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# Original Article

## An Observational Study to Monitor the Adverse Drug Reactions in Elderly Hospitalised Population

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**ABSTRACT:**

**Background:** Adverse drug reactions are important causes of mortality and morbidity in both hospitalised and ambulatory patients and are more frequently encountered in the elderly (>60 years) population. This study was designed to analyse the most affront drug group causing ADRs among elderly patients and the most frequent signs and symptoms of ADR in tertiary care hospital. **Methods:** All elderly inpatients aged 60 years and above were included in the study. Clinical pharmacist monitored and reported ADRs which were analysed by pharmacologist and physicians. The drugs causing ADRs were identified and different signs and symptoms of ADR were evaluated. This was a prospective observational study carried out in the patients of medicine wards and intensive care unit at GMC Jammu over a period of one year. **Results:** A total of 800 (7.1%) ADRs were reported from 1000 in patients. Out of 800 ADRs reported 300 (30%) ADRs were among elderly patients. ADR analyses showed a sight male predominance among elderly patients. Antibacterial agents were the most offended drug group contributing for 19.33% of ADR's. Gastrointestinal tract was the most frequently affected system with maximum number of ADRs 100 (33.33%). **Conclusions:** ADRs are major threat to hospitalized elderly patients. The risk of ADRs can be reduced by dosing the drug according to the age of the patient and there is greater need for streamlining of ADR reporting and monitoring system to create awareness.

**Key words**: Adverse drug reaction, Antibacterial agents, Elderly patients, Gastrointestinal.

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### INTRODUCTION

Adverse drug reactions (ADRS) are a major cause of morbidity and repeated ADRs related hospitalisations have consistently increased faster than first time ADRs among elderly patients.[1] Adverse reactions monitoring and reporting are very important in identifying the adverse reaction trends in local population.[2]

The WHO defines an ADR as "any response to a drug which is noxious and unintended, and which occurs at dose normally used in man for prophylaxis, diagnosis or therapy of disease, or for the modification of physiologic function." Thus definition excludes overdose (either accidental or intentional), drug abuse, and treatment failure and drug administration errors.[3]

The use of medication among the elderly population has tremendously increased over the last decade. However, the benefits of medication are always accompanied by potential harm, even when prescribed at recommended doses based on approved guidelines.[4]

ADRs are one of the leading causes of morbidity and mortality in health care. They are the fourth largest cause of death ahead of pulmonary disease, Diabetes, AIDS, Pneumonia.[5] The ADRs in elderly adults are four times more common than younger adults ,one in six hospital admissions of elderly patients are due to ADRS.[6]

The elderly are particularly increased risk of ADRs or drug related problems attributed in the main to polypharmacy and physiological changes affecting the pharmacokinetics and pharmacodynamics of many drugs or poor compliance due to cognitive impairment or depression.[7]

According to the WHO worlds elderly population i.e. People 60 years of age and older is approximately 650 million at present and by 2050, it is forecast to 2 billion with 80 % of them living in developing countries.[8]
Many studies on the reporting of ADRS are available, however an emphasis on identifying ADRS and related problems in elderly in India is limited which continues to face an increase in elderly population and chronic conditions.Hence the present study aims to analyse the most affront group of drugs causing ADRs among elderly patients and the most frequent signs and symptoms of ADRs among elderly population.

## MATERIALS AND METHODS

It is a Prospective Observational study carried out in GMC Jammu. After obtaining approval from the ethics committee all the ADRs reported from elderly patients from various departments of GMC Jammu were collected for a period of one year.

## INCLUSION CRITERIA

Patients of both the gender aged 60years and above who developed ADRs were included in the study.

## EXCLUSION CRITERIA

-Patients with intentional or accidental poisoning
-Patient who developed ADRS during transfusion of blood or blood products
- Patient treated on Outpatient Department (OPD)
-Patient with drug abuse
-Patient suffering from severe hepatic, renal and cardiac impairmentwere excluded from the study.

The data for the study were taken and recorded from adverse drug reaction form which was made available at the Intensive care units and wards. Medical staffs and clinical pharmacist were given brief demonstration and discussed about ADR reporting. WHO definition of ADR was adopted and to identify ADRs different approaches were adopted (1) In wards and ICU pharmacist and medical pharmacologist were posted (2) nurses and pharmacist were told to report ADRs. (3)To report any reaction if occurs and ADR form to be filled if established after discussed with the physician. The drug causing frequent ADRs were identified and different signs and symptoms of ADR were evaluated in the elderly patients.

