

Research Article

Drug prevalence and comparison interaction between numbers of patients admitted at two teaching hospitals; Quetta, Pakistan

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Abstract

Aim and objective: Drug-drug interaction (DDI) is of major concern in patients with complex therapeutic regimens. The study aims to assess the prevalence of DDIs in the prescriptions of patients during the hospitalization to evaluate the DDIs of drugs regarding its severity, pharmacodynamic and pharmacokinetic.

Methodology: The prescribed drugs in the admission chart of 183 patients were screened for Drug-drug interaction using *Mediscap* interaction screening program. Drug-drug interactions have been classified on the basis of severity (contraindicated, significant, minor, major, moderate and serious). Frequency and the percentage of pairs of drugs with DDIs, number of prescribed drugs, demographics and DDIs on the basis of and Pharmacodynamics, Pharmacokinetics have been analysed.

Results: The overall result shows the frequency and percentage of drug-drug interaction present in hospitalized patients, out of 183 was 125(68.3%). Majority of interactions was found on the basis pharmacokinetic DDI 108(59.0%). On the basis of severity, minor Drug-drug interaction was found dominant 91(49.7%) followed by contraindicated 19(10.4%).

Conclusion: Drug-drug interaction is common among hospitalized patient's medications. My study evaluated a positive relation between prevalence of DDIs and number of drugs prescribed. Survey concluded that percentage of minor and contraindicated DDIs at admission were produced by changes of medication during hospitalization.

Introduction

The impact of a drug on another drug is known as drug-drug interaction DDI this might be pharmacokinetic or pharmacodynamic in nature, which can bring about undesirable impacts and adequacy decreased and viability or expanded poisonous quality [1]. DDIs can prompt to undesirable impacts of drugs that can be ruthless as much as important to require hospitalization. Past studies demonstrated that a large portion of the hospitalizations were brought on due to DDIs present in their prescriptions. As needs be, study introduced that up to 3% patients were hospitalized because of DDIs. [2]. It is accounted for that up to 37-60% of patients were hospitalized having at least one inclusions of drug-drug interaction potential on

hospitalization [3]. The danger of DDIs may likewise build in view of the expansion of new drugs to the current medication treatment during hospitalization [4].

DDIs are an issue of distress for patients and health care professionals, as restorative treatment formed into more broad in the administration of diverse sicknesses or Comorbidities and the penalty can shift from negative impacts for medication related mortality and morbidity [5]. The health experts to choose the DDIs is vital to diminish their potential dangers and antagonistic result [6]. Estimation of DDIs in patients is clinically critical and evaluation will be helpful to diminish issues identified with treatment and recouping pharmaceutical concern [7]. The potential advantages of medications joined must adjust the criticalness of the DDI, in perspective of



presence of flighty. On the off chance that the upside of the administration is of significance like that it repays the plausible dangers, and none of the more secure substitutes are evident, then the dangers of a DDIs can be acknowledged and administration proceeds [8]. As per an as of late distributed study, 1% of all hospitalizations are contemplated by DDIs, comparing to 16% of all patients hospitalized because of adverse drug reaction (ADR) [9]. In a late study, the creators recommend that around 0.05% of hospitalization, 0.1% of re-hospitalization and 0.6% of the hospitalization are brought about by ADRs because of DDIs [10]. The potential DDI are regularly obscure, and epidemiological information managing this issue are rare. Be that as it may, it was called attention to by Hamilton et al. that pDDIs introduction is connected with an altogether expanded danger of hospitalization [11].

Methodology

The study was conducted on 183 both males and females at two teaching hospitals, Bolan Medical Complex Hospital and Sandeman Provincial Hospital of Quetta, Pakistan. The four medical wards (male unit-3 and female unit-3, male unit-4 and female unit-4) of Sandeman provincial hospital and two medical wards (male unit-1 and female unit-1) of Bolan medical complex hospital Quetta, Pakistan. These six wards were selected out of eight medical wards due to unit-2 limitation.

Patients with drug prescribed in treatment chart of patients admitted at least 2 day in ward and treatment charts containing multiple drugs prescription were included in the study while those outdoor, discharged, patients on single drug treatment, surgical department patients and patients with length of stay less than 2 days were excluded from the study.

