



Impact of Pharmaceutical Care Intervention on Health Outcome of Elderly Patients

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Abstract *Background/objectives:* Health related problems of geriatrics require special attention because these people face many problems, associated to health, social support and economic uncertainty. The study aims to evaluate effectiveness of pharmaceutical care programme on health outcome of geriatric patients by identifying the drug related problem, comparing the medication adherence, and quality of life and resolving it. *Methods:* The present study was a prospective interventional study carried over a period of three years and the study was performed in 3 phases. MMAS-8 and SF-36 are used in the study to find out medication adherence and quality of life respectively. *Result:* During the study period 770 patients' data was collected, out of which maximum patients were in the age group of 60–70 range (50.4%). A total of 813 drug related problems were identified from 770 study subjects. The most common drug related problems were found to be drug interactions (40.9%). Patient counselling and health care information leaflet are the most interventions in the study. The acceptance rate of suggestions and the changes in drug therapy was found to be high (40.1%). Descriptive analysis, chi-square test and *t*-test are used in this study for statistical analysis. *Conclusion:* Pharmacist's involvement in inpatients care can significantly help to identify, resolve and prevent the drug related problems. Outcomes of interventions indicate that almost 80.26% of problems are totally solved by pharmacist's interventions in this study. Pharmacist in geriatric health care has a positive influence on their health outcomes.

Keywords *Guiera senegalensis*, Oil, GC-MS Analysis, Antimicrobial Activity

Introduction

Geriatrics is the branch of the sub-specialty that mainly consists of different aspects of illness like experimental, curative, supportive and social features of diseases in the elder people. In the recent clinical practice, information about the prescribing in elderly patients, clinical knowledge in pharmacology and therapeutics, and clinical pharmacy are important due to the increased number of elderly people and their comorbidities. The drug dosage regimens in older adults are a complex process and the physicians always spend a lot of time in supervising the drugs and suitable dosage form and duration of treatment in geriatrics [1-16].

Elderly peoples constitute one of the most important parts of healthcare society and we can see that most of the elderly patients are exposed to several types of medications. Among all the elderly patients, the major part of the geriatric population will be taking at least one medication daily for their illness [17]. The drug intake behaviour in



elderly people is very high because of their illness as well as other factors like age, comorbidities and other genetic factors also make these people compelled to take many medications [2]. Age related changes starts to occur in these populations at their 5th decade of life and in case of women it starts to occur a little bit earlier when compare to men. Patient non-compliance and drug related morbidity and mortality affects these geriatric populations to a large extent. Selecting applicable pharmacotherapy is a difficult and complicated method for geriatric patients as a result of several features of getting old as well as it affects prescribing medication for geriatric people [3,18].

Drug-related problems mainly comprise of medication errors (mistake that happens throughout the method of writing a prescription, while distributing drugs, or at the time of administration of the medicine, whether or not there are any adverse concerns) and adverse drug reactions A reaction to a medicine that is unwanted and not required, and that happens at normal doses when employed in humans subjects for protecting from disease, or to investigate a disease and finding a therapy or for modifying a biological function [11-12]. The inter individual variability among elderly people in their health status, infirmity, changes related to their age, poly morbidity and poly pharmacy related along with this makes generalisation of prescribing recommendations often difficult in these patients [4, 10].

Medication use in geriatric patients are often in appropriate and erroneous, this occurs mainly because of the complexities in prescribing drugs to this category and happens due to several patient, supplier or health system issue that substantially affect the therapeutic importance of medicines in older people [9]. An important aim of drug therapy is to attain helpful outcome with the treatment and multiplying life expectancy by diminishing danger to the people [5].

