ORIGINAL

Prescriptions analysis for various effects of polypharmacy in Kempegowda Institute of Medical Sciences (Kims) Hospital and research centre, India

Análisis de prescripciones para diversos efectos de la polifarmacia en el Hospital y centro de investigación del Instituto de Ciencias Médicas de Kempegowda (Kims), India

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Abstract

Background: To assess the polypharmacy and appropriateness of prescriptions in patients in Kempegowda Institute of Medical Sciences (KIMS) Hospital and Research Centre, India.

Methods: This investigation was completed on 1000 patients of age both males and females. Data was gathered through the review of case sheets. Polypharmacy was noticed as dependent on admission and discharge prescriptions. The prescription components, drug utilization behavior, and prescribing compliance to hospital formulary were noted and subjected for Analysis of prescriptions for various impacts of polypharmacy.

Result: A total of 1.000 patients, 530 (53%) were males and 470 (47%) were females. Polypharmacy was present in 300 prescriptions (30%). The highest prevalence of polypharmacy was found in the 70-79 years age group compared to the other groups and it was measurably significant. and the average number of drugs per patient was 7. According to 1000 prescriptions analyzed, 142 prescriptions comprised of potential drug interactions and it was found that 235 drug interactions were present. From drug interactions, aspirin/clopidogrel and clopidogrel/atorvastatin were the most common drug interaction pairs observed among prescribed medications. Out of the 235 interventions proposed, the most incessant recommendation was on observing for adverse effect (44.01%) followed by dose adjustment (15.81%).

Conclusion: As the population ages, polypharmacy increases. The elderly often require multiple medications to treat multiple health-related conditions. The demographic details of the study population show that 70 % of polypharmacy occurred in elderly people. From the current investigation, we can conclude that polypharmacy prompts more potential drug-drug interactions. To improve drug safety in this high-risk population, appropriate prescribing is vital.

Keywords: Polypharmacy, prescription, elderly, drug interactions, adverse drug interaction.

Resumen

Antecedentes: Evaluar la polifarmacia y la idoneidad de las prescripciones en los pacientes del Kempegowda Institute of Medical Sciences (KIMS), India.

Métodos: Esta investigación se llevó a cabo en 1.000 pacientes de ambos sexos. Los datos se recogieron mediante la revisión de las hojas de los casos. Se observó que la polifarmacia dependía de las prescripciones al ingreso y al alta. Los componentes de la prescripción, el comportamiento de utilización de los fármacos y el cumplimiento de la prescripción en el formulario del hospital se anotaron y se sometieron a un análisis de prescripciones para diversos impactos de la polifarmacia.

Resultados: De un total de 1.000 pacientes, 530 (53%) eran varones y 470 (47%) eran mujeres. La polifarmacia estaba presente en 300 prescripciones (30%). La mayor prevalencia de polifarmacia se encontró en el grupo de edad de 70-79 años, en comparación con los demás grupos, y fue notablemente significativa, y el número medio de fármacos por paciente fue de 7. Según las 1.000 prescripciones analizadas, 142 prescripciones contenían posibles interacciones farmacológicas y se descubrió que había 235 interacciones farmacológicas. En las interacciones farmacológicas, aspirina/clopidogrel y clopidogrel/atorvastatina fueron los pares de interacciones farmacológicas más comunes observados entre medicamentos prescritos. De las 235 intervenciones propuestas, la recomendación más incesante fue la de observar los efectos adversos (44,01%), seguida del ajuste de la dosis (15,81%).

Conclusiones: A medida que la población envejece, la polifarmacia aumenta. Los ancianos suelen necesitar varios medicamentos para tratar múltiples de salud. Los detalles demográficos de la población estudiada muestran que el 70% de la polifarmacia se produjo en personas mayores. A partir de la presente investigación, podemos concluir que la polifarmacia provoca más interacciones farmacológicas potenciales. Para mejorar la seguridad de los medicamentos en esta población de alto riesgo, es vital una prescripción adecuada.

