conditions.
3. Medications to be used with caution.
4. Potentially inappropriate drug–drug interactions.
5. Drugs for which renal function should be considered while adjusting dosage.
It also has a list of medications to avoid or lower dosage based on kidney function test results, as well as DDIs to avoid in elderly patients. As previously noted, it has been noted that although older adults make up the majority of those receiving modern medication therapy, they are more vulnerable to adverse drug reactions (ADRs) and drug interactions. The incidence of ADRs in the aged population is "a major modern epidemic." As such, it is critical to adhere to guidelines, such as Beer's criteria for safe prescribing of geriatric medications, to minimize these problems.

3. START AND STOPP CRITERIA:
STOPP: Screening Tool of Older People's Potentially Inappropriate Prescriptions [76]
Prescriptions that might not be suitable for those over 65.
START: Screening Tool to Alert to Right (i.e. appropriate, indicated) Treatments [76]
Drugs that, in the absence of contraindications, individuals 65 years of age and older should take into consideration.
A definition of medication review is "a structured, critical examination of a patient's medicines with the objective of reaching an agreement with the patient about treatment, optimizing the impact of medicines, minimizing the number of medication-related problems and reducing waste" [77]. The goal of the STOPP/START Tool is to help pharmaceutical reviewers determine whether medications, for older patients, have greater dangers than benefits. First contributing to the suggestion and later grading of the criteria were eighteen geriatric pharmacotherapy experts. Hospital admissions were used to compare the STOPP criteria and Beer's criteria. Based on STOPP criteria, a third of the patients had "potentially inappropriate prescriptions" that were accompanied by an adverse medication event. This study aimed to assess the prescribing patterns in the geriatric population, ascertain whether the prescriptions were based on Beer's criteria, and find any associations between potentially inappropriate medications and variables such as age, the total number of prescription drugs prescribed, and the number of comorbidities

AIM AND OBJECTIVES:

Aim: "Evaluation of Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment and Beers criteria practice in geriatric patients."

Objectives:

- Assessing Adherence to Beers Criteria Standards in geriatric patients.
- To evaluate specific adverse drug responses (ADRs) linked to different prescription regimens used.
- To determine the association between number of PIMs prescribed with total number of drugs prescribed.

METHODOLOGY

STUDY DESIGN:

"Evaluation of Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment and Beers criteria practice in geriatric patients" is assessed through a bi-directional study, in a Parul Sevashram Hospital, Waghodia, Vadodara.

ETHICAL CONSIDERATION:

The study proposal is obtained from Institutional Ethical Committee of Parul Sevashram Hospital, Vadodara and approval number is PUIECHR/PIMSR/00/081734/6511. After peer interviewing and reviewing, the study was approved by the ethics committee.

STUDY DURATION:

Duration of 6 months [October 2023 – March 2024], we collect the data of patients, this include gathering information from patients and their relatives by taking history of the patient.

STUDY SITE:

This study was conducted at Parul Sevashram Hospital. Parul Sevashram Hospital is a multispecialty tertiary care hospital with over 126 beds conveniently located in Vadodara, Gujarat, India. Parul Sevashram Hospital consists of many departments like Nephrology, Cardiology, Radiology, General Medicine, Surgical, Pediatrics, Obstetrics and Gynecology, etc.

NO. OF SAMPLE COLLECTED:

153 patients

SOURCE OF DATA:

Data will be obtained by collecting information from patient profile form and by gathering the medical history from patients and relative.

STUDY CRITERIA:

INCLUSION CRITERIA:

• Patients of 60 years of age and above.
• Geriatric patients prescribed more than three drugs.
• Geriatric patients with co-morbidities

EXCLUSION CRITERIA:

• Patients below 60 years of age.
• Patients undergone surgery within in the last 6 months until data collection.
• Geriatric patients prescribed less than 3 drugs.

DATA COLLECTION AND STUDY PROCEDURE:

For this study, Google Forms was used to create the data collection form for this study, which asked questions on the patient's age, gender, medical history, final diagnosis, recommended medication, and the PIMs checklist that is part of Beers criteria were all included.

Patient data was gathered prospectively or from the hospital's medical record department. The hospital's inpatient section, which housed the critical care unit, general ward, male ward, and female ward, provided data on 153 patients. Google Forms was then used to examine and interpret the data.
This study will examine the prevalence of potentially inappropriate medications (PIMs), as well as the relationship between the number of PIMs administered and the overall number of prescription drugs.
DATA ANALYSIS: Data were collected from OPD department and then statistically analysed. The collected data were tabulated and statistically analysed. Different types of graphs, figures, and tables are used to summarize the data visually and MS Excel sheet was used for the analysis of the data.