Pharmaceutical care services offered by the clinical pharmacist to geriatric patients are an attempt to resolve or reduce drug related problems, improve medication adherence and health outcomes [13]. Studies shows that majority of the drug related problem were predictable which can be avoided and pharmacist services can decrease the frequency of occurrence of ADR, number of hospital visits, and money required for treatment [19]. Interventions provided by clinical pharmacist can definitely improve patient outcome including medication adherence, appropriateness of drug therapy, HRQOL, financial status and patient satisfaction [6,14]. Numerous researches performed in many different parts of the country proves that drug related problem is significantly high in developed area and clinical pharmacist is having a prominent role in health care team who can give interventions regarding drug therapy and proper patient counselling about their illness and treatment [15,20]. Hence, the recent work is performed to know the effect of pharmaceutical care service on health outcome of geriatric patients and to contribute an optimised pharmacotherapy in geriatric patients [7].

Methodology

The investigation was carried out at the inpatient setting of a private, referral and tertiary care teaching hospital at Dehradun. A prospective and pharmacist interventional study was carried out for a 3-year time period. The study involved data collection of patients by conducting regular ward rounds and identification of patients to be included in the study. All data including demographic details, patient past medical and medication history, social history was collected by using the medication history interview form. The drug related problems like medication errors, adverse drug reactions and drug interactions was monitored and the pharmaceutical care documentation form was used to document the pharmaceutical care provided by the clinical pharmacist. The quality of life was evaluated by using the SF36 questionnaire and Morisky medication adherence scorings evaluated the adherence status or patient compliance to medication. All these details were obtained by direct interview of patients and through checking the medical records which were later documented.

The study was planned for duration of three years, among the inpatients admitted in various departments of the hospital. The study includes geriatric in-patients with different comorbidities and multiple drug therapy and patients admitted in various department of hospital during three year of study period. The sample size taken for this study



was 770 patients and these patients were evaluated again after providing pharmacist intervention to find out the effectiveness of pharmaceutical care provided by the pharmacist. Approval for carrying out the study was obtained from the ethical committee working in Shri Mahant Indires hospital and the authority of the hospital provides official consent to conduct the study in different departments of the hospital. It was certified by the Institutional Ethics Committee (IEC) and approved the proposal (SGRR/MC/126). Patients with age above 60 years, Inpatients on medication therapy with admission more than 2 days were included in the study and patients with age below 60 years, Surgery, ICU and Psychiatric patients were excluded. Literatures supporting the study were collected from authorized international and national journals. Study was conducted in three phases such as pre-intervention, intervention and post-intervention. The major DRPs such as medication error, adverse drug reaction and Drug interactions were identified during pre-phase. The interviews for medication adherence behaviour of the patient were done using Morisky Medication Adherence Scale and measurement of HRQOL was done by using SF-36 questionnaire. The medication adherence and HRQOL were also taken from the patient and evaluated in the pre-interventional phase for finding the patients' health status and life quality (HRQOL) in Phase 1. Major intervention like Pharmaceutical care (PC) counselling was provided to the patients in phase The major intervention done was educational interventions and drug therapy interventions. In phase 3, the adherence to entire therapy was measured by using the Morisky Medication Adherence Scales MMAS-8. The HRQOL was again assessed in this phase by using the same SF-36 questionnaire which was used in the pre-interventional phase. The scores obtained from the pre and post interventional phases are compared to study the effect of pharmaceutical care programme on life quality.

All data obtained from the case records of patients were entered to Microsoft excel 2010. This was then connected with SPSS-USA, IL, CHICAGO (statistical package of social science) software by providing keys. For computers, windows SPSS version 20 software was used and were statistically analysed by appropriate methods. A confidence interval of 95% (descriptive) was used for analysing statistical reports. Analysis of Continuous variables was done by using the mean, percentage and standard deviation. Analysis of Discrete variables was obtained by using proportions. The mean data obtained in pre and post interventional phases were compared by using student's t-test. From the data obtained, statistical significance was obtained from a value < 0.05 .

Result and Discussion

The present study was mainly focused in geriatric patients. Patients were selected from the inpatients of different departments like neurology, General medicine, Pulmonology, Nephrology, Cardiology and Gastroenterology of a multispecialty hospital in order to assess the drug therapy behaviour in geriatric patients and the effect of pharmaceutical care activities on the patient management. Details of 770 patients were collected during the study period.

