Assessment of Medication Related Problems in Geriatrics Unit of Nigerian Tertiary Hospital

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Abstract
Medication related problems are prevalent especially in the geriatric population and can cause considerable patient morbidity and in some cases death as well as increased health expenditure. The elderly population is at increased risk for medication related problems as a result of age-related physiological changes and the presence of multiple chronic diseases. Aim: This study aimed to assess medication related problems (MRP) in University of Port Harcourt Teaching Hospital, with the objective to identify and categorize the MRP according to types as well as identify the most frequent MRP encountered and interventions made by the pharmacists. Method: The study was a retrospective study carried out among 200 geriatric patients randomly sampled, over 18 months period (January 2018 to June 2019). Data extracted include patients’ demographic information, prescribed medication and number, medical condition, and pharmacist’s intervention (where available) using data collection form. Information collected were categorized and analyzed statistically. Result: showed that female geriatric patients (64.4%) were more than male (35.5%). Most (43%) of the studied population were in the range of 60yrs – 70yrs. Out of the 200 patients assessed, 157 (78.4%) had medication related problems. Drug-drug interaction was the most frequently (64.4%) occurred MRP, as most (62.5%) of the studied group had 6 -10 medications in one prescription, and 12.5% had more than 10 medications in one prescription. Following drug interaction was incorrect drug administration (18.5%). Of the population studied, 56.5% of the patients were using their medication inappropriately. The major contributing factors responsible for these MRPs were comorbidities, poly-pharmacy, and medication non-adherence. Conclusion: The study identified categories of medication related problem in the geriatric Unit of the hospital and the need for pharmacists’ interventions.
Medication related problems or drug-related problems include medication errors involving error in the process of prescribing, dispensing, or administration of a drug (irrespective of any adverse consequences or not) and adverse drug reactions. (1) Adverse drug reactions, on the other hand, are any response to a drug which is noxious and unintended which occurs at doses normally used in humans for prophylaxis, diagnosis, or therapy of disease or the modification of physiological function. (1) Adverse drug event can be defined as an injury, whether or not casually related to the use of a drug. The Pharmaceutical Care Network of Europe defined medication related problems as events or circumstances involving drug therapy that actually or potentially interfere with desired health outcome. (2) Medication error (ME) is a form of medication related problem.

Medication errors are generally any barrier that prevents the right patient from receiving the right medication in the right dose at the right time through the right route of administration, at any stage in the medication use process, (which includes prescribing, order communication, dispensing, administration and monitoring) with or without the occurrence of adverse drug events. (3) Medication error could be wrong patient, wrong dose, no date, or wrong date, wrong time, wrong documentation, wrong route of drug administration, wrong frequency of medication, and inadvertent changing of medication.

Medication related problems have been identified as the third or fourth cause of death among the elderly and can cause disability, gait disturbance and falls. (4) United Nations states that 60 years and above will be referred to as the older population and further grouped geriatrics into three which are: young old or elderly (up-to 75 years), old – old or aged (up-to 85 years), and very old (over 85 years). The elderly population is at risk for medication related problem as a result of the changes in their pharmacodynamics and pharmacokinetic profiles, presence of multiple chronic disease and comorbid conditions, as well as the types and numbers of prescription and non-prescription medications they consume. (5) Consequences of medication related problems may be mild in some cases and in others severe. They include drug – drug interaction, drug – disease interaction, lack of efficacy, poor patient adherence, and poor quality of life. In turn, these may have significant health and economic implications including increased use of health services, prolonged hospital stay, increased burden on healthcare system and providers and patient caregiver and even death. (6) The National Coordinating Council for medication Error Reporting and Prevention (NCCMERP) has defined medication errors (ME) as “Any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of healthcare professional, patient or consumer” (7) While American Society of Hospital Pharmacists’ guideline for MEs stated that incidence of MEs is not exactly known because of variations in different definitions of medication error, different methods, or subject populations (8). Medication error may not always result in injury and therefore will not always be adverse drug event (ADE). Adverse drug event may be preventable or non-preventable. Non preventable ADE are also known as adverse drug reaction and may include allergies and correct use of medications that were not tolerated (9).

Study carried out in Malaysia (10) determined medication errors among geriatrics in a teaching hospital and found that the prevalence of medication errors per day was approximately 20 cases. In an Indian tertiary hospital, 83.4% of drug related problems were identified in geriatrics Unit. (11) While another study (12) compared potential inappropriate prescribing and associated factors among older persons in Nigeria and in South Africa, and reported that the prevalence and pattern were similar. Meanwhile, a review article (13) of medication errors in elderly acute care pointed out that there was no clear pattern found in the types of medication errors according to
geographical origin of the studies, pointing out that the problems of medication safety are quite alike, at least in developed countries but that the situation in less developed countries where not much research has been made about this topic, maybe different.