Palabras clave: Polifarmacia, prescripción, ancianos, interacciones farmacológicas, interacción farmacológica adversa.

Introduction

Polypharmacy is most usually characterized as the use of five or more medications day by day by a person. A few studies additionally by and large characterize polypharmacy as the utilization of different simultaneous medications or synchronous long haul utilization of different medications by the equivalent individual.[1-5] The prevalence of polypharmacy is estimated to be somewhere in the range of 10% and 90% relying upon the definition utilized, the age group examined, and the geographic area.[6]

Polypharmacy isn't foolish, yet in numerous cases can prompt negative results or helpless treatment viability, frequently being more harmful than helpful or presenting too much risk for too little advantage. Therefore, health professionals consider it a situation that requires monitoring and review to validate whether all of the medications are still necessary. Concerns about polypharmacy include increased adverse drug reactions, interactions of drugs, prescribing cascade, and higher costs. Polypharmacy is often associated with a diminished quality of life, including decreased mobility and cognition.[7, 8]

In this day and age where medical decision-making is frequently affected and sometimes controlled by financial considerations, it is usually for specialists to become disappointed and regularly resentful when cost turns into an issue in deciding the fitting treatment for a patient. The most well-known situation for such a response is the point at which a physician is informed that there is an elective treatment that is nearly as great and significantly more affordable. When the third parties interject themselves into the specialist-patient relationship in this way, it is simple for a physician to feel that the financial requirements and not nature of consideration are leading American drugs in the 21st century. Despite all this, however, the cost must be considered as an issue for determining the treatment plan. Once again, if the expense of a specific blend of medications makes it unthinkable for patients to get the medications, they won't take them, and all things considered, the prescription regimen will be incapable. Indeed, even the most liberal protection plans have impediments or copy on medications. It is significant while thinking about polypharmacy to think about the financial impact at least on the patient, if not on the healthcare system as a whole. The more medications recommended, the higher the expense and the more intricacies are made as a result.[9] For all the above cases, prescriptions Analysis for various effects of polypharmacy in a south Indian tertiary care hospital is so significant and Need for study.

Materials and methods

Our study was led in the Department of Pediatrics, Kempegowda Institute of Medical Science (KIMS) Hospital and Research Centre, Inida. It is 1200 beds tertiary care teaching and super specialty hospital, with an Outpatient and Inpatient facility. The hospital provides specialized healthcare services to all strata of people in and around Bangalore. This study was carried out on 1000 patients of age both males and females. In this strategy, the inpatient review of case sheets and medicines was screened for prescriptions Analysis for various effects of polypharmacy on a consistent schedule. All the recommended drugs alongside different prescriptions and significant data were noted in a modified information accumulation structure to discover polypharmacy and others. The investigation patients were pursued day by day until their release. The Micromedex, Medscape, articles, and relevant reference books were used as tools to review the collected data. The prescribed medication was checked for their existence in the hospital and also the relevant dosing calculation and polypharmacy. Check for any error in prescription such as doses, frequency, and route of administration, and analysis of prescription for any polypharmacy, etc. The prescription components, drug utilization conduct, and endorsing consistency to hospital formulary were noted and oppressed for Analysis of prescriptions for different impacts of polypharmacy. Polypharmacy was observed based on admission and discharge prescriptions.[10, 11]

Result and discussion

Drug usage
In our study population out of 300 patients' prescriptions contains polypharmacy, which that 159 were male and 141 were female and in the pediatric population 53% were male and 47% were female (**Table I**).

Table I: Number of drug usage by study patients.