## RESULTS

A total number of 1000 patients were admitted during one year study.Total number of ADR reported were800 (7.1 %) out of which 300 ADRs were reported from elderly patients. Study revealed that **(Figure 1)** elderly males 200 (66.66%) predominated over females 100 (33.33%) in ADR occurrence.

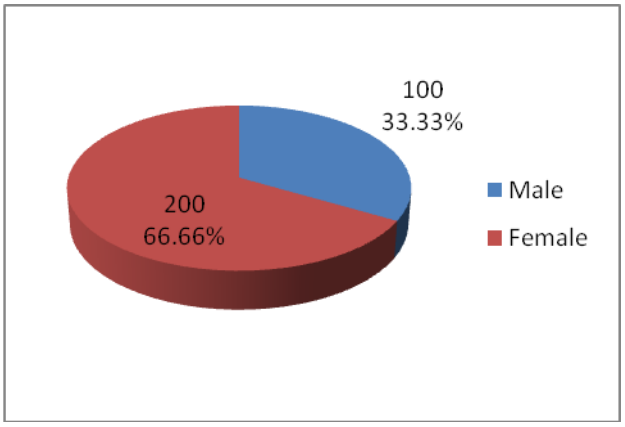


**Figure 1:** Depicts Elderly Male predominance over Females in ADR occurrence.

The age of patients ranged from 60-90 years. **Figure 2** Depicts the maximum number of ADRs were seen between 60-80 years of age group with maximum number 114 were recorded in the age group of 60-65 years, followed by age groups 66-70 years 65, 71-75 years 58, 76-80 years 45, 81-85 years 19,86-90 years and Less no of ADRs were infrequently seen in the age group of 86-90 years 2.**(Figure 3)**

