ORIGINAL ARTICLE

A Study of Drug Utilization Pattern in Geriatric Patients at Local Secondary & Tertiary Care Hospitals

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Abstract

Introduction : As the number of drugs taken by geriatric patients and the incidence of ADR is high in this age group, it becomes increasingly essential to study patterns of drug use. This study aimed to analyze the medication utilization patterns using WHO core prescribing indicators.

Methods: Cross Sectional & Analytical study using WHO core indicators and Beer's criteria as an assessment tool for potentially inappropriate medication for older adults.The top 10 drugs were classified according to WHO-ATC (Anatomical Therapeutic Code) Classification system with DDD (Defined Daily Dose)

Results: A total of 200 Geriatric patients were taken in the study. . The average number of drugs per encounter was 7.16. Drugs acting on the cardiovascular system were the most commonly prescribed. Ranitidine was the most commonly prescribed drug. The study shows the present prescribing practices in the hospital related to higher polypharmacy and inappropriate medication use.

Conclusion: To enhance drug therapy for geriatric patients, it is essential for prescribers to make aware of the Beers criteria and should be surely followed for good health care outcomes in the elderly. A systematic medication chart review by the clinical pharmacist can minimize the frequency of prescribing drugs without indications and thereby decrease polypharmacy.

Keywords: Geriatric , WHO-ATC , Beers criteria , AGS

1 | INTRODUCTION

Drugs play a vital role in providing ideal care and have a major influence on health. Throughout the last decades of the 20th century, new medicines will lead to decreased mortality, reduced hospitalization duration, and enhance the quality of life for several people.[1]

It is necessary to identify the negative results of drug therapy and arising problem of inappropriate drug use, with issues vary from increased morbidity to enormous medicalization, polypharmacy, adverse drug reactions (ADRs) and higher antimicrobial resistance. The economic results related to inappropriate drug use are significant. Drug utilization research is an extensive collection of descriptive and analytical methods for the quantification, the understanding and the evaluation of the processes of prescribing, dispensing and consumption of medicines, and for the testing of interventions to improve the quality of these processes . It targets on the different medical, social, and economic view of drug use.[1] Drug utilization becomes necessary for the elderly, the main problem faced by this populate use of incorrect use of drugs[2] . The main aim of drug utilization study is the rational use of drugs. The anatomical therapeutic classification (ATC)/defined daily dose (DDD) is used as a tool to enhance the quality of drug use and is advised by the WHO as the international standard for drug utilization studies[3] . WHO and International Network of Rational Use of Drugs (INRUD) has established a group of drug prescribing indicators used as a measure to identify the prescribing accomplishment [4,5]

The defined daily dose is an average maintenance dose per day and used as a comparable unit. Prescribed daily dose (PDD) may not be identical to DDD. It is rough to estimate of drug utilization[6] . Geriatrics is the branch of medicine that deals with the physiological attribute of aging and the diagnosis and treatment of disorder influencing the aged[7] . Geriatric medicine is the branch of gerontology which deals with people who is having age more than 65 years[8]. People above the age of 65 years have more predominance of chronic illness than those less than 65 years[9]. Many physiological and pharmacological variations occur in elderly people[10,11]. Thus special care has to be taken as there is alteration in pharmacokinetic and pharmacodynamics due to the age[12] . As the number of drugs taken by geriatric patients and the incidence of ADR is high in this age group, it becomes increasingly essential to study patterns of drug use[13]. Because of various prescriptions, they use multiple drugs (Polypharmacy) for different chronic disease. Polypharmacy also increases the risk of drug interaction, which leads to higher the cost of therapy[14] . Manufacturers do not involve elderly in the clinical trials before marketing drugs, which are the major drawbacks concerning the use of medicine[15] . WHO core indicators and Beer's criteria can be used as an assessment tool for potentially inappropriate medication for older adults[16]. The American Geriatrics Society (AGS) Beer's standards 2012 for the potentially inappropriate medication (PIM) has been developed to assist healthcare providers in improving medication safety in older adults. Beer's criteria can be classified into three: category 1, category 2 and category 3. [17]This study aimed to analyze the medication utilization patterns using WHO core prescribing indicators and the development of inappropriate drug prescribing according to the Beers criteria 2012 method in geriatric patients, in a secondary care hospital [18] .