Among the study subjects, the highest number of patients is belonging to the range of 60–70 (50.4%). The least number of patients (1.6%) were found to be in the range of > 100 . 29.6% was surveyed in 70–80 range and 30 patients were found to be in between 90 and 100 (3.9%) and rest of them (14.5%) were observed in the 80–90 range (Fig. 1).

Both male and female patients were included in the study. Higher number of patients were male 444(57.7%), while the rest, 326(42.3%) were female. Among the study population, maximum number of patients were admitted in the General medicine (38.2%) and least of them in the Gastroenterology (10.9%). The remaining patients admitted in the Neurology (14.5%), Pulmonology (12.7%), Cardiology (11.9%) and Nephrology (11.7%). The results reveal a greater number of patients are admitted in the general medicine department, as the geriatric patients are often admitted with a disease condition associated with comorbid conditions (Fig. 2).



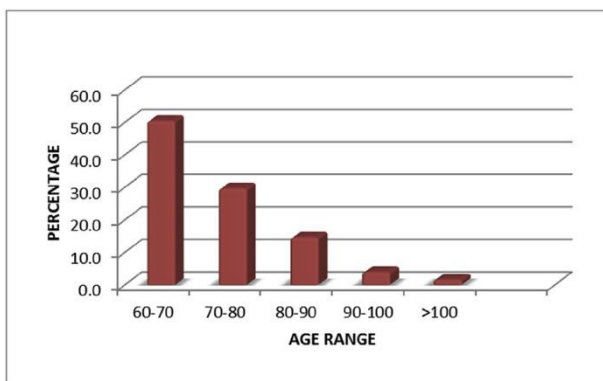


Figure 1: Age wise distribution

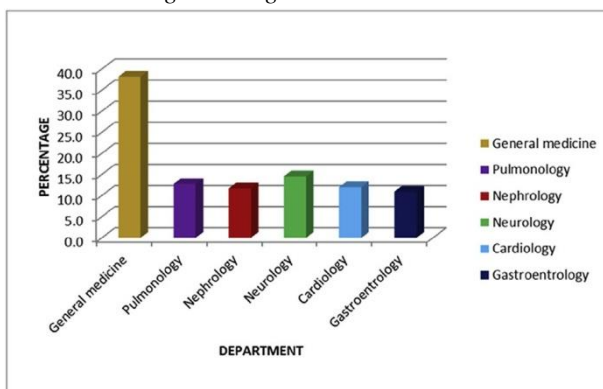


Figure 2: Department wise distribution

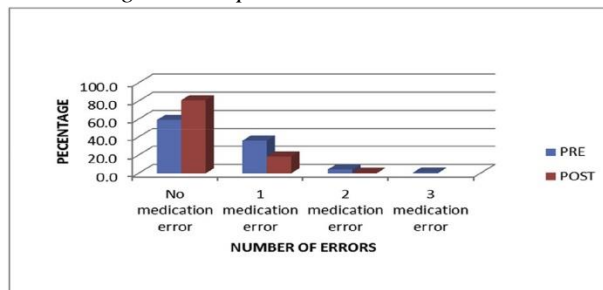


Figure 3: Comparison of pre & post medication error

Past medical history was observed in 673 (87.4%) patients, whereas 97 (12.6%) patients did not have a past medical history. The majority of the geriatric patients were diagnosed as hypertension and diabetes mellitus. In the co-morbidities Hypertension was observed in highest number (53.125%). Followed by Diabetes (51.87%), coronary artery disease (26.60%), respiratory system disorder (22.80%), chronic kidney disease (16.60%), gastrointestinal disorder (13.80%), cerebrovascular accident (11.30%) and others (9.37%). The result showed that, majority of the patients (74%) preferred to take diet for their drug therapy and rest of them (26%) have no specific diet prefer for their treatment.