This study thus aimed to assess medication related problem in geriatrics Unit of University of Port Harcourt Teaching Hospital, a typical Nigerian tertiary hospital, located within less developed part of the world.

2 | METHOD

A retrospective study was conducted in the geriatrics Unit of University of Port Harcourt Teaching hospital for a period of 18months (January 2018 to June 2019).

Ethical approval was obtained from the Research and Ethics Committee of the University of Port Harcourt Teaching Hospital before accessing the patients’ folders.

2.1 | Sample size

The sample size was calculated using the Taro Yamane formula (1967) (14) shown as

\[
    n = \frac{N}{1 + N(e)^2} 
\]

Where \( n \) =sample size; \( N \) = population size; \( e \) = margin of error (0.05)

A total of 200 patients were assessed. The study included both male and female who were 60 years and above. Both in- patients and out- patients were assessed.

Hospitalized patients who were unconscious were excluded. HIV infected patients who have complications and patients with malignancies, or patients waiting for surgery, were all excluded.

2.2 | Data collection

Eligible patients’ folders (case records) containing patient case history, diagnosis, physician’s medication order sheets, nurse medication administration records, progress charts, and laboratory investigation results, were reviewed Information extracted from the folders include: demographic data, educational status, social habits, current medications, past medical and past medication history, medication dose and dosage regimen, as well as administration regimen.

In-patient case records were reviewed from date of admission to date of last medication or discharge (whichever applied). Out patients’ prescriptions were assessed for medication errors and medication related problems.

The data collected were assessed for medication related problems and medication errors. All medication related problems and medication errors identified were documented and analyzed.

Descriptive statistics were applied for the data variables using the statistical package for social sciences (SPSS) version 20.0. A p-value of 0.05 was considered significant.

3 | RESULT

A Total of 200 geriatric patients were assessed for medication related problems. Of these patients, 157 had medication related problems. The demographic data of the studied group is shown in Table 1. The result showed that there were more female geriatric patients (129(64.5%) than male 71(35.5%).

The age distribution of this studied population is shown in Figure 1.

The result showed that most of the patients were between the ages of 60yrs to 70yrs, 86(43%) while 17(9%) were above 90yrs.

On the educational status only few patients 9(4.5%) had no formal education, while majority 190(95%) of the studied group were married.

The overall percentage of the observed medication-related problems was 78.5%. This comprised prescription error (70.1%) and administration error.
TABLE 1: Demographic Data of the Geriatric Population Studied (N = 200)

| Characteristic       | Proportion | Percentage |
|----------------------|------------|------------|
| Gender               |            |            |
| Male                 | 71         | 35.5%      |
| Female               | 129        | 64.5%      |
| Age (yrs)            |            |            |
| 60 - 70              | 86         | 43%        |
| 71 - 80              | 55         | 27.5%      |
| 81 - 90              | 42         | 21%        |
| >90                  | 17         | 8.5%       |
| Marital status       |            |            |
| Married              | 190        | 95%        |
| Divorced             | 4          | 2%         |
| Widow/Widower        | 6          | 3%         |
| Educational status   |            |            |
| No formal education  | 9          | 4.5%       |
| Primary              | 36         | 18%        |
| Secondary            | 100        | 50%        |
| Tertiary             | 55         | 27.5%      |
| Religious belief     |            |            |
| Christianity         | 190        | 95%        |
| Unspecified          | 10         | 5%         |

The most frequent medication–related problem identified which related to prescription error was drug–drug interaction (64.4%) as shown in Figure 2. The interactions were more of pharmacodynamics (51%) than pharmacokinetic (13.4%) interactions (p<0.05).

FIGURE 2: Frequency (in %) of Identified Medication-related Problems

Other medication–related problems identified include incorrect frequency of drug administration, dosage too high, and dosage too low which is the least (1.8%) of the identified medication problems.

The average number of drugs per prescription as observed among the studied population is given in Figure 3.

FIGURE 3: Average number of drugs per prescription among the geriatric patients

The result showed that 12.5% of the geriatric patients had more than 10 drugs per prescription while most
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of them (62.5%) had 6 to 10 medications in a prescription.

The common diseases identified among the studied geriatric group, ranked in order of occurrence were:

Hypertension > Diabetes mellitus > Osteoarthritis > Rheumatoid arthritis > Psychotic disorders > Chronic Obstructive Pulmonary Disease (COPD) > Ocular disease

However, these diseases, occurred as comorbidity.

The study also sought to identify pharmacists’ intervention in the medication related problems. But no documented pharmacists’ intervention was identified.

4 | DISCUSSION

The goal of medication use is to achieve defined therapeutic outcomes with improvement of quality of life and minimize patient risk. (15) Some of the factors that can contribute to the risk of drug related problems in elderly include sub optimal prescribing (e.g. overdose of medications, poly-pharmacy, inappropriate use of medications, and under dose).

