



Pharmaceutical care Plan and Pharmacist Intervention against Medication Errors in Geriatric Patients

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ARTICLE HISTORY

Received: 17.11.2017

Accepted: 28.02.2018

Available online: 30.03.2018

ABSTRACT

OBJECTIVES: Main objective of the study was to evaluate, categorize the errors and to reduce the medication errors in geriatric inpatients, to find out what types of errors are happening in our hospital and to suggest the clinical pharmacist directed interventions to improve the better patient outcomes.

METHODOLOGY: The entire study was divided into two phases namely Phase 1 & Phase 2. In the phase 1, it was assessed, analyzed and categorized that each error happened during the gap of 3 months and in the phase 2, the collected errors were put forward to the health professionals and awareness class was conducted for them about the medication errors by using leaflets, newsletter and also through individual counseling. The results obtained from the phase 1 was then compared to that of the phase 2. **RESULTS:** The total number of patients involved in the study was 213 in number. Among them in phase 1 there were 154 number of errors out of 110 patients whereas in the phase 2 there was 101 number of errors out of 103 patients(p value <0.05). Hence, this implies a statistically significant reduction of errors as our p value(0.02) is less than 0.05. **CONCLUSION:** The study provided a complete evaluation, categorization and analysis of different medication errors seen in the departments of general medicine, neurology, nephrology and pulmonology. The errors so obtained were grouped as per the types of medication errors namely prescription errors, administration errors, reconciliation errors, dispensing errors, transcription errors, storage errors, documentation errors and others.

Keywords:

Geriatry, Medication Errors, Types of Errors

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INTRODUCTION

Medication errors are common cause of iatrogenic adverse events in elderly people. Medication error can be defined 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[1]. As per the United Nations initiatives every countries must prepare their healthcare settings on the ageing of their population[2]. Clinicians must put their effort on proper geriatric prescriptions in order to prevent the iatrogenic adverse events in older patients[3]. Inappropriate pharmacotherapy among older patients is said to be a critical and alarming situation in our healthcare system. Apart from poly-pharmacy and multiple co-morbidities

the age related pharmacokinetic and pharmacodynamic changes may increase the risk of adverse drug reactions and medication errors.

Drug use is a complex task and there are many drug related challenges at various levels starting from prescriber, pharmacists, nurses and ending with the patients. Adverse events and medication errors are an inevitable reality of healthcare system.

As the age gets increased the pharmacodynamics and pharmacokinetic aspects get altered due to the physiological and anatomical changes in the body function. Geriatric patients who have complex health problems and rely on multiple therapies are always susceptible to medication errors. Hence adequate management of medication errors can reduce both short term and long term morbidity as well as mortality in patients of various

risks and timely monitoring of various complications which may lead to negative socioeconomic crisis. Therefore optimization of drug prescribing in geriatric population is having significant clinical and economic value.

METHODOLOGY

A prospective interventional study was conducted among the inpatients of Pulmonology, Nephrology, Neurology and General medicine departments of KIMS Al-Shifa hospital Perinthalamanna, Malapuram, Kerala. The study was carried out for over a period of 6 months among the geriatric inpatients of the respective departments specified above. This study was approved by the ethical committee of the institution and an official consent was also given for the purpose of performing the study. It was certified by the Institutional Ethics Committee (IEC) and approved the proposal of the study. Patients with age below 60years, all the outpatients and inpatients without medication therapy, patients admitted for diagnostic techniques and patients taking voluntary discharge were excluded from the study. Patients with age above 60years, Inpatients on medication therapy with admission of more than 2 days were selected for the study. Literatures supporting the study was collected from authorized international journals and national journals. Information from the review of these literatures and the scenario in the study site were put together in developing a data collection form and protocol. A data collection form, leaflets and newsletter were developed for the study.