The results showed that in the study population, patients having polypharmacy (6–10 drugs) prescription were more 516 (67.0%), 142 (18.4%) patients were prescribed with 11–15 medications, patients prescribed with up to 5 medication were 102 (13.2%) and only 10 (1.40%) patients were prescribed with more than 15 drugs. 445 (57.79%) patients were having poly pharmacy and remaining 325 (42.20%) were not noticed with polypharmacy.



The results showed that 455 (59.1%) patients were not exposed to any kind of medication errors in the pre phase. From the remaining patients, 276 (35.8%) patients experienced one medication error, followed by 32 (4.2) patients with 2 medication error and only 7 (0.9%) patients were exposed to 3 medication errors. Among the study population, after intervention statistically significant improvement was seen in the post intervention phase. These results showed that, no medication error level was increased (80.9%) and number of medication errors reduced (1 medication error = 18.4%, 2 medication error = 0.6%) in the post intervention phase. Significant improvement was seen in geriatric patients after intervention ($P < 0.001$). (Fig. 3).

The results of the study indicated that 442 (57.4%) patients did not have any type of drug interactions in their prescription. A total of 328 drug interactions were observed in the Phase 1 (before providing clinical pharmacist intervention) but in the post phase it reduced as 5 drug interactions. Comparing both phases in geriatric patients, category of “no drug interactions” exhibit more improvement (74.4%). After intervention, statistically significant improvement was seen in post-intervention phase ($P < 0.001$). (Fig. 4). Among the study population, significant improvement was seen in the post intervention phase ($P < 0.001$). In pre intervention phase, level of no adverse drug reactions were decreased and increased number of adverse drug reactions occurred in each category but in post-intervention phase each category have significant improvement, “No Adverse drug reaction (90%)” were increased, “1 ADR (9.7%)”, “2 ADR (0.3%)” were decreased after intervention (Fig. 5).

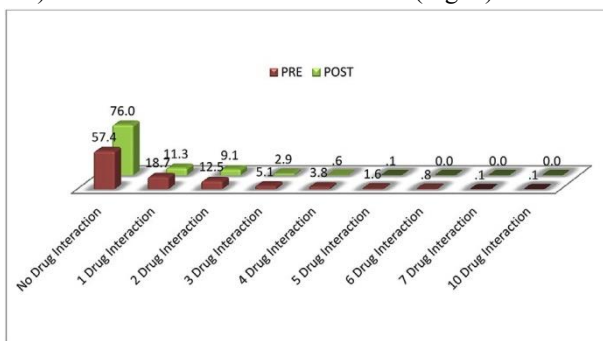


Figure 4: Comparison of pre and post drug interaction

A total of 813 DRPs were identified in pre phase and 409 DRPs obtained from the post phase. In this study duration, in the pre-intervention phase medication error 315 (40.9%), Drug interaction 328 (42.5%) Adverse drug reaction 170 (22.07%) was found to be in study subjects but in the post intervention phase (medication error 147 (19.00%), Drug interaction 185 (24.02%) and adverse drug reaction 77 (0.1%). These exhibit significant improvement after intervention ($P < 0.001$). Among all the DRP occurred, drug interaction was found to be highest number in both phases (Fig. 6).

From the study, it was observed that Corticosteroids (19.75%) were the major class of drugs implicated in causing ADR followed by Antibiotics (13.58%), Anticoagulants (13.58%) and Antihypertensive drugs (11.11%). The ADR obtained during the study period were analysed by Naranjo Causality assessment scale shows that majority of the ADR were probable (56%) and the remaining (44%) were possible. None of the ADR was proved to be definite, as re-challenging of the drug was not performed. Modified Hart wig severity scale was used to assess the severity of the reported ADR, and shows that majority of the ADR were mild (50.53%) followed by moderate (47.31%) and only 1.07% ADR was found to be severe in nature.



