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Pharmacists-led interventions to improve medication adherence in global health settings

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ABSTRACT

The sword with two sides, Although medicine has the power to cure diseases, it also has the unspoken potential to damage patients if not used properly. Every healthcare system should prioritize ensuring that patients receive the appropriate medication for their clinical condition at the appropriate time, via the appropriate route, and in the appropriate dosages. Polypharmacy can be helpful because various morbidities are so common, but it can also have unintended harmful effects. In order to forecast the course of treatment, the co-morbidity-polypharmacy score correlates the patient's physiological age rather than their chronological age. Any departure from the medication's anticipated positive effect may be seen as a drug-related issue. In this study, the cost-benefit analysis of clinical pharmacy services and the effects of clinical pharmacist interventions on drug-related issues in polypharmacy prescriptions were examined. Finding and addressing drug-related issues, determining the level of health care providers' acceptance of clinical pharmacist interventions, analyzing the cost-benefit of clinical pharmacy services, and creating and recommending a clinical pharmacists intervention form to standardize and record drug-related issues were the specific goals.

Keywords: Drug, pharmacy, medicine.

1. INTRODUCTION

The prognosis of disease conditions are usually calculated based on the chronological age of the patient but some time calculations might become obsolete if the disease conditions of the patient are not taken into account in addition to the 3 medications administered. A formula to predict the physiological age of the patient was designed by adding all the disease conditions prevailing in the patient with the corresponding medications used to control the progress of the disease or alleviate the symptoms or cure the disease. It is called Comorbidity –polypharmacy score [1]. It can be calculated easily by adding the number of drugs administered to the patient with the corresponding number of disease conditions for which these medications were prescribed. The scoring of comorbidity polypharmacy has got relevance now-a- days as the life style diseases are increasing day by day. The prevalence of diabetes, hypertension and heart diseases are increasing to such a condition that majority of the population above the age of fifty years cannot lead normal life without the interventions of the pharmacological agents [2]. The disease progression is another serious issue that might be due to the changes in food habits of natural products to chicken and other non- vegetarian food items and then lack exercise due to scarcity of time with ultimate result of sedentary life style with number of disease conditions that directly have an impact on the physiological age of the patient [3].

2. REVIEW OF LITERATURES

The study by (Simin Dashti et.al 2012) [4] conducted in Tehran University in Iran focused on identifying the effectiveness of educational classes taken by Clinical Pharmacists in improving the practice of drug administration through enteral feeding tubes by nursing staff. A case control study was carried out in two separate teaching hospitals affiliated to their university. The nurses were divided into case and control groups and education regarding medicine administration through enteral tube was provided only to case group nurses. They used a 47-item questionnaire as the measuring tool of effectiveness of the training sessions which was answered by the nurses both before and after intervention. They also observed for changed in practice of nurses. The study found that educational activities by clinical pharmacist could significantly improve the knowledge and practice related to drug administration through enteral tubes by nurses. This was a good reference on basis of study design, statistical tools used and outcome for the present study.

A Brazilian study by (Lima et al 2007) [5] states that Clinical Pharmacist interventions can considerably decrease the number of medication errors in patients on enteral feeding tubes. Their study was on pediatric as well as adult patients who were critically ill and admitted in ICUs. Critically ill patients are mostly put on enteral feeding tubes as they have swallowing difficulties. So the study subjects they chose were highly relevant. Initially they carried out a survey to determine how many medication errors are occurring and to what extend the clinical pharmacist interventions are applied. Various errors related to tube obstruction, drug interactions etc were identified. As an improvement tool for intervention they developed a follow-up form for proper review of prescriptions of such patients. The outcome was an increase of clinical pharmacist interventions by 100% after implementation of the follow up form. This study shows the importance of novel ideas to be developed by clinical pharmacists and the impact it can produce in reducing the medication errors and related risk to patients [6].

3. METHODOLOGY

3.1 Study Design

A Pre-post Interventional study design was used. It is a subtype of interventional studies. Interventional studies are those in which the researcher intervenes directly at some points throughout the study. These are also called Experimental study designs. It is different from observational study. In observational studies the researcher does not involve to make any changes in study outcomes rather they observe and reach at conclusions on natural relationships. But in interventional or experimental study model the researchers look for the impact of the interventional approach applied by them. In pre post interventional study the same things are evaluated both before and after applying the intervention and the obtained data is compared in detail to find out the differences made after intervention. The changes are attributed to the applied intervention. The fact that not merely the intervention but other unconsidered factors can also influence the outcomes makes this study type a weaker one compared to the randomized controlled trials [7].