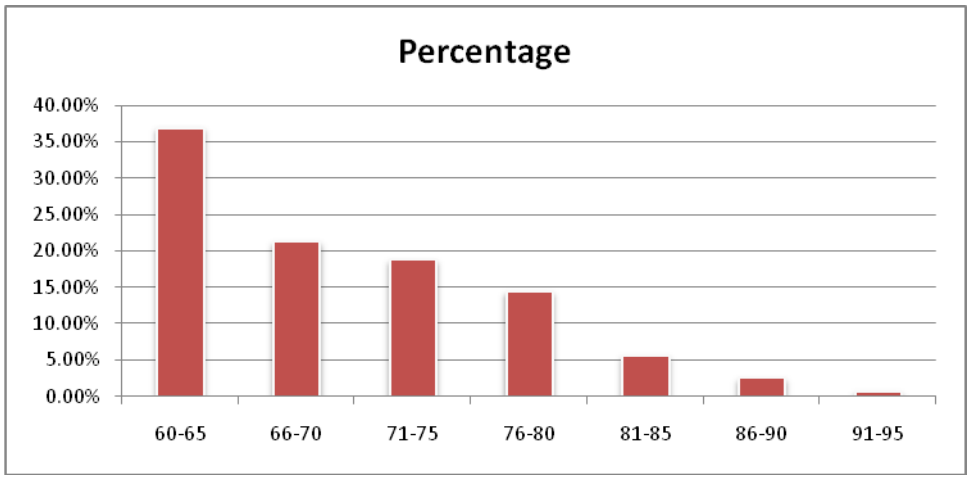


**Figure 1: Depicts Age of patients ranged from 60 years to 90 years with percentage (%)**

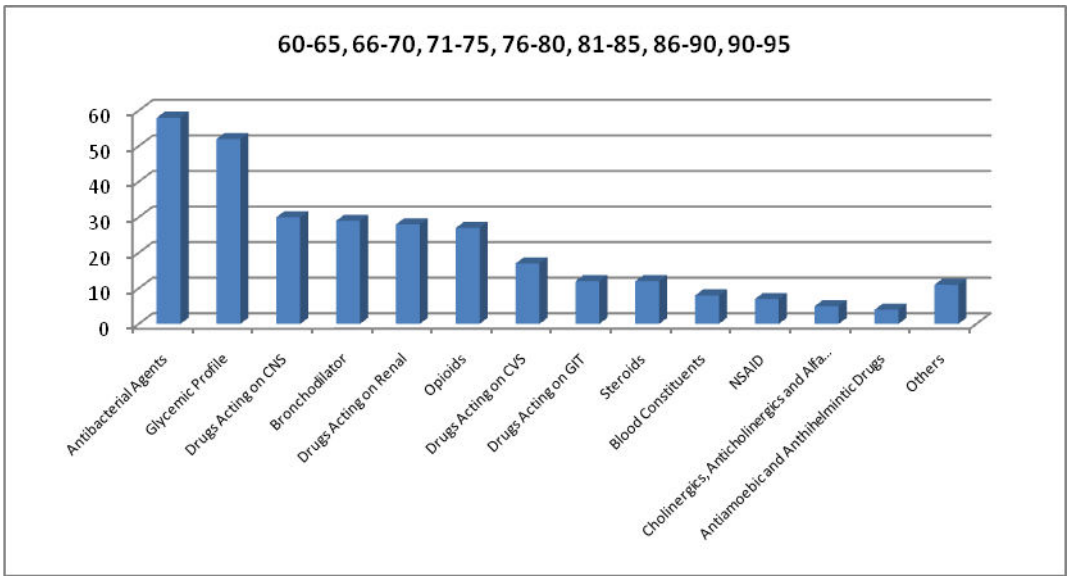


**Figure 3: Age distribution of Adverse Drug Reactions.**

In the study Antimicrobials were the most frequently associated with ARDs followed by drugs altering glycaemic profile, drugs acting on Central nervous system and renal system and bronchodilators (**Table 1**). Antiamoebic and antihelmenthics drugs showed least number of ADRs.

**Table 1: Depicts Drug category causing ADRs.**

| Drug Category | Total | Percentage |
|---|---|---|
| Antibacterial agents | 58 | 19.33 % |
| Glycaemic Profile | 52 | 17.33% |
| Drugs acting on CNS | 30 | 10% |
| Bronchodialtor | 29 | 9.66% |
| Renal | 28 | 9.33% |
| Opoids | 27 | 9% |
| CVS | 17 | 5.6% |
| GIT | 12 | 4% |
| Steroids | 12 | 4% |
| Blood constituents | 8 | 2.66% |
| NSAIDs | 7 | 2.33% |
| Cholinergics, Anticholinergics & α blockers | 5 | 1.66% |
| Antiamoebics & Antihelmenthics Drugs | 4 | 1.33% |
| Others | 11 | 3.66% |

In the study different signs and symptoms of ADRs were identified and grouped into 14 categories. The Gastrointestinal tract symptoms were at the top100(33.33%) followed by electrolyte and renal category accounting for 86 (28.6%). **(Figure 4**)The rare signs and symptoms were grouped under category "various" causing total no 14 (4.66%) ADRs.

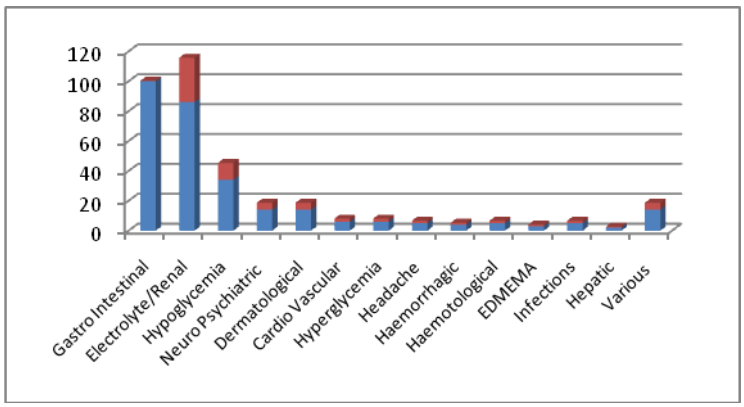


**Figure 4: Depicts Frequency of Adverse Drug Reactions**

## DISCUSSION

The prevalence of disease increases with age and elderly are frequent medication users. Increased sensitivity to drug effects among the elderly results from changes in pharmacokinetics and pharmacodynamics. Age related losses of physiologic function also may predispose the older patient to adverse drug reactions. In our study, we found that, there was a male preponderance 200(66.66%). This is correlated with a study conducted by Veena et al. in Bengaluru which reported male patients were dominated with 55.66%. The same study demonstrated age wise distribution in between the age group of 65 and 70 years was 79.24%. These results are similar as shown by our study which shows frequency of ADRs in that age group around 86.51%. Another study by Lohani et al. in Nepal shows similar results for age wise distribution of ADRs.[9, 10] In our study an increased occurrence of ADRs were observed among 60-65 years (36.88%) and it decreased as age progressed towards 90-95 years (0.66%) which may be explicated due to lack of physical ability of patients to reach the hospital without dependent, uncooperative family members, low socioeconomic status, self-medications, more belief in Ayurveda, homeopathy, use of other home remedies .[11]