Ethical consideration

The proposal of the study was approved by the supervisor, chairman of department of pharmacy practice, faculty of Pharmacy University of Balochistan Quetta. Office orders were provided by the Medical superintendent and the chief drug analysts of both teaching hospitals. Allowing in medical wards for duration of two months in each.

Results

Demographic characteristics of patients are displayed in Table 1. Which shows that majority of the patients 47(25.7%) were in between age group of 55 to 69 years old, including 100(54.6%) males and 83(45.4%) females. During time period of data collection majority of patients belonged to Sandeman provincial hospital 141(77.0%) more patients 84(45.9%) at Medical Unit 3 both male and female. Length of stay of majority of patients 110(60.1%) were from 1 to 5 days, and 64(35.0%) patients were admitted in hospital for 5 to 10 days.

Table 2. Shows prevalence of DDIs and number of drugs prescribed; enrolling 183 patients, majority 44(24%) patients were prescribed with 6 drugs during hospitalization. Drug-drug interaction was present in majority of patient's prescriptions 125(68.3%) and in 58(31.7%) patients no interaction was found.

In majority of prescriptions 39(21.3%) one pair of drugs were found having interaction.

According to Table 3. DDIs were on the basis of pharmacokinetics; in 108(59.0%) patients pharmacokinetic

Table 1: Demographics

Category	Frequency n=183	Percent
Age group		
10 to 24	30	16.4
25 to 39	28	15.3
40 to 54	44	24.0
55 to 69	47	25.7
70 to 84	30	16.4
85 to 99	2	1.1
100 to 114	2	1.1
Gender		
Male	100	54.6
Female	83	45.4
Hospital		
Sandeman Provincial Hospital	141	77.0
Bolan Medical Complex Hospital	42	23.0
Medical Unit		
Unit 1	42	23.0
Unit 3	84	45.9
Unit 4	57	31.1
Length Of Stay In Hospital		
1-5 Days	110	60.1
5-10 Days	64	35.0
10-20 Days	9	4.9

Table 2: Number of drugs and number of drug pairs per patient having DDIs.

Category	Frequency n=183	Percent
No. of drugs Prescribed		
3	4	2.2
4	13	7.1
5	34	18.6
6	44	24.0
7	35	19.1
8	29	15.8
9	15	8.2
10	5	2.7
11	2	1.1
13	1	0.5
16	1	0.5
Drug-drug interaction		
Present	125	68.3
Not Present	58	31.7
Number of Pairs having Drug-drug Interaction		
1	39	21.3
2	24	13.1
3	15	8.2
4	6	3.3
5	12	6.6
6	11	6.0
7	4	2.2
8	6	3.3
9	4	2.2
10	1	0.5
12	2	1.1
14	1	0.5



based DDIs were found. Absorption based DDIs were present in 52(28.4%) prescriptions in which majority 36(19.7%) of prescriptions contained 1 pair of drug having DDIs. DDIs on the basis of distribution were found in 18(9.8%) patients in which majority 16(8.7%) of the patients had one pair of drug having interaction. In total of the included hospitalized patients metabolism based DDIs were present in 63(34.4%) patients in which majority included 1 pair of drug having interaction 29(15.8%).

According to Table 4. DDIs on the basis of Pharmacodynamics were present in 69(37.7%) prescriptions analyzed. Antagonism based drug-drug interaction was present in 26(37.7%) prescriptions in which majority 11(6.0%) of prescriptions contained 1 pair of drug having DDIs. Additive effect of drugs was found in 38(20.8%) patients in which majority 27(14.8%) of the patients had one pair of drug having interaction. Upon analysis synergism based drug-drug interaction were present in 42(23%) patients in which majority included 1 pair of drug having interaction 22(12%).

Table 3: Prevalence of Drug-drug interaction on the basis of Pharmacokinetics.

Category	Frequency n=183	Percent
Pharmacokinetic Drug-drug Interaction		
Present	108	59.0
Not Present	75	41.0
Absorption based Drug-drug interaction		
Present	52	28.4
Not Present	131	71.6
Number of Pairs having Drug-drug Interaction on Absorption bases		
1	36	19.7
2	9	4.9
3	2	1.1
4	1	0.5
5	1	0.5
9	1	0.5
Distribution based Drug-drug interaction		
Present	18	9.8
Not Present	165	90.2
Number of Pairs having Drug-drug Interaction on Distribution bases		
1	16	8.7
2	2	1.1
3	1	0.5
Metabolism based Drug-drug interaction		
Present	63	34.4
Not Present	120	65.6
Number of Pairs having Drug-drug Interaction on Metabolism bases		
1	29	15.8
2	19	10.4
3	7	3.8
4	5	2.7
5	1	0.5
6	3	1.6
Elimination based Drug-drug interaction		
Present	25	13.7
Not Present	158	86.3
Number of pairs having Drug-drug Interaction on Elimination bases		
1	19	10.4
2	5	2.7

Table 4: Prevalence of Drug-drug interaction on the Basis of Pharmacodynamic.