The prognosis of disease conditions are usually calculated based on the chronological age of the patient but some time calculations might become obsolete if the disease conditions of the patient are not taken into account in addition to the 3 medications administered. A formula to predict the physiological age of the patient was designed by adding all the disease conditions prevailing in the patient with the corresponding medications used to control the progress of the disease or alleviate the symptoms or cure the disease. It is called Comorbidity –polypharmacy score. It can be calculated easily by adding the number of drugs administered to the patient with the corresponding number of disease conditions for which these medications were prescribed. The scoring of comorbidity polypharmacy has got relevance now-a- days as the life style diseases are increasing day by day. The prevalence of diabetes, hypertension and heart diseases are increasing to such a condition that majority of the population above the age of fifty years cannot lead normal life without the interventions of the pharmacological agents. The disease progression is another serious issue that might be due to the changes in food habits of natural products to chicken and other non- vegetarian food items and then lack exercise due to scarcity of time with ultimate result of sedentary life style with number of disease conditions that directly have an impact on the physiological age of the patient [8].

4. RESULT

The prognosis of disease conditions are usually calculated based on the chronological age of the patient but some time calculations might become obsolete if the disease conditions of the patient are not taken into account in addition to the [9-10] medications administered. A formula to predict the physiological age of the patient was designed by adding all the disease conditions prevailing in the patient with the corresponding medications used to control the progress of the disease or alleviate the symptoms or cure the disease. It is called Comorbidity –polypharmacy score.

Table 1: Predictors for hypertension during pregnancy

Characteristics*	Total (*N* = 1214)	Mothers with hypertension (*n* = *146)*	Mothers without hypertension *(n = 1068)*	OR (95% CI); *P* Value
Age [*n* (%)] 14-18	12 (0.99)	2 (16.67)	10 (83.33)	1.87 (0.40-8.75); 0.331
19-23 →	622 (51.24)	60 (9.65)	562 (90.35)	Reference
24-28	412 (33.94)	44 (10.68)	368 (89.32)	1.12 (0.74-1.69); 0.599
29-33	110 (9.06)	22 (20.00)	88 (80.00)	2.34 (1.37-4.01); 0.002
34-39	58 (4.78)	18 (31.03)	40 (68.97)	4.22 (2.28-7.81); <0.001
Education [*n* (%)] Illiterate	22 (1.81)	2 (9.09)	20 (90.91)	Reference
Primary schooling#	12 (0.99)438	0 (0.00)	12 (100.00)	--
Secondary schooling	(36.08)	50 (11.42)	388 (88.58)	1.29 (0.29-5.68); 1.000
Pre-university University	452 (37.23)	52 (11.50)	400 (88.50)	1.30 (0.30-5.72); 1.000
(Not available)†	224 (18.45)	36 (16.07)	188 (83.93)	1.92 (0.43-8.55); 0.543
	66 (5.44)	6 (9.09)	60 (90.91)	--

Occupation [*n* (%)]	1072 (88.30)	114 (10.63)	958 (89.37)	Reference
Homemaker Employed	76 (6.26)	24 (31.58)	52 (68.42)	3.88 (2.30-6.53); <0.001
(Not available)†	66 (5.44)	8 (12.12)	58 (87.88)	--
Consanguinity marriage [*n* (%)]	1034 (85.17)	126 (12.19)	908 (87.81)	Reference
None	12 (0.99)	0 (0.00)	12 (100.00)	--
First degree# Second degree	90 (7.41)	6 (6.67)	84 (93.33)	0.52 (0.22-1.20); 0.127
Third degree (Not available)†	72 (5.93)	12 (16.67)	60 (83.33)	1.44 (0.76-2.75); 0.268
	6 (0.49)	2 (33.33)	4 (66.67)	--

It can be calculated easily by adding the number of drugs administered to the patient with the corresponding number of disease conditions for which these medications were prescribed. The scoring of comorbidity polypharmacy has got relevance now-a- days as the life style diseases are increasing day by day. The prevalence of diabetes, hypertension and heart diseases are increasing to such a condition that majority of the population above the age of fifty years cannot lead normal life without the interventions of the pharmacological agents. The disease progression is another serious issue that might be due to the changes in food habits of natural products to chicken and other non- vegetarian food items and then lack exercise due to scarcity of time with ultimate result of sedentary life style with number of disease conditions that directly have an impact on the physiological age of the patient.

