Optimizing Medication Management and Deprescribing in Type 2 Diabetes with Comorbidities: A Clinical Pharmacist-Led Initiative in a Private Healthcare Setting

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ABSTRACT:

Background: The primary objective is to investigate medication errors, and emphasize the role of clinical pharmacists in minimizing these errors. The secondary objectives included examining prevalent comorbidities in diabetic patients, identifying commonly prescribed medications, and to assess patients' and caregivers' perception on polypharmacy and deprescribing using a revised Patients' Attitudes Towards Deprescribing (rPATD) questionnaire. **Method:** A prospective cross-sectional questionnaire-based study involving 164 type 2 diabetes patients with comorbidities was conducted over six months in a private healthcare setting. The study identified common comorbidities and reviewed medical records to detect, address, and avert medication-related issues. Appropriate interventions were implemented subsequently. The rPATD questionnaire was used to understand patients' and caregivers' attitudes toward their medications and their thoughts on discontinuing them. **Result:** The study included 164 participants, with 98 patients and 66 caretakers. Hypertension (87%), chronic kidney disease (63%), cardiovascular diseases (52%), dyslipidemia (20%) retinopathy (37%), and diabetic ketoacidosis (19%)) were the most common comorbidities. Among the 164 inpatients, 75 (46%) medication errors were identified, including 69% prescription errors, 19% administration errors, 12% documentation errors. It was also found that patients and caregivers of individuals over the age of 60 experienced significant financial and medication burdens. **Conclusion:** The involvement of clinical pharmacists was crucial in improving drug documentation, reducing prescription duplications, and minimizing dosing errors, potentially enhancing patients' quality of life. This study highlights the essential role of clinical pharmacists in addressing gaps in the Indian healthcare system.

Keywords: Type 2 Diabetes Mellitus, Comorbidities, Polypharmacy, Medication Errors, rPATD questionnaire

INTRODUCTION:

Diabetes is a global health concern, affecting approximately 422 million individuals worldwide. In India, 101 million people or 11.4% of the population lives with diabetes, with over 95% of adult cases attributed to type 2 diabetes mellitus(T2DM)[1]. This Condition, when unmanaged, can lead

to severe complications such as cardiovascular disease, end-stage renal failure, vision loss and nerve damage.[2]

Managing diabetes is further complicated by the presence of comorbidities. Most diabetic patients suffer from at least one additional health condition, and about 40% live with three or more, making their care significantly more challenging [3]. This often necessitates the use of multiple medications, leading to a phenomenon known as polypharmacy.

Polypharmacy, while sometimes essential, increases the risk of medication errors necessitating careful monitoring of treatment regimens. The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) has defined medication errors (MEs) as, "Any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the health care professional, patient, or consumer" [4]. Medication errors can take place at any point in the medication management pathway. Research commonly identifies five core types of errors: those associated with prescribing, transcription, preparation or dispensing, administration, and the monitoring process. Medication errors can result in drug-related issues, which may negatively affect patient safety and hinder the effectiveness of treatment.

These issues underscore the importance of vigilant medication management, as they can hinder patients' adherence to their treatment plans and undermine the intended health outcomes. In a systemic review, Krahenbuhl Melcher et al. found that around 8% of hospitalized patients encounter an ADR and 5–10% of all drug prescriptions or drug applications are mistaken. In a study conducted by Nascimento, 91.7% of DRPs was reported.[5][6] Clinical pharmacists play a crucial role in addressing these challenges. With their in-depth knowledge of disease states and

pharmacotherapy, they are pivotal in managing chronic conditions by optimizing drug therapy, providing patient counseling, and facilitating communication between physicians and patients.[7]

Timely deprescribing of inappropriate medications is essential in minimizing drug related problems, ensuring that treatments are safe and effective. By eliminating unnecessary or potentially harmful drugs from a patient's regimen, clinical pharmacists help reduce the risk of adverse drug reactions and improve overall treatment outcomes.[8][9] Through treatment chart reviews and patient education, they raise awareness of the risks associated with polypharmacy and emphasize the importance of optimizing medication use.

This study employs the rPATD questionnaire to evaluate patients' and caregivers' attitudes towards deprescribing, a subject that has not been previously explored in Kerala.[10] This study also underscores the indispensable role of clinical pharmacists in hospital settings, highlighting their crucial interventions in managing drug-related problems, particularly among patients experiencing polypharmacy, to optimize therapeutic outcomes and enhance patient safety.