In our study 300 ADRs were associated with 95 different drugs. They were grouped into 14 drug group. The majority of ADRS were caused by antibacterial agents contributing to (19.33%) of total ADRs whereas piperacillin, tazobactam combination produced 19 signs and symptoms(5.98%). Other agents like Azithromycin, ceftriaxone, cefotaxime, ciprofloxacin, agumentin, isoniazid produced 7 (2.19%), 6 (1.88%), 6 (1.88%), 5 (1.56%), 3 (0.94%) and 3 (0.94%) of ADRs respectively **(Table 2).** Drugs that alter glycaemic profile produced 52 ADR's (17.33%) and the foremost in the group was Insulin with 31 (9.69%) of hypoglycaemic ADR's. Metformin, HumanActrapid, Glibenclamide produced 7 (2.19%), 6 (1.88%) 3 (0.94%) of ADRs respectively and other hypoglycemic agents showed less than three ADR's. Opioids have been categorized as a separate group to show that it caused 9% of total ADR against all other CNS drugs which constituted only for 9% of ADR. Similarly, the studies done by David W Bater et al, showed that morphine compounds accounted to 9% of all ADR.[12] As age progress the first pass clearance of various drugs decreases, thus common prescriptions like opioids, sedatives, hypnotics requires a low dosing schedule to avoid recurrent ADRs. The use of opioids, sedative, hypnotics, antipsychotic in elderly people should be restricted to lower the risk of falls. [13]ourstudy reported that drugs acting on renal system and cardiovascular system were the most affronted groups of drug causing ADRS in elderly.Cardio vascular drugs are consistently given as one of the most implicated drug group.[14-17]GIT symptoms were the most common type of ADRS with drugs like Tramadol and Piperacilin,Tazobactum combination causing symptoms like constipation accounting to 50 (16.25 %),vomiting22(7.10%) and diarrhoea 17(5.31%). Renal/Electrolyte type amounting to 86 (28.06%) ADRs, the most frequent symptom identified in this type was hypokalaemia 66 (20.63%) caused majorly by salbutamol and furosemide. Hypoglycaemia 34 (11.25%) caused by anti-diabetic agents like Insulin and sulfonylureas have similar to studies done by Rupawala et al.[19] The present study showed that the recurrent use of offending drug in elderly patients can lead to increase prevalence of ADRS and largely contributed by prescribing error e.g. large doses of drugs without taking into account, theeffect of age and frailty on drug disposition, especially renal and hepatic clearance, increased pharmacodynamics sensitivity of elderly to several commonly used drugs, e.g.central nervous system and cardiovascular drugs should also be considered while prescribing in elderly. The new Beers criterion has identified about 48 drugs to be avoided in elderly patients and 20 inappropriate drugs for patients with comorbid conditions.[20] The central drug standard control organization (CDSCO) has initiated nationwide pharmacovigilance program from 2010 and about 90 ADR monitoring centres in all four zonal categories have been established. Yet ADR reporting in India is still in preliminary level. A study by Amrita P et al showed that inspite of good ADR monitoring knowledge and awareness among physicians, the rate of reporting ADR was very low.[21]Maintaining accurate record of all medications, monitoring to balance the need and avoiding polypharmacy, titrating from a small dose and individualizing dose to each patient ,involving patient in decision on their therapy and educating them about the side effects of the drug are the strategies that can be employed by the physicians which will decrease the potential adverse drug reactions.

## CONCLUSION:

The present study attempted to study the pattern of ADRs in elderly age group. ADRs are major threat to hospitalized elderly patients. Anti-bacterial drugs being mostly effecting class of drugs. Careful therapeutic monitoring and dose individualisation is important. This study strongly suggests that there is greater need for streamlining of ADR reporting and monitoring system to create awareness. Measures to improve detection and reporting of ADR by all health care professionals should be undertaken, to ensure patients safety. Also more original studies, need to be conducted in an Indian

population to know the exact prevalence of ADRs in Indian hospitals and significantly reduce the harmful consequences of drugs in elderly groups.