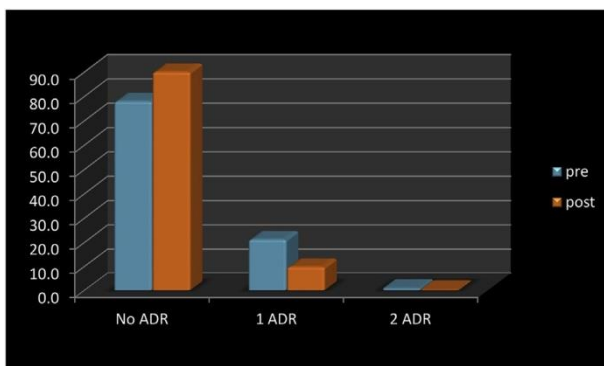


Figure 5: Comparison of pre & post ADR

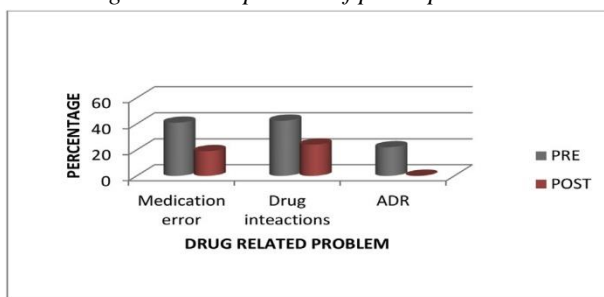


Figure 6: Comparison of pre & post DRP

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The acceptance level of physicians on clinical pharmacist intervention was monitored. In majority of the cases, the physicians accepted the suggestion given by the clinical pharmacist and the therapy was changed as patient's benefits outweigh the risk. In some cases, suggestions brought by the clinical pharmacist were acknowledged but no change was made in the therapy because of patient's benefits from the existing therapy and in few patient reports, physicians were not willing to change the therapy as they were ignoring the suggestions of clinical pharmacist (Fig. 7).

Medication adherence behaviour of the patients was assessed before and after intervention using MMAS-8 questionnaire. Statistically significant improvement was seen in medication adherence behaviour after intervention. In low level adherence there is significant reduction (19.2%) after intervention ($P < 0.001$). There is significant increase in high (24.4%) and medium (56.4%) level adherence after providing intervention (Fig. 8).

Quality of life of patients was assessed before and after intervention using with SF-36 questionnaire. This result showed that, during the study period quality life of patients was found to be General health 50.80%, Physical functioning 48.92%, Physical health problems and limitations 43.57%, emotional problems limiting health 35.71%, Energy 53.79%, or Emotional wellbeing 55.17%, Social functioning 43.49% and Pain 47.66%. Comparing both phases of all parameters, statistically significant improvement was seen in the post intervention phase ($P < 0.001$) after intervention and in this more improvement exhibit in Limitation due to physical health (71.06), Social functioning (66.72%), Limitations due to emotional problems (65.71%) followed by energy (62.93%), and emotional wellbeing (61.39%). Significant improvement was also observed in General health (59.33%), Physical functioning (57.57%), and Pain (58.57%) (Fig. 9).