A Pharmacist data collection form was designed to collect information needed for the study. One part of the data collection form consists of patient profile form and the other by medication error reporting and documentation form. The patient profile form contains the details such as name, sex, age, weight, MRD number, department, date of admission, date of discharge, reason for admission, past medication history, comorbid conditions, family history, social history, details of medications and relevant lab data. Medication error reporting and documentation form was designed from standard USP medication error reporting and documentation form and it contains details on errors such as date and time of event, brief description of event, error reached the patient or not, type of staff

involved in the error, type of error, causes of error, drug involved in the error, how was it discovered, and finally NCC MERP proposed medication error index for quick reference. Leaflets was prepared to provide knowledge about importance of proper use and storage of medicines, different types of medication errors, consequences associated with medication errors and knowledge about medication error reporting and documentation. News letter was prepared to publish the results we got from the phase 1 and to provide knowledge about the medication error assessment and reporting. The study was carried out in 2 phases which consists of pre interventional and interventional phase, in the Pre interventional phase an observational audit was conducted for all patients who were eligible according to the inclusion criteria. All the selected patients were followed till discharge. All necessary data in the case files were written in the data collection form, while looking for any transcription errors and improper recording or omitted doses. Also the medicines dispensed from the pharmacy were checked from nursing station where the medicines stored in a separate container for each individuals. Spot interviews with nurses were done for the clarification. Then the patient interviews were done to assess the medication errors. The identified errors were documented in the prescribed form, categorized and analyzed for a period of 3 months. There was an interventional phase of 3 months in which, the documented errors were reported to the physician, and thereby the rectified informations about the medication errors were published in the form of news letters and leaflets about the medication errors were distributed among the health care professionals of the respective departments of Nephrology, Pulmonology, General medicine, and Neurology departments. Regular audits were performed again for a period of 3 months to assess whether there was any reduction in medication error. Data was entered into Microsoft excel and the recorded data were statistically analysed using statistical package for social sciences (SPSS) software version 20.0 for WINDOWS. Also Pearson chi-square tests and Mann Whitney U tests were performed to compare the results

RESULTS

213 patients were randomly selected from the respective

Table 1 : List of prescription's number collected from hospitals

CAUSES	NUMBER OF PATIENTS(n=213)	PERCENTAGE %
Illegible / incomplete prescription	87	34.11%
Patient information / record unavailable	23	9.01%
Lack of knowledge about the drug	18	7.05%
Wrong labeling / instruction on dispensing envelope or bottle / container	7	2.74%
Environmental or staffing problem	99	38.82%
Other causes	21	8.23%

departments and followed during the period of 6 months. Out of them, 53.5% were males and 46.5% were females. Among them 51.64% experienced a total number of 255 different types of errors consisting of 55.3% male and 44.7% female patients. Male patients were predominated over females in the overall population and also in the study population with errors. The results showed that 117(45.90%) of the error population were

prescribed with minimum of 6-10 drugs followed by 105(41.17%) with 11-15 drugs, 17(6.66%) with 1-5 drugs and 16(6.27%) with more than 15 drugs. The more number of drugs prescribed may be due to the increased number of disorders (Fig.01). When analyzed the number co-morbidities associated with error population, patients with 4-5 co-morbidities have the highest number of errors 108(42.35%) followed by patients with