Category	Frequency n=183	Percent
Pharmacodynamic Drug-drug Interaction		
Present	69	37.7
Not Present	114	62.3
Antagonism based Drug-drug interaction		
Present	26	14.2
Not Present	157	85.8
Number of Pairs having Drug-drug Interaction on Antagonism bases		
1	11	6.0
2	11	6.0
3	1	0.5
4	1	0.5
5	2	1.1
Additive Effect		
Present	38	20.8
Not Present	145	79.2
Number of Pairs having Drug-drug Interaction on Additive bases		
1	27	14.8
2	6	3.3
3	2	1.1
4	3	1.6
Synergism based Drug-drug interaction		
Present	42	23.0
Not Present	141	77.0
Number of Pairs having Drug-drug Interaction on Synergism bases		
1	22	12.0
2	10	5.5
3	8	4.4
4	1	0.5
6	1	0.5

The prevalence of Drug-drug interaction on the basis of severity is shown in Table 5. Using the severity scale; serious, major, moderate, minor, significant and contraindicated, majority of patients 18(9.8%) had at least 1 pair of drug having serious interaction present in out of 23(12.6%). No major and moderate interactions of drugs were found. In majority of the patients 41(22.4%), 1 pair of minor drug-drug interaction was found out of 91(49.7%) patients presenting minor drug-drug interaction. Significant severity of DDIs were analyzed in 18(9.8%) of the prescriptions in which majority contained one pair of drug having interaction 36(19.7%). 19(10.4%) prescriptions of hospitalized patients showed contraindicated drug-drug interaction in which more prescriptions included 1 pair of drug having DDIs 17(9.3%).

In Table 6, mean comparison of the individual demographics were taken and is calculated and determining of p-value have been done which shows that all p-values are not exceeding than 0.05 except Gender which has no significance over the DDIs, and is more than 0.05 i.e. 0.237. Other than there, Age group (p=0.000), Hospital (p=0.000), Medical unit (p=0.001) and Length of stay in hospital (p=0.000) these all have significance over Drug-drug interaction, hence all Demographics have significant effect on DDIs except Gender.

Discussion

This study revealed that overall the prevalence of DDIs in two teaching hospitals of Quetta was 68.3%. In my study result



shows among the 125 drug-drug interactions, 59.0% DDIs were pharmacokinetic and 37.7% were on pharmacodynamic basis. These results were different from another study reported where the release prescriptions of the admitted patients were of unease and pharmacodynamic based drug-drug interactions were predominant [12]. On the basis of severity of interactions between drugs in my study, results showed that majority of the interactions were minor (49.7%) followed by serious (12.6%) and significant (9.8%) interactions. This pattern is unique in relation to another study done in south Indian showing teaching hospital where the vast majority of drug-drug interactions were moderate (70%) trailed by minor (28%) and major (2%) interactions [13]. My study found that due to increase of number of drugs (majority=24%) per prescription increases the number of drug-drug interactions per patient (68.3%). This discovery was similar to another distributed report where the drug-drug interaction increased from 13%

Table 5: Prevalence of Drug-drug interaction on the Basis of Severity.

Category	Frequency	Percent
Serious Drug-drug Interaction		
Present	23	12.6
Not Present	160	87.4
Number of Pairs having Serious Drug-drug Interaction		
1	18	9.8
2	4	2.2
3	1	0.5
Major Drug-drug Interaction		
Present	0	0.0
Not Present	183	100
Moderate Drug-drug Interaction		
Present	0	0.0
Not Present	183	100.0
Minor Drug-drug Interaction		
Present	91	49.7
Not Present	92	50.3
Number of Pairs having Minor Drug-drug Interaction		
1	41	22.4
2	27	14.8
3	9	4.9
4	4	2.2
5	2	1.1
6	1	0.5
Significant Drug-drug Interaction		
Present	18	9.8
Not Present	165	90.2
Number of Pairs having Significant Drug-drug Interaction		
1	36	19.7
2	16	8.7
3	16	8.7
4	11	6.0
5	5	2.7
6	2	1.1
7	4	2.2
11	1	0.5
Contraindicated Drug-drug Interaction		
Present	19	10.4
Not Present	164	89.6
Number of Pairs having Contraindicated Drug-drug		
1	17	9.3
2	2	1.1