Medication errors maybe from both dispensing and administration problems, patient medication non-adherence, and attendance by multiple physicians.

The result of this study revealed that of 200 geriatric patients assessed for medication related problems, 157, (78.4%) were identified with medication related problems, though the problems were more of pharmacodynamics than pharmacokinetic. The elderly undergo some degree of physiological changes as they age. With increasing age comes cognitive and physical vulnerability, multiple chronic diseases, and geriatric syndrome such as alteration in gait, balance and mobility.

Our study is in line with the study done in Malaysia (10) where highest prevalence of medication error was found among the geriatrics especially those who receive more than nine drugs per prescription and in India (11) where 83.4% of medication related problems were identified among the geriatrics.

The results also showed that 35.5% of the patients were male and 64.5% were female showing that females have greater percentage of medication related problems than males. This is similar to the results of study carried out in Oman (16) where medication errors in prescriptions obtained by female were 67.6% when compared to male patients. But in contrast, study in India (11) reported that female geriatric patients were less (34.4%) when compared to the male geriatric patients (65.6%). Thus our result may be attributed to higher number of elderly female than elderly male.

Medication error can occur at any phase of medication use cycle from prescribing, dispensing, and administration of a drug to the patient. Medication error can increase morbidity and mortality of the population along with increase in the cost of the treatment and furthermore, can affect patient’s confidence in medical care (17, 18).

This study revealed that prescription errors was the most frequent (70.1%) followed by administration error (29.9%). This differed from the results obtained by Karthikayan et al (19) where administration error (28.35%) was the most frequently occurring type of error, followed by prescribing errors (22.38%), dispensing errors (8.9%) and drug interaction, patient errors and other types of errors collectively contributed to the remaining portion. Prescription error encompass those related to the act of writing prescriptions, whereas prescribing faults encompass irrational prescribing, inappropriate prescribing, under-prescribing, over-prescribing, and ineffective prescribing, arising from erroneous medical judgment or decisions concerning treatment or treatment monitoring (20, 21).

Furthermore, the high rate of prescription error in this study may be attributed to lack of pharmacists’ intervention.

Another medication-related problem revealed in this study is administration error, although the incidence (29.9%) was relatively low compared to prescription error (70.1%). Administration error identified were incorrect frequency of drug administration (18.5%) and wrong time of drug administration (11.4%). Administration error could be in the form of wrong route; wrong dose; wrong time; wrong drug; and incorrect frequency; drug not administered or written.
communication errors. In this study the most common administration errors were incorrect frequency and wrong time of drug administration. Administration errors may result from poor knowledge of drug among nurses, physical and emotional state of nurses and the working environment and its workload. (13) To minimize the incidence of administration errors, nurses should be taught about proper use and checking of proper function of different kinds of medication-dispensing systems. Some educational interventions about the medication use can be provided for outpatients and their caregivers. This could comprise information leaflets, educational events or even films about these topics. (13) In a systematic review of medication errors in elderly acute care, the authors classified medication errors into four groups based on content: those associated with (i) nursing competence, (ii) prescription- and patient – related factor (iii) medication work organization and nursing process and (iv) safety culture (13) Their review reported that the most often mentioned medication errors in the elderly acute care were factors associated with poly-pharmacy and drug interactions, (22–27). This agreed with the result of our study that identified drug – drug interaction as the most prominent MRP, and dosage too low as the least. Furthermore, majority (62.5%) of the elderly in this study had 6-10 medications per prescription while 12.5% had more than 10 medications per prescription. Factors that can contribute to drug – drug interactions include poly-pharmacy which can also be linked to dependence on multiple physicians. This study observed that majority of patients’ prescriptions were done by more than one physician. The dependence on more than one physician may lead to poly-pharmacy, inappropriate medication, drug-drug interactions. Another reason for the dependence on more than one physician is that geriatric patients may have more than one disease conditions and therefore more than one specialist of each disease may treat the patient. This is probably the reason why there may be two or more physicians responsible for medication-related issues. Again many chronic diseases, such as hypertension, osteoarthritis are age – related. Thus, in this study the observed chronic diseases that occurred among the geriatrics ranked according to their prevalence, reflects the level of possible treatment, thus poly-pharmacy and possible level of drug- drug interactions.

Our study showed no documented pharmacist’s interventions recorded for all medication-related problems identified. This could be due to lack of established medication-related problems reporting system or poor consideration of the severity of the medication related problems.

5 | CONCLUSION

The level of medication related problems identified in geriatrics Unit of University of Port Harcourt Teaching Hospital was high. The most prominent among all was drug- drug interaction which was more of pharmacodynamics than pharmacokinetics. The need for pharmacists’ intervention is very crucial to reduce medication related problems.

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