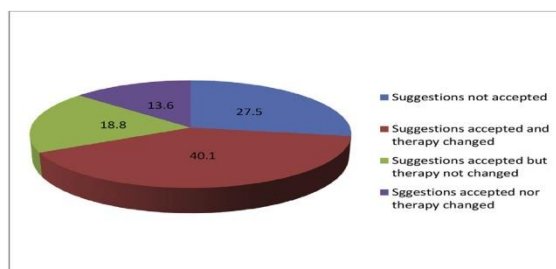


Figure 7: Acceptance Level of physicians on clinical pharmacist

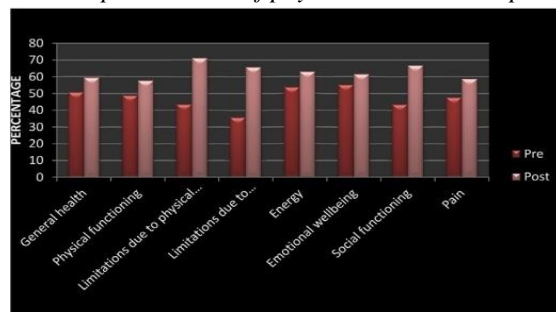


Figure 8: Comparison of pre & post medication adherence

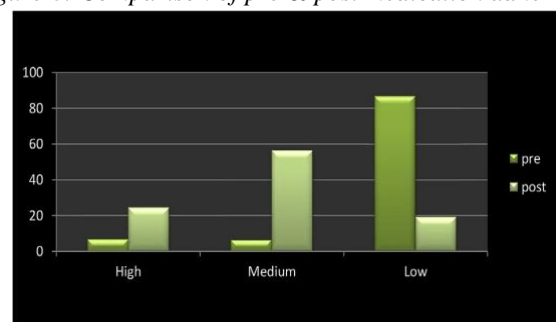


Figure 9: Quality of life

Comparing number of drugs with medication errors in pre-intervention phase, this result reveals, there is no significant improvement ($\chi^2 = 14.80$, $P = 0.096$) before intervention but in post intervention phase, the result indicated that a statically significant improvement ($\chi^2 = 36.01$, $P = 0.05$) after intervention.

Comparing number of drugs with drug interactions in pre intervention phase, there is no significant improvement was seen ($\chi^2 = 10.53$, $P = 0.992$) before intervention but in post intervention phase, there was seen a statistically significant improvement ($\chi^2 = 34.14$, $P = 0.04$) after intervention.

This result showed that, during the study period 6–10 range of drugs are commonly used in no ADR, 1 and 2 ADR category. Comparing number of drugs with adverse drug reactions in pre intervention phase, no significant improvement was seen ($\chi^2 = 3.98$, $P = 0.678$) before intervention but in post intervention phase, there is seen a statistically significant improvement ($\chi^2 = 36.1$, $P = 0.05$) after intervention.

Comparing number of drugs with medication adherence in post intervention phase, there is seen a statistically significant improvement ($P < 0.001$) after intervention (Fig. 10).

Conclusion

Patient safety is identified to be one among the most important aspects in the health care system. Medicines if not used safely and appropriately can cause harm to the patients rather than curing the diseases. It is evident from different studies that drugs can harm the patients. The world of pharmaceutical care is often encountered with the



term DRPs. Drug related problems comprise of either potential or actual problems. In case of actual DRP, the signs and symptoms of the patients persists resulting in treatment failure where as in potential DRP, there will be absence of the signs and symptoms of disease, but if it remains as such without any attention may results in patient harm due to adverse events. This study showed that, Geriatric patients had more chance to drug related problems because of various pharmacodynamics and pharmacokinetic changes in their body, comorbid conditions of these population, poly pharmacy, lack of knowledge about their medicines and medical conditions, inappropriate medication use and hoarding of b old medicines. This study indicates that pharmacist's intervention is important for solving DRP in the geriatric patients. The occurrence of DRP in the geriatric patients may result in increased risk of hospital readmission, mortality, morbidity and health care costs.

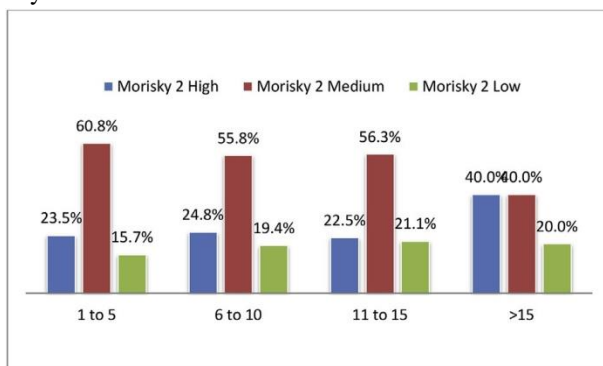


Figure 10: Number of drugs vs medication adherence Post phase

Recommendation

The pharmacist should update their “clinical knowledge” for providing proper intervention which helps to reduce occurrence of DRP. Development and the implementation of guidelines for geriatric care like cautionary guidelines as well as geriatric screening using computer technologies helps physicians and other professionals to overcome harmful drug interactions which stabilizes the patients from danger. Physician should prescribe the evidence-based medicine (EBM) with rational combinations. Patient counselling should be made mandatory in all hospitals. Establishment of geriatric clinical ward and appointment of geriatric clinical pharmacist.