Number of Drug Dispensed	Male		Female		Total	
	N	%	N	%	N	%
1,2,3	7	2.25	4	1.43	11	3.67
4,5,6	46	15.51	35	11.63	81	27.14
7,8,9	106	35.31	101	33.88	207	69.18

N=300

A total of 300 drugs were prescribed, and thus the average number of drugs per patient was 7. Among studied patients, 3.67% were using 1-3 medications followed by 27.14% of patients using 4-6 medications. According to table 2,3 Extensive (70%), polypharmacy was observed in the study population.

in our study various classes of drug-like Pantoprazole, Aspirin, Paracetamol, Zincovit, Levocetrizin, Atorvastatin, etc. Were prescribed. Out of which 53% males, 47 % females have prescribed Pantoprazole which was highest among monotherapy. A different class of medications is endorsed in our study populace dependent on the patient condition and comorbidities .out of which 87males,

47 females are prescribed atorvastatin drugs which were the highest followed. Totally 20.74% atorvastatin was prescribed. 16.41% of patient used Pantoprazole, 10.22 H. Actapid, 6.81% Zicovit, 6.5% Ceftriaxone, 5.27 Paracetamol.

Potential Drug-Drug Interaction

Concerns about polypharmacy include increased adverse drug reactions, drug interactions, Pharmacists Intervention, prescribing cascade, and higher costs. Polypharmacy is often associated with decreased quality of life, including decreased mobility and cognition (**Table II**).

Table II: Potential drug-drug interaction inpatient.

Parameters		Total	
		N	%
Severity	Major	101	40.59
	Moderate	145	58.11
	Minor	6	1.28
Pharmacodynamic Interaction		147	57.26
Pharmacokinetic Interaction		91	36.75
Unknown Mechanism		18	5.98
Management	Monitoring	185	73.93
	Dose adjustment	38	13.67

Drug interaction frequency

Out of 300 prescriptions analyzed, 142 prescriptions comprised of potential drug interactions and it was found that 235 drug interactions were present. The incidence of potential drug interaction was 63.64%. Among 235 drug interactions, 90 types of interaction combinations were identified. The studied prescription comprised 58.11% moderate interaction, 40.59% major drug interactions, and 1.28 minor drug interactions. Among them, 57.26% were pharmacodynamic drug interactions followed by 36.75% of pharmacokinetic interaction and 5.98% of unknown mechanism interactions (**Table III**).

Table III: Frequency of drug interaction in the study population.

Frequency of pDDI	Male		Female		Total	
	N	%	N	%	N	%
1	52	37.14	23	16.42	75	53.57
2	25	17.85	18	12.14	43	30
3	14	10	5	3.57	19	13.57
4	2	1.42	0	0	2	1.42
5	2	1.42	0	0	2	1.42

N=142

In most patients, the cases of one potential drug interaction were identified with a median of 1.67 potential drug-drug interactions. Among them, 30% of prescriptions had two potential drug-drug interactions.

Pharmacists Intervention

Out of the 235 interventions proposed, the most frequent suggestion was on monitoring for adverse effect (44.01%) followed by dose adjustment (15.81%). 25.64% of interventions were accepted and therapy was changed. Various interventions provided by the pharmacist and their result are presented in **table IV**.

Table IV: Types of pharmacist intervention to prevent pDDI.

Types of intervention	Total	
	N	%
Substitution	24	10.25
Stop/avoid/dose adjustment	37	15.81
Monitoring	103	44.01
No change	70	29.91

The pharmacist's role concerning clinical results of different adverse events is very significant as pDDIs are a noteworthy factor for the hospitalization of patients. A clinical pharmacist can help in the improvement of pharmacotherapy. A clinical pharmacist can discover factors that may result in irrational prescriptions. Such factors are called "drug-related problems" and may change the ideal impacts of medications. The role of the pharmacist in the created world is all around perceived but this profession is not well established in the developing nations including India. The absence of an appropriate role of the pharmacist in less-created nations is driving patients with a higher ratio of drug-related problems. This can be reduced by the clinical pharmacist's active participation in direct patient care.[12-14]

The incidence rate of adverse drug interactions was found to be 20%. This rate is similar to the study conducted in Iran[12]. Another study reported 17.53% of observed drug interaction which is lower than this study. The most common drug interaction pair resulting in adverse drug reactions was aspirin/clopidogrel (5). Bleeding was the most important interaction in 8 cases followed by hypoglycemia (4) and QT-interval prolongation (4). The most common objective drug is aspirin and the precipitant drug is clopidogrel. Similarly, Bleeding was the most common clinical effect of observed drug interaction in a South Indian study.[10-13] (**Tables V, VI**).