Table 6: Comparison of Mean DDIs Present

Description	Frequency n=183	Mean DDIs ± SD	P value
Age group			
10 to 24	30	1.23+0.430	.000
25 to 39	28	1.36+0.488	
40 to 54	44	1.32+0.471	
55 to 69	47	1.30+0.462	
70 to 84	30	1.33+0.479	
85 to 99	2	1.50+0.707	
100 to 114	2	2.00+0.000	
Gender			
Male	100	1.38+0.488	0.237
Female	83	1.24+0.430	
Hospital			
Sandeman Provincial Hospital	141	1.31+0.465	.000
Bolan Medical Complex Hospital	42	1.33+0.477	
Medical Unit			
Unit 1	42	1.33+0.477	0.001
Unit 3	84	1.35+0.478	
Unit 4	57	1.26+0.444	
Length Of Stay In Hospital			
1-5 Days	110	1.35+0.478	.000
5-10 Days	64	1.30+0.460	
10-20 Days	9	1.11+0.333	

to 82% because the amount of medications increased from 2 to 7 or additional [14]. My conclusion also revealed that the prevalence of Drug-drug interaction was not significant with sex, but it was positively correlated with the age of the patient. This corresponds to other reported studies [11, 15]. Another study of correlation showed a positive association between total DDI and the age of the patient, size of the prescription and the number drugs prescribed [13]. According to prescription data recovered, it was not possible to estimate the duration of drug treatment. However, in my study, it is demonstrated that the duration of the stay of the patient is significant over Drug-drug interaction during the hospitalization of the patient, this study is analogous to another result of the study reported. [13]. The importance of the use of electronic software has been reported in the previous studies [16]. I used a software Medscape for my study, Similarly, other software has been used in a study by Sepehri and his colleagues who used the software recognition advance and noted the presence of DDIs in 20% of patients [17]. These concentrations could have overestimated the danger of DDI. To better assess the clinical relevance of a DDI, it is fascinating to know how as often as possible a DDI appears in reality in solutions. It is the critical duty of this study. These numbers are by and large default since medication cooperation studies are revolved around the component, pharmacokinetic thinks about, or a solitary case reports or case course of action give no information on the denominator of patients displayed to this medication combination [18, 19]. In addition, DDI' studies of clinical relevance is often performed in a small group of volunteers or derive a series of cases with specific patients, or drugs. Overall the studies conducted in the rest parts of the planet were parallel with this one based on socioeconomic backgrounds of the regions which reflect their healthcare systems.



Conclusion

Conceivable DDIs are regular among patients hospitalized a few physician recommended drugs. My study has comprehended the age assembles most inclined to the infections and continuous implies that can bring about the DDIs in hospitalized persistent medication treatment. This can help to enhancing the safe and effective prescription practice in healing centers. The utilization of the medication association checker Medscape a interaction checker application helped a ton in my study by assessing the above results all the more just; It would have been more hard to finish if done physically. My discoveries likewise clarified the part of critical of the drug specialist to assess or screen the DDIs. Different overviews may include an appraisal of the aftereffects of budgetary, restorative and humanistic of the clinically critical DDIs, particularly among people at hazard. Predominance of DDIs directly as indicated by the quantity of medications endorsed, number of classes of prescription treatment, sex and time of patients. Despite the fact that the quantity of medications have expanded from outside patients to admission to doctor's facility by 55%, the quantity of DDIs major and conservatives per understanding has not expanded. As indicated by these outcomes, understand that the rate of all minor and noteworthy DDIs to confirmation were made by changes in medications recommended while in clinic. My outcomes demonstrated the relationship of between aggregate DDI and the quantity of recommended medications. Patients with comorbidity, age, more established than 55, who had more medications endorsed and hospitalized toward the end of week must be close observed for unfavorable impacts of DDI, so as to evade essential clinical ramifications.

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