Table 2: Types of medical conditions

ICD chapter name and code (n, %) (*N* = 750)	**Disease code**	**Name of the disease**	**Number of neonates (%) (*N* = 405)**
I. Certain infectious	A41.9	Neonatal sepsis	125 (30.86)
	A97.9	Dengue	1 (0.25)
	B34.3	Parvovirus	1 (0.25)
III. Diseases of the blood	D53.9	Anemia	4 (0.99)
	D45	Polycythemia	8 (1.98)
	D59.9	Hemolytic anemia	2 (0.49)
IV. Endocrine,	E16.2	Hypoglycemia	10 (2.47)
	E87.1	Hyponatremia	5 (1.23)
	E87.2	Lactic acidosis	3 (0.74)
V. Mental and behavioural disorders	F45.3		1 (0.25)
VI. Diseases of the nervous system	G00.9	Meningitis	19 (4.69)
	G06.2	Cerebral abscess	3 (0.74)
	G40	Epilepsy	3 (0.74)
	G40.3	Neonatal convulsion	10 (2.47)
	G93.4	Encephalopathy	3 (0.74)
VIII. Diseases of the ear and mastoid process	H66.9	Acute otitis media	1 (0.25)
IX. Diseases of the circulatory system	I21.9	Myocardial infraction	1 (0.25)
	I64	Neonatal Stroke	3 (0.74)
X. Diseases of the respiratory system	J15	Bacterial pneumonia	11 (2.72)
	J18.0	Bronchopneumonia	6 (1.48)
	J21.9	Bronchiolitis	7 (1.73)
	J30.3	Rhinitis	1 (0.25)
	J44.9	Chronic lung disease	1 (0.25)
	J68.9	Pulmonary edema	1 (0.25)
	J84.9	Interstitial pneumonia	1 (0.25)
	J93.9	Pneumothorax	3 (0.74)
XI. Diseases of the digestive system	K75.0	Liver abscess	1 (0.25)
XIII. Diseases of the musculoskeletal system and connective tissue	M00.9	Septic arthritis	3 (0.74)
	M31.1	Thrombotic thrombocytopenic purpura in a newbom	1 (0.25)
XIV. Diseases of the genitourinary system	N17.9	Acute kidney injury	6 (1.48)
XV. Pregnancy, childbirth and the puerperium	O41.9	Meconium stained amniotic fluid	6 (1.48)
	P00.2	Neonatal gangrene	1 (0.25)
	P00.9	Congenital heart disease neonatal	10 (2.47)
	P07	Preterm disorder	22 (5.43)
	P10.2	Intraventricular hemorrhage due to birth injury	3 (0.74)
	P20.9	Perinatal hypoxia	1 (0.25)