Table V: Observed adverse drug-drug interaction.

Object Drug	Precipitant Drug	No. of adverse drug-drug interaction	Adverse outcome
Enalapril	Spironolactone	2	Hyperkalemia
Aspirin	Clopidogrel	6	GI bleeding
Amiodarone	Atorvastatin	1	Muscle pain
Clopidogrel	Acenocoumarol	2	bleeding
Venlafaxine	Ivabradine	1	QT prolong
Furosemide	Hydrocortisone	2	Hypokalemia
Aspirin	Acenocoumarol	3	Bleeding
Domperidone	Cilnidipine	2	QT prolong
Insulin	Aspirin	1	Hypoglycemia
Aspirin	Heparin	1	bleeding
Clopidogrel	Atorvastatin	2	thrombocytopenia
Aspirin	Telmisartan	1	Increase creatinine
Insulin	Nebivolol	1	hypoglycemia
Domperidone	Atorvastatin	1	QT prolong
Amiodarone	Nebivolol	1	bradycardia
Spironolactone	Aspirin	1	hyperkalemia
Metformin	Ramipril	2	hypoglycemia

Conclusion

As the population ages, polypharmacy increases. The elderly often require multiple medications to treat multiple health-related conditions wich requires more cuasions

Table VI: Details of observed drug interaction (adverse drug interaction).

Interacting drug	No.	Effect	WHO causality	Naranjo Causality	Severity
Enalapril/Spironolactone	2	Hyperkalaemia	probable	Probable	Mild
Aspirin/Clopidogrel	66	bleeding	probable	Probable	Major
Amiodarone/atorvastatin	1	Muscle pain	possible	Possible	Mild
Clopidogrel/Acenocoumarol	2	bleeding	probable	Probable	Moderate
Venlafaxine/Ivabradine	1	QT prolong	possible	Possible	Moderate
Furosemide/Hydrocortisone	2	Hypokalaemia	probable	Probable	Mild
Aspirin/Acenocoumarol	3	Bleeding	possible	Probable	Moderate
Domperidone/Cilnidipine	2	QT prolong	possible	Possible	Mild
Insulin/aspirin	1	Hypoglycaemia	probable	Possible	Moderate
Aspirin/Heparin	1	bleeding	possible	Possible	Moderate
Aspirin/Telmisartan	1	Increase creatinine	possible	Probable	Mild
Insulin/nebivolol	1	hypoglycaemia	probable	Probable	Moderate
Domperidone/Atorvastatin	1	QT prolong	possible	Probable	Mild
Amiodarone/nebivolol	1	bradycardia	possible	Probable	Moderate
Spironolactone/aspirin	1	hyperkalaemia	probable	Probable	Moderate
Metformin/Ramipril	2	hypoglycaemia	possible	Possible	Mild

particularly on renal function. The demographic details of the study population showed that 70 % of polypharmacy occurred in elderly people because they use 6 or more medicine. This study shows that DDIs are frequent among hospitalized cardiac patients. The majority of interactions were pharmacodynamic, having moderate severity. Anti-platelets and anti-coagulants were commonly implicated in many PDDIs in this study and therefore require intensive monitoring during therapy. From the current study, we can reason that polypharmacy leads to more potential drug-drug interactions. To improve drug safety in this high-risk population, appropriate prescribing is vital.

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