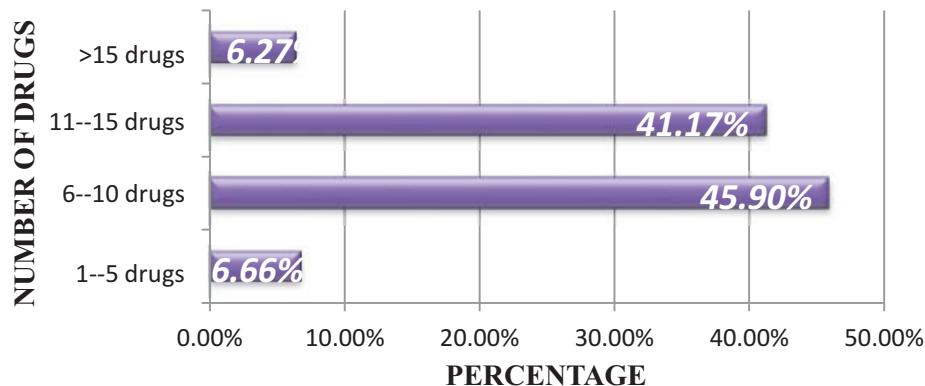


Fig. 1 : Number of drugs prescribed for error population

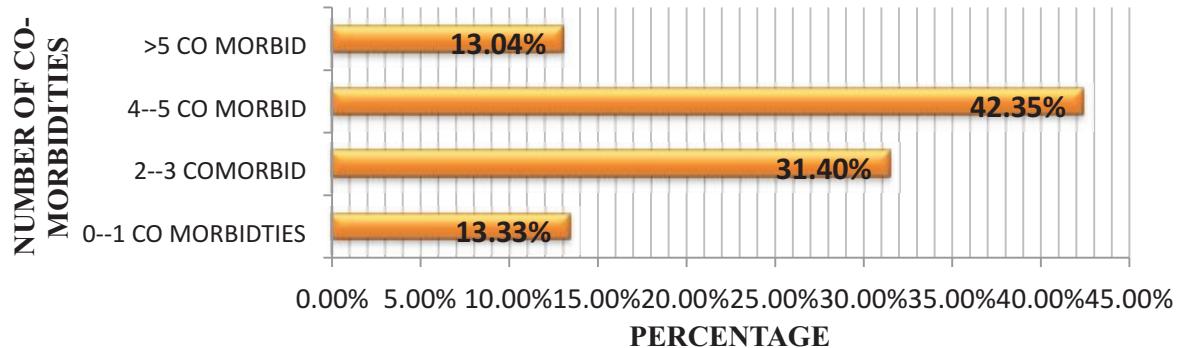


Fig. 2 : Co-morbidities for error population

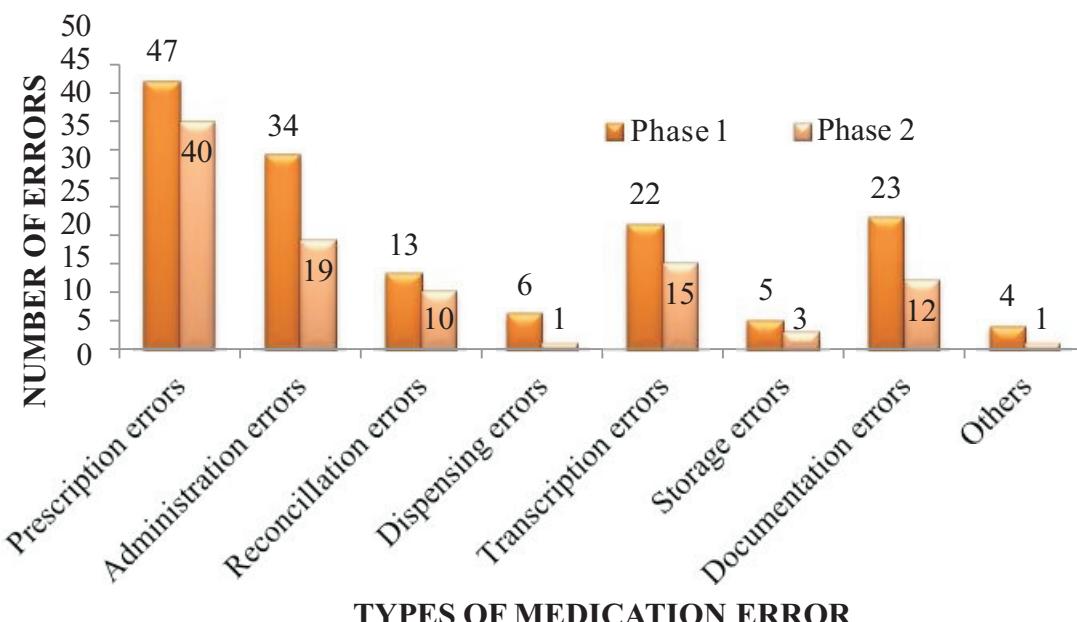


Fig. 3 : Different types of medication errors found

2-3 co-morbidities 80(31.40%), patients with 0-1 co-morbidities 34(13.33%) and finally patients with more than 5 co-morbidities 33(13.04%) (Fig.02). Analysis of types of errors in total population showed that prescription errors were more accounted 87(34.11%) followed by administration errors 53(20.7%), transcription errors 37(14.5%), documentation errors 35(13.72%), reconciliation errors 23(9.01%), storage error 8(3.13%), dispensing errors 7(2.74%) and other errors 1.90% (Fig.03). On analyzing the major causes of errors for the total population, a result of 38.11% of errors occurred because of environmental or staffing problem, followed by illegible or incomplete prescription (37.11%), 9.01% with no proper patient information or record, 7.05% was due to lack of knowledge about the drug, 2.74% with wrong labeling or wrong instruction on drug envelop or container and 8.23% was due to other causes such as lack of proper care given to patients (Table. 01), study showed that doctor (106) were more predominant in causing errors followed by nurses (69), patients (6) and pharmacists (4) respectively. (Fig.04). When comparing the pre interventional and interventional phase, out of 213 total population 110(51.64%) patients were followed in the first phase and