STATISTICAL ANALYSIS: Counts and percentages were used to summarize categorical variables. Graphical data displays were used to summarize data. This study used statistical analysis to evaluate the prevalence of potentially inappropriate medications (PIMs) and the relationship between the number of PIMs administered and the total number of prescription drugs.

RESULTS:

Patient characteristics:

More than half of the patients included in this study were males i.e., 58.17% of them were males and the rest 41.83% were females. Patients whose cases were studied for this project belonged to age group between 60-85 years. Out of the 153 patients, most of them were aged between65- 70 years old i.e., 74.51% of patients were 65-70 years of age. Maximum no. of patients i.e., 61.44% of the patients were admitted to the general medicine department. The second highest no. of patients (7.84%) were admitted to cardiology and pulmonology. The third highest no. of patients (7.18%) were admitted to nephrology. 59.47% of patients were suffering from hypertension making it the most common ailment seen in the study sample. 52.94% suffered from Type 2 Diabetes Mellitus and 26.14% suffered from Ischaemic heart disease. Patient characteristics are summarized in Table 1. Graphical representation of gender distribution observed in the study is shown in Figure 1, and number of patients admitted to various departments is shown in Figure 2.

Table 1: Patient characteristics.

Variables	Patients (N=153)
Gender	
➢ **Male, n (%)**	**89(58.17)**
➢ **Female, n (%)**	**64(41.83)**
Age distribution (years), n (%)	
➢ 65-70	**114(74.51)**
➢ 70-75	**20(13.07)**
➢ 75-80	**14(9.15)**
➢ 80-85	**5(3.26)**
Department, n (%)	
➢ Cardiology	**12(7.84)**
➢ Diabetology	**2(1.31)**
➢ Gastroenterology	**6(3.92)**
➢ General medicine	**94(61.44)**
➢ Haematology	**7(4.57)**
➢ Nephrology	**11(7.18)**
➢ Neurology	**9(5.88)**
➢ Pulmonology	**12(7.84)**
Medical history, n (%)	
➢ **Hypertension**	**91(59.47)**
➢ **Diabetes Mellitus**	**81(52.94)**
➢ **Ischaemic heart disease**	**40(26.14)**
➢ **Cerebrovascular accident**	**14(9.15)**
➢ **Thyroid disorder**	**20(13.07)**
➢ **COPD/Bronchitis/Asthma**	**23(15.03)**
➢ **Kidney disease**	**22(14.37)**
➢ **Liver disease**	**20(13.07)**
➢ **Seizure disorder**	**24(15.68)**
➢ Hematologic disease	**11(7.18)**

N = Total number of patients, n = number of patients.

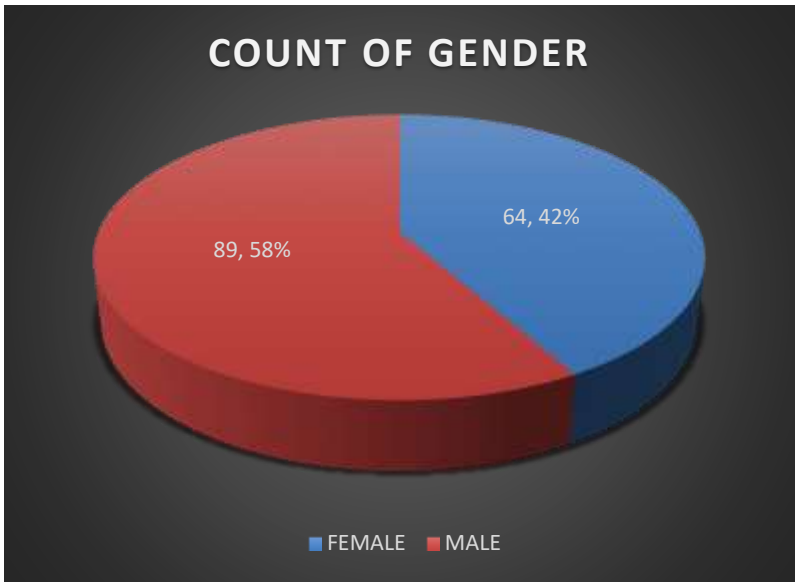

Figure 1: Gender distribution observed in the study.