2 | METHEDOLOGY

This Cross Sectional & Analytical study involved Prior Consent from Hospital Authorities / Medical Superintendents of the Randomly selected Local Secondary & Tertiary care hospitals with the

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disclosure that we will use the data for study purpose only.

The study was conducted within ethical standards. Randomization was done using computer tables in selecting data. All Patients data had details of standard clinical examinations, routine biochemical and haematological investigations, For the purpose of the present study, data of 200 of the randomly selected patients (candidates / study subjects) were identified.

This was a cross sectional study conducted in general medicine units of local secondary & tertiary care hospitals both Govt & Pvt. The study was conducted for a period of 8 months after the approval . A total number of 200 patients were taken for this study. Patients of both male and female aged 65 years and above, who were admitted in the general medicine.

Inclusion Criteria:

• Patients of age 65 years and above.
• Either male or female.
• Admitted in general medicine.

Exclusion Criteria:

• Patients below 65 years.
• Patients with severe disease.
• Pregnant women.
• Pediatric patient.
• Patient who was shifted to ICU.
• Patients who were mentally unstable.
• Patients who are not willing to participate.

Continuous data were expressed as mean ± standard deviation (SD) . The data were analysed by IBM SPSS Statistics 23. All quantitative data were coded and transformed into an excel master sheet for computer programming. A chi-square test was used to evaluate categorical variables for analysis. Overall, < 0.05 was proposed to represent statistical significance after correction.

3 | RESULTS

Total of 200 geriatric patients who were admitted in the general medicine ward were incorporated in the study. The patients were allocated according to age and gender.

Various data were used to evaluate commonly prescribed drugs and classified as per anatomical therapeutic classification (ATC) and WHO core indicators, the most commonly diagnosed disease, co-morbid condition and potentially inappropriate medication using Beer's criteria 2012.

Among 200 prescriptions were collected, out of which 110 (55%) were males and 90 (45%) were females.

The majority of the patients were in the age group of 61-70 years (62%), followed by 71-80 years (30%), 81-89 years (6.5%) and only 1.5% of age >89 years.

Out of 200 prescriptions, 36(18%), prescription contain therapeutic drug duplication, 164(82%) prescription was found to be without drug duplication .

Among 200 cases, 145(72.5%) contain drug-drug interaction, and the remaining 55 (27.5%) were without drug-drug interactions. Polypharmacy was significantly high in each prescription; there were 72.5% clinically significant drug-drug interactions

The majority of drugs were administered in oral route , , followed by injectables of total routes, inhalation, and topical routes.

Among the study population, the prevalence of cardiovascular disorder 26% was high, followed by respiratory disorder (20.5%) and GI disorder (17%) , COPD (24.5%) was the most common disease in this study, followed by Hypertension (22.5%), Cardiovascular accident (14%), and Diabetes Mellitus (10%).

Majority of patients (69%) were found with one co-morbidities, (29%) patients are with 2 co-morbidities and (3%) patients with ≥3 co-morbidities .

In our study majority of drugs acting on cardiovascular system were most frequently prescribed, followed by gastrointestinal drugs , respiratory drugs and antibiotics.

Ranitidine 165 was the commonly prescribed drug followed by B complex , Amlodipine and Atorvastatin

The top 10 drugs were classified according to WHO-ATC (Anatomical Therapeutic Code) Classification system with DDD (Defined Daily Dose)

According to WHO core indicators, the average number of drugs per prescription was 7.16. Out of total drugs, 80.52% were prescribed by generic name.

Encounters with antibiotics and injections were to be 90 (45%) and 171(85.5%) respectively, and 100% of drugs were prescribed from the EDL/ Formulary .