**Table 2:** Category of drugs implicated and their Adverse Drug reactions observed

| Types of ADR'S | Signs and symptoms of ADRS | Frequency of ADR no. (%) | Drugs Implicated |
|---|---|---|---|
| Gastro intestinal | Abdominal-Discomfort, Constipation, Diarrhea, Nausea, Vomiting Abdominal pain | 100 (33.33%) | PiperacillinTazobactam, Tramadol, Clindamycin, Azithromycin, Ceftriaxone, Moxifloxacin, Levofloaxacin, Donepezil, Metronidazole Resperidone, Ceftriaxone, Sulbactam, Isonazid, Augmentin, Metrogyl, Ivermectin, Albendazole, cefotaxime, Potasiumchloride, Diclofenac, Gabapentin, Rabeprazole, pantaprazole, Linezolid, Ceftriaxone, Amoxicillin Clavulonic, Acid, aspirin, Ciprofloxacin. |
| Electrolyte/renal | Acute kidney injury, Hyperkalemia, Hypokalemia, hyponatremia, Lactic acidosis, Nephrotoxicity | 86 (29.66%) | Torsemide, Salbutamol, PiperacillinTazobactum, Furosemide, Human Actrapid, Metformin, Thiazide, Telmesartan, Cefaperazone, Potasium Chloride Hydrochlorthiazide, Furosemide+Spironolactone, Salbutamol, Gentamycin, Furosemide, Losartan, Azithromycin, Ramipril, Carbamazepine, Levosalbutamol, Insulin, Salbutamol+Ipratropium, Torasemide, Amilodipin, Salbutamol+Hydrocortisone, Meropenam |
| Hypo glycemia | Hypoglycemia | 34 (11.33%) | Glimpride, Metformn, Human Actrapid, Mixtard Human, Insulin, Metformin+Glimpride, Glibenclamide. |
| Neuro psychiatric | Drowsinerss, Hallucination, Insomnia, Mania, Neurotoxicity Sedation, Tremor | 14 (4.66%) | Levochlorperastine, Phenytoin, Cetirizine, Pregabalin, Resperidone, Quetiapin, Lorazepam, Colistimethate, Olanzapine, Trihexyphenidyl, Carbidopa+Levodopa, Tramadol |
| Dermatological | Itching Rashes | 14 (4.66%) | Ceftriaxone, Thicolchioside, Hydrocortisone, Ciprofloxacin, Ofloxacin, Salbutamol, Cefataxin, Piperacillin+Tazobactam, Paracetamol, Levosalbutamol |
| Cardio vascular | Bradycardia, hypotension, Orthostatic- Hypotension, Palpitation | 6 (2%) | Enalapril, Ivabradine, Atenolol, Metformin, Tamsulosin, Bisoprolol, Losartan, Carvedilol |
| Hyper glycemia | Hyperglycemia | 6 (2%) | Dexamethasone, Betamethasone, Carvedilol |
| Headache | Headache | 5 (1.66%) | Ciprofloxacin, Azithromycin, Pantaprazole, Zolpidem, Glyceryl, Trinitrate, Tramadol |
| Haemorrhagic | Bleeding Hematuria | 4 (1.33%) | Naltokinse, Heparin, Enoxaparin, Heparin |
| Haematological | Anemia increase PTINR Thrombocytopenia | 5 (1.66%) | Clonazepam, Phenytoin, Nicoumarol, Isoniazid, Pyranzinamide, Heparin |
| EDEMA | Edema of tongue facial puffiness pedal Edema | 3 (1%) | Amilodipine, Hydrocortisone, Salbutamol, Amilodipine |
| Infections | Candidiasis, Recurrent UTI | 5 (1.66%) | Carbidopa Levodopa, Budesonide, Piperacillin+Tazobactam |
| Hepatic | Elevated liver function test | 2 (0.66%) | Bicalutamide, Isoniazid |
| Various | Blurring of vision cough, dehydration, dry mouth, fatigue, fever, giddiness, metallic taste, oral ulcer, redness of eye | 14 (4.66%) | Moxifloxin, Clonazepam, Losartan, CholecalciferolMeropenam, Pregabalin, Metformin, Tramadol, Paracetamol, Resodium, Piperacillin+Tazobactam, Diclofenac, Prazosin |