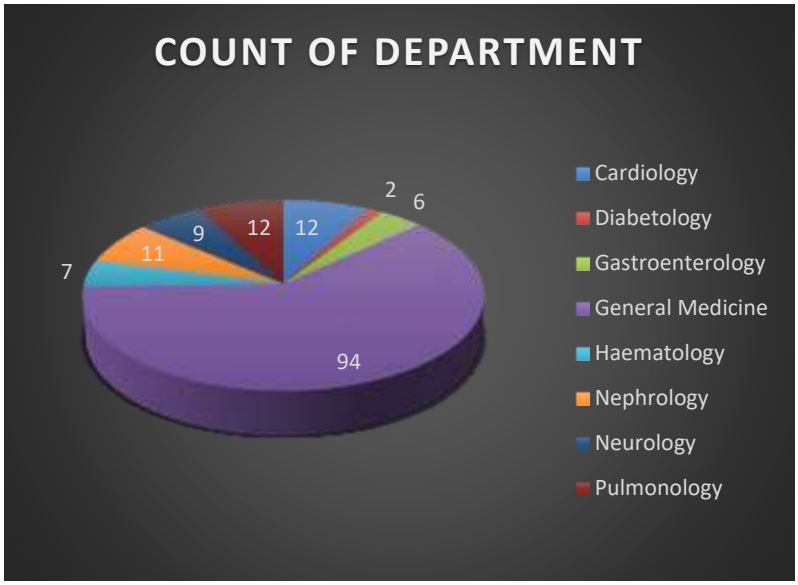

Figure 2: Number of patients admitted to various departments.

Drugs prescribed per patient:

The patients included in the study were prescribed at least 4 drugs. The most observed no. of drugs that were prescribed were 12 i.e., 13.07% of prescriptions had 12 drugs prescribed. Number of drugs prescribed per patient is summarized in Table 2 and graphical representation is shown in Figure 3.

Table 2: Drugs prescribed per patient.

Number of drugs	Number of patients
1-5	9
6-10	49
11-15	68
16-20	21
21-25	6

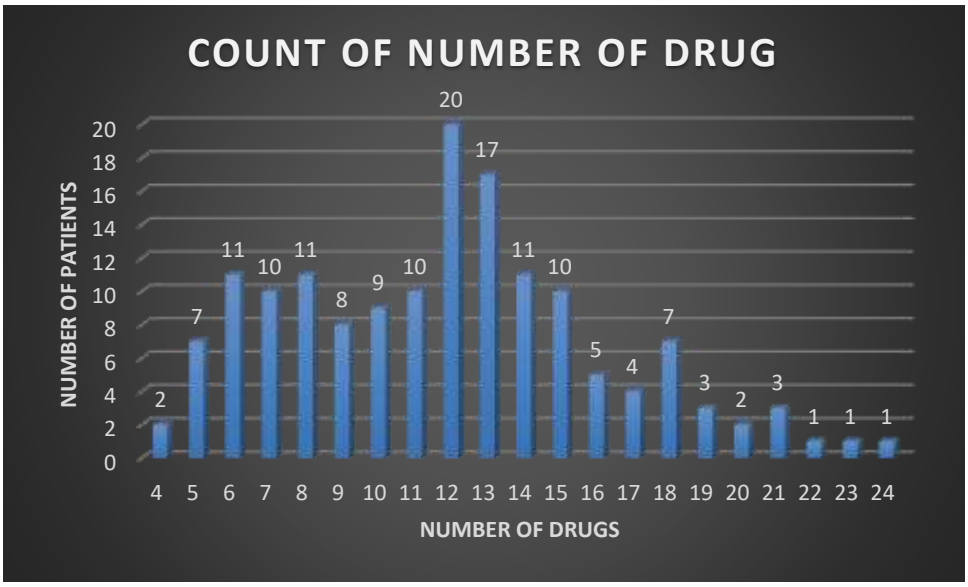

Figure 3: Number of drugs prescribed per patient.

Table 3: PIMs prescribed per patients		
Number of PIMs	**Number of patients [n]**	**(%)**
0	12	(7.84)
1	23	(15.03)
2	12	(7.84)
3	18	(11.76)
4	12	(7.84)
5	12	(7.84)
6	9	(5.88)
7	7	(4.57)
8	12	(7.84)
9	1	(0.65)
10	14	(9.15)
11	4	(2.61)
12	3	(1.96)
13	4	(2.61)
14	2	(1.30)
15	1	(0.65)
16	3	(1.96)
17	3	(1.96)
19	1	(0.65)
n = number of patients, PIMs-Potentially inappropriate medications.		