The optimal value of IRDP (Index of Rational Use of Medicines) was 2.99. In this study, the average index of generic name prescribing was 0.81. The index of prescribing of antibiotics and injections were 0.59 and 0.101, respectively.

Based on the American Geriatric Society updated Beers criteria on 2012. Out of 200 patients, 118 patients (59%) received at least one drug which PIMs from Beers list. Out of total drugs, a total number of 168 PIMs were prescribed in all with 12 medications. Out of 118 patients, 76 patients (66.08%) were prescribed to have a single drug of PIMs from Beers list.

35 patients (29.66%) were prescribed two different PIMs, and 4 patients (3.38%) were prescribed to have three different PIMs from the Beers list. Medications to be avoided in elderly (category 1) being the most common category of inappropriate use.

Diclofenac was prescribed PIMs in 27 cases, followed by Spironolactone and Alprazolam. Least prescribed PIMs were Nifedipine and Verapamil in 2 and 1 case respectively.

Under category 3, aspirin was the only drug which was prescribed to 56 patients.

4 | DISCUSSION

Drug utilization studies (DUS) is conducted to know the prescribing, dispensing, and distribution of drugs. The main purpose of DUS is to facilitate the rational use of medicine (RUM) in population. These studies are used to determine the reported adverse drug reactions, to monitor the utilization of different categories of drugs and regulatory activities. The geriatric population is increasing worldwide.

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Among 200 prescriptions were collected, out of which 110 (55%) were males and 90 (45%) were females. The majority of the patients were in the age group of 61-70 years (62%), followed by 71-80 years (30%), 81-89 years (6.5%) and only 1.5% of age >89 years. Same results were found in other studies too.[14,19,20]

In our study, the most commonly diagnosed disease were Chronic obstructive Pulmonary disease , Hypertension , Cerebrovascular accident , Diabetes Mellitus , Acute gastroenteritis , Acute diarrheal disease , Coronary artery disease , Chronic kidney disease , Anaemia and Congestive cardiac failure . On the system wise disease analysis the prevalence of Cardiovascular disorder such as Hypertension, Coronary artery disease and Congestive cardiac failure was high . The second-most system affected was a Respiratory system like COPD followed by GI system such as Acute gastroenteritis and Acute diarrhoeal disease , CNS disorder like a Cerebrovascular accident (CVA). The most commonly found co-morbidity was Hypertension, Diabetes mellitus, which was similar to the study conducted in India [21], followed by CVA, CCF, MI, and CAD. Among 200 patients in a study by Sharma et al.,[22] 29% had two comorbidity, whereas 3% had ≥ 3 co-morbid conditions together. Loss of functional reserve with aging makes geriatric patients vulnerable to the development of multiple diseases affecting different body system. The most commonly prescribed drugs are

cardiovascular drugs . This is because the first most morbidity condition was Hypertension, Coronary heart disease for which they prescribed either single or multiple numbers of Cardiovascular drugs. Following this descending order of frequency, the prescribed category included drugs acting on GIT , drugs acting on the Respiratory system and Antimicrobials . The most frequently prescribed drugs in this study were Ranitidine . Even though the prevalence of cardiovascular disease is high in our study, ranitidine was probably prescribed prophylaxis against NSAID induced gastric ulcer. This can be justified if we compare with an Indian and Brazilian study has also reported ranitidine was one of the most frequently prescribed drugs.

Acidsuppressive drugs were used more. Drugs which change acid secretion may vary absorption of many drugs and interact with other drugs, which lead to toxicity. The 2nd most prescribed drugs were B complex as micronutrient on the brain and cognitive performance for geriatrics. Amlodipine , Atorvastatin , Aspirin , Frusemide , Enalapril and Clopidogrel were the frequently prescribed drugs as the morbidity pattern of cardiovascular disease was highest in our study. Deriphyllin and Salbutamol were the frequently prescribed drugs for COPD. The above top 10 prescribed drugs were classified according to WHO-ATC classification[23,24] .