XVI. Certain conditions originating in the perinatal period	P21.9	Birth asphyxia	32 (7.90)
	P22	Respiratory distress syndrome neonatal	62 (15.31)
	P22.1	Transient tachypnea of the newborn	19 (4.69)
	P23	Congenital pneumonia	8 (1.98)
	P24.0	Meconium aspiration syndrome	32 (7.90)
	P24.9	Neonatal aspiration pneumonia	7 (1.73)
	P26.9	Pulmonary hemorrhage of neonates	13 (3.21)
	P28.4	Apnea of newborn	8 (1.98)
	P29.3	Pulmonary hypertension of neonates	13 (3.21)
	P39.3	Urinary tract infection of neonatal	7 (1.73)
	P53	Hemolytic disease of the newborn	4 (0.99)
	P54	Neonatal hemorrhage	2 (0.49)
	P57.9	Neonatal septic shock	2 (0.49)
	P59.9	Unconjugated hyperbilirubinemia	83 (20.49)
	P60	Disseminated intravascular coagulation of newborn	3 (0.74)
	P61.6	Coagulation disorder of neonatal	2 (0.49)
	P70.1	Infant of diabetic	15 (3.70)
		mother	
	P70.4	Hypoglycemic seizure of newborn	11 (2.72)
	P74.9	Dehydration fever of neonate	25 (6.17)
	P76.0	Meconium plug syndrome	5 (1.23)
	P76.9	Intestinal obstructive of newborn	1 (0.25)
	P77	Congenital hypotonia	21 (5.19)
	P78.8	Gastroesophageal reflex disease of neonate	3 (0.74)
	P91.5	Neonatal depression	2 (0.49)
	P91.6	Hypoxic ischemic encephalopathy of newborn	33 (8.15)
	P92	Feeding problem for newborn	5 (1.23)
XVII. Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99) (40, 5.3%)	Q05.9	Meningomyelocele	6 (1.48)
	Q21.1	Atrial septal defect	7 (1.73)
	Q25.0	Patent ductus arteriosus	8 (1.98)
	Q25.2	Congenital rectovaginal fistula	1 (0.25)
	Q39.1	Tracheoesophageal	1 (0.25)
	Q40.0	Congenital hypertrophic pyloric stenosis	4 (0.99)
	Q42.8	Imperforate anus	2 (0.49)
	Q43.1	Hirschsprung disease	5 (1.23)
	Q79.0	Congenital diaphragmatic hernia	6 (1.48)
XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99) (4, 0.5%)	R73.9	Hyperglycemia	4 (0.99)

However they had fair knowledge about tube types and uses but were still making mistakes due to the lack of understanding of guidelines. The doctors had fairly good knowledge about the drugs but they were not able to put the knowledge into practice when it comes to the therapy through EFT. All the professionals were unaware of the standard guidelines. Pharmacists had better knowledge compared to nurses on drug and formulation related aspects. But they were also not able to correlate the knowledge with practical application and advise the nurses. The practice and attitude aspects were also poor among all the professionals before the intervention phase which could be highly improved after intervention.

5. DISCUSSION

In the current review 160 qualified patients were recognized before the mediation stage and 245 patients after the intercession stage. The mean age before intercession was 56 years and mean age after mediation was 54 years. This is almost equivalent to the patient populace of a concentrate by Sohrevadi et.al who led the concentrate in a 16 had relations with ICU of an enormous educating clinic. Their patients had a mean age of 58 years. (31) The concentrate by Isabel et al is additionally reliable with this where the mean age was viewed as 59 years. (15) Yet in the concentrate by Gorzoni et.al the mean age was a lot higher which was 65.6. (26) The example populace of concentrate by Presoti et.al (30) and one more concentrate by Galvez et.al (23) had much higher mean age which was viewed as 70.4 years and 74.9 years individually. The orientation conveyance of present review showed that male patients was more in number than female patients in both pre mediation (94

guys and 66 females) and post mediation gatherings (142 guys and 103 females). This was conflicting with the investigation of Presoti et.al (30) and the concentrate by Gorzoni et.al (26) where females were more in number than guys. The review populace of Galvez et.al was comparable in orientation conveyance to the current review with 40 guys and 25 females in the review bunch. In the current review nervous system science and neuro medical procedure were two divisions with biggest number of patients being placed on enteral taking care of cylinder. This is a result of the idea of infections connected with sensory system. Stroke patients comprise a critical level of patients of nervous system science division who ordinarily get gulping challenges because of the illness conditions. In neuro medical procedure most cases are mishap related mind wounds where the patient remaining parts oblivious or with negligible capacities for a more extended timeframe. This large number of conditions require the inclusion of enteral taking care of cylinders to the patients.

6. CONCLUSION

Patients on polypharmacy can be segregated into three cohorts based on the score in the comorbidity polypharmacy score of mild cases with scores less than seven, moderate with scores between eight to fourteen and severe when the score goes beyond fourteen. This severity scale has direct relationship with the incidence of drug related problems in addition to the prognosis of the disease conditions for which the patient approached healthcare providers. Deviation from the expected positive effects of the drug therapy can be taken as the drug related issue or problem. The medications have got the potency to modify the disease conditions. It is due to its pharmacological activity with the untoward potential to cause negative impact of drug related problems. Many a times the hidden negative outcomes of the treatment with the potential pharmacological agents indented for the mitigation of the disease conditions were not at all considered due to ignorance. This ignorance might invite number of drug related issues with the potential to cause even death of the patient. So drug related problems are a major issue in the treatment of disease conditions with highly potent chemical agents.

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