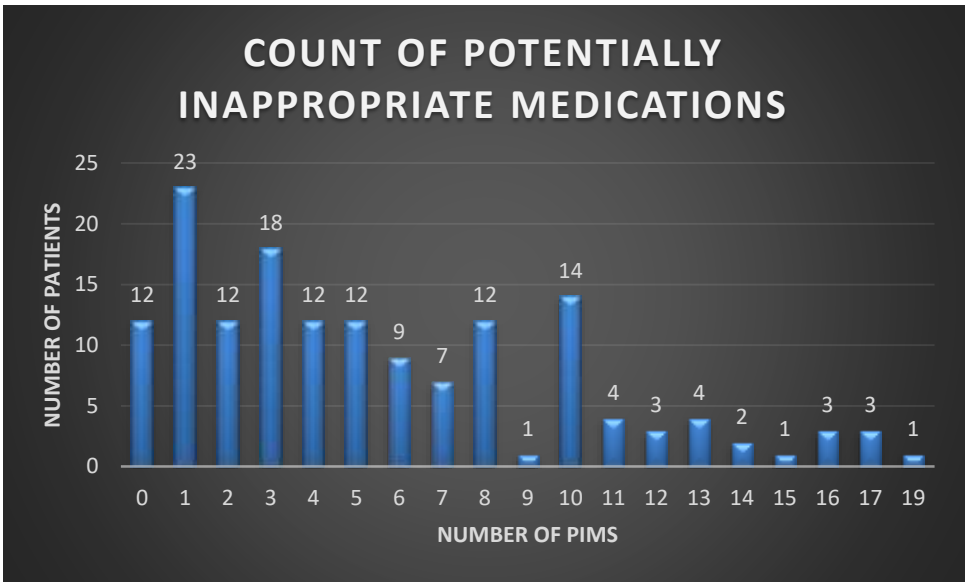

Figure 4: Number of PIMs prescribed.

PIMs prescribed per patient

Most prescriptions i.e., 15.03% prescriptions had 1PIMs present. Most prescribed PIM was Pantoprazole; 89.1% patients were prescribed pantoprazole. Next most prescribed PIMs were diuretics; 46.5% patients were prescribed diuretics with Furosemide being the most common diuretic that was prescribed. Number of PIMs prescribed per patient is summarized in Table 3 and graphical representation is shown in Figure 4.

Correlation between number of drugs prescribed per patient and total number of PIMs

t-Test: Paired Two Sample for Means		
	Variable 1	*Variable 2*
Mean	11.81045752	5.555555556
Variance	18.89146887	20.55116959
Observations	153	153
Pearson Correlation	0.49853701	
Hypothesized Mean Difference	0	
df	152	
t Stat	17.38892272	
P(T<=t) one-tail	2.83756E-38	
t Critical one-tail	1.654940175	
P(T<=t) two-tail	5.67512E-38	
t Critical two-tail	1.975693928	

Correlation is significant at the 0.01 level (2-tailed).
Variable 1: Number of drugs prescribed per patient and Variable 2: total number of PIMs
This table presents the results of a t-Test for paired two samples for means:
153 observations provide a mean of 11.81 and a variation of 18.89 for variable 1. The variance of variable 2, which is similarly based on 153 observations, is 20.55 and the mean is 5.56. The two variables have a 0.4985

Pearson correlation value. A mean difference of zero is theorised. For the t-Test, the degrees of freedom (df) are 152. The t statistic that was computed is 17.39. Strong evidence opposing the null hypothesis is indicated by the t statistic's one-tailed p-value of roughly 2.84E-38. For a one-tailed test with 152 degrees of freedom and a significance threshold of 0.05, the crucial t value is around 1.65. Strong evidence opposing the null hypothesis is also indicated by the two-tailed p-value, which is roughly 5.68E-38. For a two-tailed test with 152 degrees of freedom and a significance threshold of 0.05, the critical t value is roughly 1.98. Overall, the findings indicate that there is a statistically significant difference between Variable 1 and Variable 2's means.