Patients who are revealed to drug duplication can only notice the toxic potential of that drug and have small or no chance of realizing any positive outcome related to such unnecessary treatment. Polypharmacy and multiple prescribers will lead to the occurrence of potential drug interactions [25] .

Most of the drug administered by oral route (61.29%) followed by injectables (38.01%) which are similar to the study conducted by Jhaveri et al.,[26] possible reasons for high use of oral route could be less aggressiveness of the therapy and avoidance of unnecessary selection of the parenteral route. While the parenteral route is very expensive when compared to other dosage form and require trained person for administration and it produces the faster onset of action.The study found that polypharmacy was common due to inappropriate prescription.

The number of drugs prescribed per prescription was 6.86, which is much lesser than a similar study on geriatric population, which is conducted in India 20 , where the average number of drugs per prescription is 7.3. Maximum 9 drugs given to the patient, whereas up to 27 drugs were prescribed in a similar study. The rise in polypharmacy may be due to more illiterate geriatric patients or their caretakers. It is preferable to keep the number of drugs per prescription as low as possible since polypharmacy leads to increased risk of drug interaction and errors of prescription and increased hospital cost.

Total of 80.52% medicines prescribed by generic name which is nearer to the standard value WHO recommendation of 100% [14] .

Prescribing by generic names allows flexibility of stocking and dispensing of various brands of drugs that are cheaper than effective as proprietary brands. This is the basis of EDL/ formulary use. From our study, we found 100% of drugs prescribed from EDL/ formulary, which is very similar to the WHO standard (100%) derived as ideal. List of EDL prepared with public health relevance, evidence of safety and efficacy of that drugs and cost comparative effectiveness. From our study the percentage encounters in which antibiotic was prescribed to 49%, which is high compared to standard 20-26.8% derived from being ideal27 . The use of this much antibiotics, which leads to antibiotic resistance. The percentage encounters with an injection prescribed was much higher than the WHO standard 13.4-24.1% derived from being ideal [27] . This may be due to the psychological advantage of infection and treating doctors and patients. The optimal value of IRDP was 2.99 which is less than WHO standard value[5].

The optimal index was 1 for all indicators. The values are adjacent to 1 designated rational drug use and vice versa. The index of polypharmacy shows more deviation from the WHO standard, which indicates polypharmacy. The optimal value of a generic prescription is 100%; in our study, the index of generic name prescribing was 0.80.

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In our study PIMs, the category B of Beers criteria which includes the drugs to be avoided in combination with specific co-morbidity, were not prescribed. In category C in which medicines to be used with cautions.

Aspirin as an antiplatelet drug was prescribed frequently our study by most of the physician for the follow up on the cardiovascular disease. The medication error also occurred in many prescriptions due to illegible handwriting, failure to write the dose, dosage form, and decimal points. Pharmacist involvement in patient care and computerized decision support help to reduce medication error [29].

5 | Conclusion

Particular awareness and training should be given to the prescribers concerning geriatric patients. To enhance drug therapy for geriatric patients, it is essential for prescribers to make aware of the Beers criteria and should be surely followed for good health care outcomes in the elderly.

The maximum number of drug utilized by males is greater compared to that of female because the prevalence of the disease is more in the male in our study.

The average number of drugs per encounter was high.

Our studies propose the present prescribing practices in the hospital related to higher polypharmacy and inappropriate medication use.

A systematic medication chart review by the clinical pharmacist can minimize the frequency of prescribing drugs without indications and thereby decrease polypharmacy. It will also lower the cost of therapy, which will eventually benefit the patients.

A high number of prescription errors were found. Many of these were small and unlikely to have had serious effect, some were of great importance. Further extensive studies on medication error are essential to predict the scale of the problem and their economic impact.

Study limitations

The main limitations of this study include a limited number of participants (n=200). We have not studied the longterm outcomes, and it may be that although we are not seeing any difference in short-term outcomes, they may become apparent in the long term.

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