103(48.35%) were selected in the second phase. Among the total errors (255 in number) in both phases, the phase 1 experienced more errors, 154(60.4%) than the second phase, 101(39.6%). (Fig. 05). Among the total 154 different types of errors in the phase 1, Prescription errors 47(30.5%) were found more predominantly followed by Administration error 34(22.07%), Documentation error 23(14.93%), Transcription errors 22(14.28%), Reconciliation errors 13(8.44%), Dispensing errors 6(3.90%), Storage error 5(3.24%) and other types of errors 4(2.59%) respectively. But in the Phase 2 it was observed that there were 101 different types of errors, among them Prescription errors 40(39.60%)(chi-square=0.334, p value= 0.564) were predominantly observed, followed by Administration errors 19(18.81%)(chi-square=4.420, p value= 0.036), Transcription errors 15(14.85%)(chi-square= 1.095, p value= 0.295), Documentation errors 12(11.88%)(chi-square=3.321, p value= 0.068), Reconciliation errors 10(9.90%)(chi-square=0.246, p value= 0.620), Storage error 3(2.97%)(chi-square=0.392, p value= 0.531), Dispensing 1(0.99%)(chi-square=3.364, p value= 0.067) and other errors 1(0.99%) respectively. (Fig.06). When compared the person

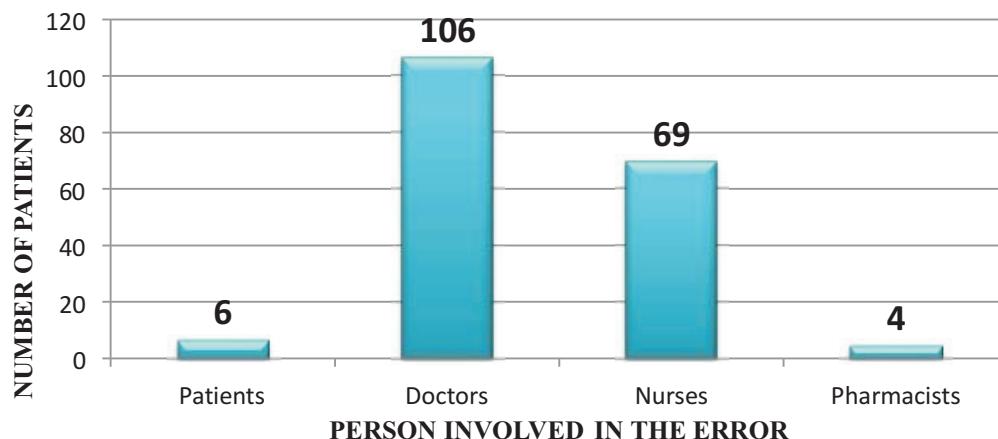


Fig. 4 : Distribution of person involved in the error

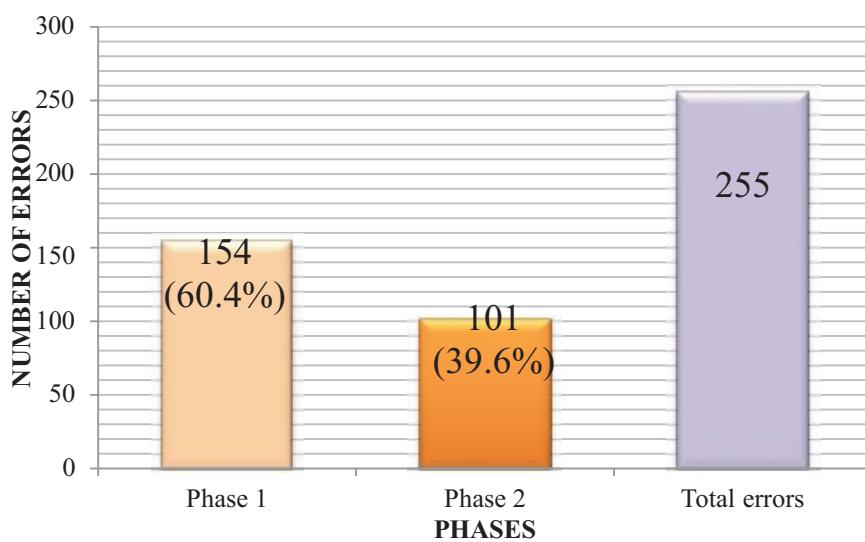
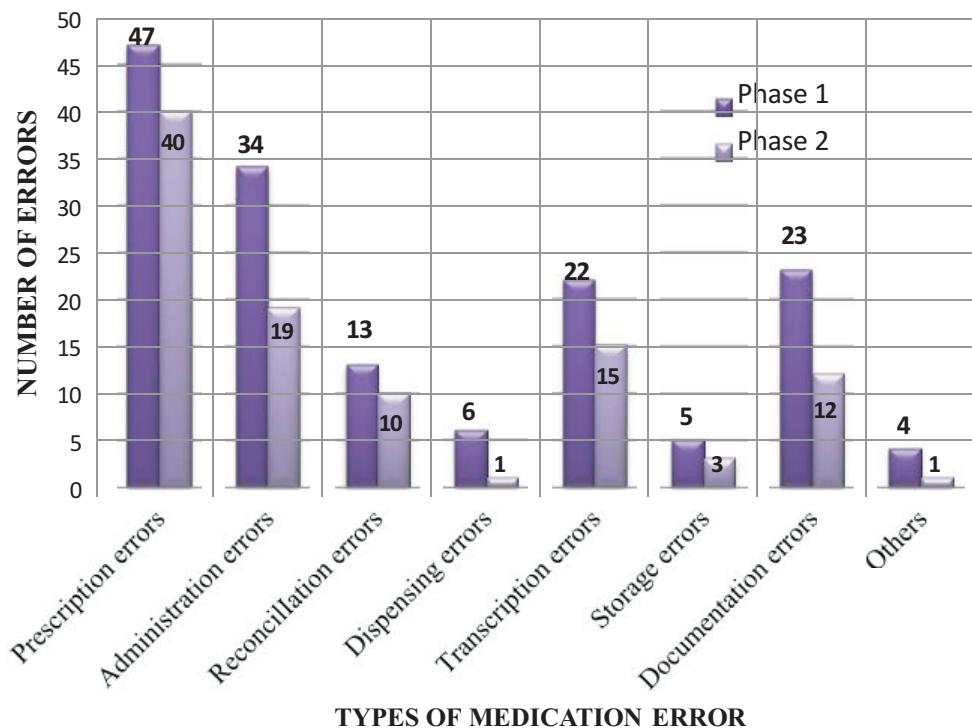
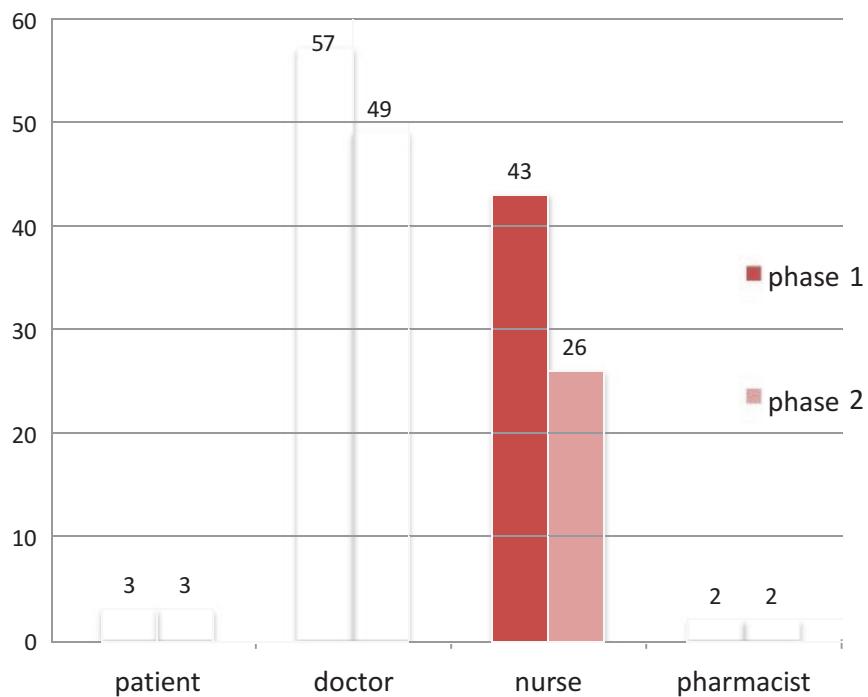