References

- [1]. Maxwell Sr, Webb Dj. Clinical pharmacology too young to die? *Lancet*. 2006; 367:799–800.
- [2]. Filova Daniela, Onder Graziano. Medication errors in elderly peoples: contributing factors and future perspectives. *Bjcp*. 2009; 1365–2125.
- [3]. Spinewine A, Schmader KE, Barber N, et al. Appropriate prescribing in elderly people: how well can it be measured and optimised? *Lancet*. 2007; 370: 173–184.
- [4]. Elliott R. Geriatric pharmacy practice. In: Parthasarathi G, Hansen KN, Nahata MC, eds. *A Text Book of Clinical Pharmacy Practice*. Chennai: Orient Longman Private Limited; 2004: 190–218.
- [5]. Bremner J, Frost A, Haub C, Mather M, Ringheim K, Zuehlke E. Old age dependency. *Popul Bull*. 2010; 65: 6–8.
- [6]. Ingle GK, Nath A. *Indian J Community Med*. 2008; 33: 214–218.
- [7]. Bressler R, Bahl JJ. *Mayo Clin Proc*. 2003; 78: 1564–1577.
- [8]. Sandra VK, Mika S, Swetlana SR, Milika C, et al. Potentially inappropriate prescribing in older primary care patients. *PlosOne J*. 2014; 9: 1–7.
- [9]. Vrdoljak D, Borovac JA. Medication in elderly considerations and therapy prescription guidelines. *Acta Medica Academica*. 2015; 44(2): 159–168.



- [10]. M Shetty HG, Woohouse K. In: roger walker, cate Whittlesea. Geriatrics. Clin Pharm Therap. 2012: 157–158.
- [11]. Hegel SB, Kirsten KV, Sabine R. Classification of drug related problems. J Norweg Med Assoc. 2007; 127: 3073–3076.
- [12]. Linda MS, Peter CM, Robert JC, Ruthanne R. Drug related problems: their structure and function. DCIP Ann Pharmacother. 1990; 24(11): 1093–1097.
- [13]. Foppe VM. Drug-related problem: a cornerstone for pharmaceutical care. J Malta Coll Pharm Pract. 2005; 10: 5–8.
- [14]. Antoine CGE, Marie L, Ronald HBM. An ABC of drugrelated problems. Drug Saf. 2000; 22(6): 415–423.
- [15]. Abu-Gharbieh Eman, Fahmy Sahar, Abdul Rasool Bazigha, Abduelkarem Abduelmula, Basheti Iman. Attitudes and perceptions of healthcare providers and medical students towards clinical pharmacy services in United Arab Emirates. Trop J Pharmaceut Res. 2010; 9(5): 421–430.
- [16]. Dooley Michael, Bogivic Antun, Carroll Margaret, Cuell Sylvia, Galbraith Kiratie, Matthews Helen. SHPA standards of practice for clinical pharmacy. J Pharm Pract Res. 2005;35(2):122–146.
- [17]. American College of Clinical Pharmacy. Standards of practice for clinical pharmacists. Pharmacotherapy. 2014;34(8):794–797. Available from: <http://www.accp.com/docs/positions/guidelines/StndrsPracClinPharmPharmaco8-14.pdf>.
- [18]. Azman AB, Sararaks S, Rugayah B, et al. Quality of life of the Malaysian general population, result from a postal survey using SF-36. Med J Malaysia. 2003; 58: 694–711.
- [19]. Fairclough DL. Design and analysis of quality of life studies in clinical trials. CRC. 2002; 34: 123–129.
- [20]. Wilson IB, Cleary PD. Linking clinical variables with health related quality of life. J Am Med Assoc. 1995:59–65.