## REFERENCES

1. Zhang M et al. Repeat adverse drug reactions causing hospitalization in older Australians: a population based longitudinal study 1980-2003.Br J ClinPharmacol .2007; 63:163-70.
2. Ramesh M, Pundit J, Parthasarathy,G. Adverse drug reactions in a south Indian teaching hospital-their severity and cost involved. Pharmacoepidemiol. DrugSaf . 2003;12(8);687-692
3. Primohamed M, Brecken AM. Clinical review-Adverse drug reaction.BMJ 1998;316(25):1295-1298.
4. Brennan TA,etal.Incidence of adverse events and negligence in hospitalized patients.Results of Harvard Medical practice study I. New England Journal of Medicine .1991 ;324:370-376
5. LavanAGallagher P. Predicting risk of adverse drug reactions in older adults,TherAdv in Drug Saf .2015 ;7(1):11-22
6. Beijer HJ, deBlaey CJ. Hospitalisations caused by adverse drug reactions (ADR) :a meta-analysis of observational studies. Pharm world sci.2002:24(2):46-54
7. Brennan TA,etal.Incidence of adverse events and negligence in hospitalized patients.Results of Harvard Medical practice study I. New England Journal of Medicine .1991 ;324:370-376
8. World Health Organization .10 facts on ageing and the life course. (Last accessed on 2016 Dec 3 ).Available from :http://www.who.int/features/factfiles/ageing/en/index.html.
9. Veena DR, Padma L,Patil S Drug prescribing pattern in elderly patients in a teaching hospital ,J Dent Med Sci ;1(5):39-42 2012.
10. LohaniSP, ThapaP, AryalUR, SatyalKR. Polypharmacy and geriatric patients: patterns of prescribing in the tribhuvan University Teaching Hospital in Nepal,Nepal Health Res Council:4(1) 2006.
11. Award A, EltayebI, MatoweL, Thalib L. Self medication with antibiotics and antimalarials in the community of Khartoum state,sudan. J Pharm Pharm Sci.2005 Aug 12;8(2):326-31.
12. Bates DW, Cullen DJ, Laird N, Petersen LA, Small SD, Servi D, et al. Incidence of Adverse Drug Events and Potential Adverse Drug Events Implications for Prevention. JAMA. 1995;274(1):29-34.
13. Woolcott JC, Richardson KJ, Wiens MO, Patel B, Marin J, Khan KM, et al. Meta-analysis of the impact of 9 medication classes on falls in elderly persons. Archives of internal medicine. 2009 Nov 23;169(21):1952-60.
14. Brvar M, Fokter N, Bunc M, Mozina M. The frequency of adverse drug reaction related admissions according to method of detection, admission urgency and medical department specialty. BMC ClinPharmacol. 2009 May 4;9:8.
15. Gurwitz JH, Field TS, Harrold LR, Rothschild J, Debellis K, Seger AC, et al. Incidence and preventability of adverse drug events among older persons in the ambulatory setting. Jama. 2003 Mar 5;289(9):1107-16.
16. Wilson RM, Runciman WB, Gibberd RW, Harrison BT, Newby L, Hamilton JD. The quality in Australian health care study. Medical journal of Australia. 1995 Nov 6;163(9):458-71.
17. Dartnell JG, Anderson RP, Chohan V, Galbraith KJ, Lyon ME, Nestor PJ, et al. Hospitalisation for adverse events related to drug therapy: incidence, avoidability and costs. The Medical Journal of Australia. 1996 Jun;164(11):659-62.
18. Chan M, Nicklason F, Vial JH. Adverse drug events as a cause of hospital admission in the elderly. Intern Med J. 2001;31:199-205.
19. Rupawala AH, Kshirsagar NA, Gogtay NJ. A retrospective analysis of adverse events in the elderly in a tertiary referral center in Mumbai (Bombay), India. Indian J Med Sci. 2009 May;63(5):167-73.
20. Fick DM, Cooper JW, Wade WE, Waller JL, Maclean JR, Beers MH. Updating the Beers criteria for potentially inappropriate medication use in older adults: results of a US consensus panel of experts. Archives of internal medicine. 2003 Dec 8;163(22):2716-24.
21. Amrita P, Singh SP. Status of spontaneous reporting of adverse drug reaction by physicians in Delhi.Indian J Pharm Pract. 2011;4:29-36.

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