Fig. 5 : Number of errors in each phases

**Fig. 6 :** Different types of errors in two phases**Fig. 7 :** Distribution of person involved in the error

involved in the medication errors, the highest number of errors out of total 110 patients, 57 were reported from the doctors hand in the 1st phase and 49 out of 103 patients in the 2nd phase(chi-square=0.383, p value= 0.536). Next highest position of errors occurred from the hands of nurses, 43 out of 110 in the 1st phase and 26 out of 103 in 2nd phase(chi-square=4.658, p value= 0.031). It is followed by the mistakes from patients, 3 out of 110 in 1st phase and 3 out of 103 in 2nd phase(chi-square=0.005, p

value= 0.944). Only least number of errors were being reported from the pharmacist part, 2 out of 110 in 1st phase and 2 out of 103 in 2nd phase(chi-square=0.004, p value= 0.947) (Fig. 07). According to NCC MERP, the errors were broadly categorized into "NO ERROR", "ERROR NO HARM", "ERROR HARM" and "ERROR DEATH". 12(11.7%) of the errors in the 2nd phase were categorized under "NO ERROR" which was higher than that in 1st phase 11(10.0%) showed a positive change(chi-

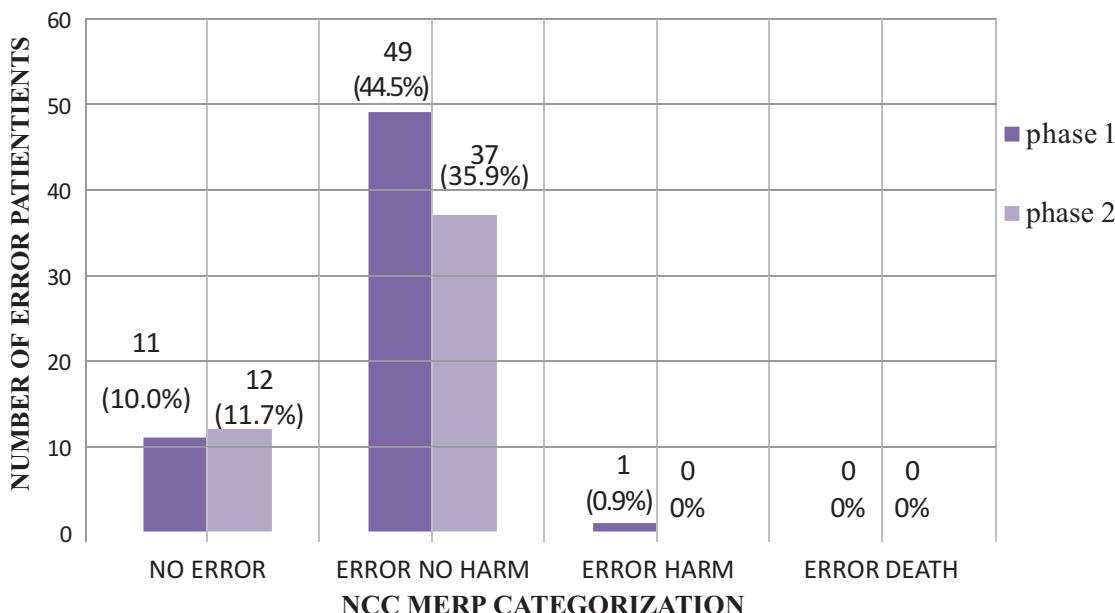


Fig. 8 : NCC MERP categorization of errors in two phases

square=0.150, p value= 0.698). Majority of the errors in both the phases were categorized under "ERROR NO HARM" which was greater in 1st phase 49(44.5%) than in 2nd phase 37 (35.9%)(chi-square=1.320, p value= 0.251). 1(0.9%) of errors in the 1st phase were categorized under "ERROR HARM " which was greater than in the 2nd phase 0(0%) also showed positive change in error reduction(chi-square=0.941, p value= 0.332)). No errors were found in the category "ERROR DEATH" in both the phases. The details were shown in the figure. (Fig.08).