DISCUSSION:

This study aimed "Evaluation of Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment and Beers criteria practice in geriatric patients", a tool for effective medicine prescription for senior citizens. There is a sharp rise in the number of elderly patients, who are also the most vulnerable to negative health outcomes. The way that older adults react to drugs differs from that of younger adults. This is a result of their gradual pharmacokinetic alterations. Polypharmacy arises in the elderly due to the existence of numerous comorbidities. Polypharmacy is defined as the use of two or more medications, which may raise the prevalence of potentially inappropriate medications and increase the risk of side effects and drug interactions. The potential hazards associated with polypharmacy may outweigh the advantages of therapeutic practice. According to Beer's criteria, the current study gave a useful overview of the medication prescription practices for elderly patients admitted to a tertiary care facility. In this study, patients included of 58.16% men and 41.83% women, meaning that men constituted most of the patient population. The project's case studies focused on people between the ages of 65 and 85. 75.50 percent of the 153 patients, or most of the patient population, were in the 65–70 age range. The maximum number of patients, or 61.43% of the total, were admitted to the department of general medicine. Cardiology and pulmonology admitted the second-highest number of patients (7.84% and 7.84%). Nephrology admitted the third-highest percentage of patients (7.18%). Hypertension was the most prevalent condition in the study group, accounting for 59.47% of patients. There were 26.14% with ischemic heart disease and 52.94% with type 2 diabetes mellitus. The study's gender distribution is graphically represented in Figure 4.2, the age distribution is graphically represented in Figure 4.3, and the number of patients admitted to different departments is graphically represented in Figure 4.1. 12 medications were the most that could be provided to a single patient, accounting for 13.07% of all prescriptions written. This indicates that older patients likely to have polypharmacy. In a related study, Hani Ahmed Sultan et al. found that 15.6% of all prescription medications were inappropriate and that polypharmacy was highly prevalent (67.02%). 7+1 was the average number of prescription medicines written down. Patients over 90 years old received the fewest PIMs, while those in the 65–70 age range received the most [78]. Because PIMs were found in most of the prescriptions examined, this investigation gave us additional evidence that the hospital's prescribing practices were irrational. Beer's 2023 criteria were applied to our analysis, which showed that 7.84% of prescriptions, or most prescriptions, contained 4 or more PIMs. It was shown that pantoprazole, which was prescribed to 78.1% of patients, was the most prescribed PIM. Diuretics were then prescribed to 54.5% of patients, with furosemide being the most commonly prescription diuretic. The frequency of PIMs and the total amount of prescription medications given for patients are directly connected, according to this study. This is because a relatively favourable association between the total number of prescription medications written and the number of PIMs was found after statistical analysis of the data. Furthermore, the age of the patients and the number of comorbidities they have were found to be connected to the occurrence of PIMs. It is evident that while writing prescriptions for medications to elderly patients in hospitals, Beer's standards were disregarded. In older patients, this increases the likelihood of unfavourable drug interactions and adverse event occurrence. It should be noted that this was a single site study with lesser sample numbers and, as such, its own limitations. Only inpatients participated in the trial, which was completed extremely quickly. As a result, it is not possible to extrapolate from the results the prescribing trends for elderly people across the nation. However, this study highlights the need for doctors and chemists to be informed with standards or recommendations such as the Beer's criterion 2023, START criteria, and STOPP criteria to practise safer prescribing practices for senior citizens. This would encourage older adults to use safer substitute options rather than inappropriate drug use.

CONCLUSION

This study aimed "Evaluation of Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment and Beers criteria practice in geriatric patients," a tool for effective medicine prescription for senior citizens.

Because every prescription included at least one PIM, the investigation showed that the hospital's prescribing practices were irrational. According to this study, the frequency of PIMs and the overall amount of prescription medications given to patients are directly correlated.
Furthermore, the number of comorbidities and the age of the patients were found to be associated to the prevalence of PIMs. It is evident that the hospital's prescription medicine policy did not take Beer's requirements into account. The likelihood of unfavourable drug interactions and adverse events increasing in older individuals is a result.
This study highlights the need for doctors and chemists to be informed about standards or guidelines such as the Beer's criteria 2023, START criteria, and STOP criteria in order to adopt safer prescribing practices for the elderly. For elderly people, this would encourage the use of safer substitutes rather than the abuse of unsuitable medications.

LIST OF ABBREVIATIONS:

ABBREVIATIONS	TERMINOLOGY
ADR	Adverse Drug Reaction
GI	Gastrointestinal
Vd	Volume of distribution
AAG	Acid glycoprotein
GFR	Glomerular filtration rate
NSAIDS	Non-steroidal anti-inflammatory drugs
GABA	Gamma-aminobutyric acid
DDI	Drug-Drug Interaction
STOPP	Screening Tool of Older Persons' Prescriptions
START	Screening Tool to Alert to Right Treatment
PIM	Potentially Inappropriate Medication
AGS	American Geriatrics Society
PPO	Potential prescribing omission
ADE	Adverse drug event

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