DISCUSSIONS

Medication error can be generalized as the failure in therapy that leads to potential harm in the patient. Major medication errors are generally the result of improper prescribing and failure in prescription writing that leads to wrong interventions. It has been found that the prime culprits of medication errors are most likely the healthcare professionals on account of several reasons. Keen observations must be given on medication errors because they are most commonly seen in the geriatric patients. Around the globe it is noted that the overall incidence of drug reactions in geriatric population is expected to be twice than that in the younger population[4]. Everybody who prescribes for older people needs to be aware of the important physiological changes that occur with ageing that affect drug pharmacokinetics and pharmacodynamics, these changes predispose older people to adverse outcomes arising from medication errors.

Among the total number of geriatric population selected (213 patients), 53.13% were males and 46.50% were said to be female. The study focused that there is no link between the genders of the patient to that of the medication errors occurring[5]. Among the total subjects the number of patients with error was said to be 51.60% and without error was said to be 48.40%.

On the basis of a retrospective study conducted by Paul Gallagher and Denis O Mahony on inappropriate prescriptions it was clearly stated that poly-pharmacy is known to dramatically increase the risk of ADR, Drug-Drug and Drug Disease interactions etc and thereby co-morbidity is the underlying cause

of complex poly-pharmacy, which in turn is the major risk factor for medication errors in geriatrics, which in turn indicates that the use of several drugs concomitantly is justified in the treatment of multiple chronic diseases[6]. The results of our study showed that 45.9% of the error populations were prescribed with minimum of 6-10 drugs followed by 41.17% with 11-15 drugs, 6.66% with 1-5 drugs and 6.27% with more than 15 drugs. The more number of drugs prescribed may be due to increased number of disorders. The results of our study indicated that patients with 4-5 co-morbidities have the highest number of errors 42.35% followed by patients with 2-3 co-morbidities 31.40%, patients with 0-1 co-morbidities 13.33% and finally patients with more than 5 co-morbidities 13.04% respectively, this also indicates when the number of co- morbidities increases, chances of poly pharmacy would be more[6]. Another prospective study conducted by Anandhasayanan A et.al on medication errors of diabetology and general medicine departments in a multi-specialty hospital clearly states as their findings of study that major cause of medication errors was due to the inadequate staff education (40%) and staffing problems and errors were mainly caused by physician(30%) and others (32%)[7]. The results of our study showed that major cause of medication errors were environmental or staffing problems (n=213, 38.82%) followed by incomplete or illegible prescribing and other causes. Also the study revealed that errors were mainly caused by doctors (n=213, 49.7%) followed by nurses (n=213, 32.3%) and other health professional (18%).Conclusion of the study showed that the only healthcare professionals who have accepted the pharmacist interventions were said to be the nurses which in turn showed a drastic reduction of medication errors from phase 1 (49) to phase 2 (26). .Chi-square test showed that p value less than 0.05 (p value=0.039), implies that there was a statistically significant reduction in the error caused by the nurses. However study did not give relevant statistical significance because of the limitations such as limited number of geriatric individuals, limited duration of the study, not meeting the same individuals in the second phase and also changing of the shifts of health care professionals etc.

CONCLUSION

Results of various studies have showed that the maximum number of medication errors were observed in geriatric population due to poly-pharmacy and multi-morbidities. From the findings of our study we had observed that there are eight different types of medication errors in the study site. We were able to reduce almost all the errors to an extent administration errors were drastically reduced. The error picture in the second phase showed that a positive impact of pharmacist intervention mainly in the area of administration errors, prescription errors, dispensing and reconciliation errors. Thus the study concluded that, there are a number of errors that occurs in a hospital scenario. Hence, the clinical pharmacist plays an important role in the safe medication use and which in turn ensures the reduction of medication errors.

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