MATERIALS AND METHODS:

Study design and subject recruitment

A prospective, cross-sectional, questionnaire-based study was conducted over a six-month period, from October 2023 to March 2024, among 164 participants with type 2 diabetes and comorbidities at a private hospital in Calicut. Ethical clearance was obtained from the hospital's institutional ethics committee (Approval No. IEC/2024/02/01) prior to the commencement of the study. The study included male and female patients between the ages of 30 and 80, diagnosed with type 2 diabetes mellitus (T2DM) and comorbid conditions, who were on five or more long-term

prescription medications. Patients with cognitive, speech, or hearing impairments, as well as those with incomplete questionnaires, were excluded. The study also included caregivers of patients aged 60 years and above, while caregivers younger than 18 years were excluded. The sample size of 164 was determined using Cochran's formula, with a 95% confidence interval, an alpha level of 0.05, a 7% margin of error, and an expected prevalence of 30%, accounting for a 10% dropout rate.

Instrument used

A structured data collection form was developed to capture patient information, including their medication history, the number of medications they were taking, and whether they sought treatment from multiple physicians for the same condition, treatment chart review, among other relevant details. Additionally, our study employed the revised Patients' Attitudes Towards Deprescribing (rPATD) questionnaire, designed and validated by Emily Reeve. Unlike the standard PATD, which primarily focuses on patients' attitudes, the rPATD version used in our study assesses both patients' and caregivers' perceptions of deprescribing. [11]

The study utilized two distinct questionnaires: one for patients, consisting of 22 questions, and a separate version for caregivers, comprising 19 questions. The rPATD questionnaire is divided into several key factors: beliefs about the appropriateness of withdrawing medications (Appropriateness factor), perceived burden of medication use (Burden factor), concerns about stopping medications (Concerns about stopping factor), and the level of involvement or knowledge in managing medications (Involvement factor). Furthermore, it includes caregivers' views on the medication regimen of the patient they care for.

The questionnaire was validated by a panel of experts, including academicians, physicians, and statisticians. Responses were evaluated using a Likert scale, with "strongly agree" and "agree" combined into a score of 3 points, "disagree" and "strongly disagree" grouped into 1 point, and "neutral" responses assigned 2 points. Each factor was analyzed individually, and based on the scores, we determined whether patients and caregivers had a positive or negative attitude toward deprescribing.[12]

Methods

In the initial phase of the study, we conducted a comprehensive review of the existing literature to identify research gaps that supported the rationale for our investigation. Following this, we developed the study protocol and obtained approval from the ethics committee. Participants were then selected based on predefined eligibility criteria.

The study methodology was thoroughly explained to the willing participants, ensuring they fully understood the process. Informed consent was obtained through signed consent forms. A data collection form was created to gather patient details, after which we collected their prescriptions and conducted detailed treatment chart reviews. Prescription, administration, and documentation errors were recorded separately.

The collected data were relayed to the attending physician, who made the final decision on whether to continue or discontinue drug therapy. Subsequently, the revised Patients' Attitudes towards Deprescribing (rPATD) questionnaire was administered to both patients and caregivers of participants aged 60 and above. Additionally, patient counseling was conducted using a polypharmacy awareness pamphlet to raise awareness on the subject.

Statistical analysis

Collected are expressed in terms of frequency and percentages. The data were coded and entered into MS Excel for descriptive analysis. Qualitative data were summarized using both absolute and relative frequencies. For statistical analysis, IBM SPSS version 21 was employed. A binary logistic regression model was used to assess the impact of independent variables on outcome variables. In addition, chi-square analysis was conducted to examine the relationship between patient-related factors and willingness to deprescribe. Statistical significance was determined with a P-value threshold of less than 0.05.

RESULT

Patient characteristics

During the three months study period, a total of 164 participants were enrolled in the study. Of these, 98 patients and 66 caregivers participated in completing the questionnaire. Each patient's prescription underwent a detailed treatment chart review, revealing 75 medication errors (46%) among the group. Of the study group, 96 were female and 68 were male, with the majority of patients between 70 and 80 years old. Furthermore, 74 patients (45%) reported a monthly income ranging from ₹11,000 to ₹20,000, and 59 patients (36%) had received a secondary level of education. A total of 49 patients (29.8%) were consulting multiple doctors for the management of a single condition. Eighty-one patients (49%) incurred monthly medical costs falling within the ₹41,000 to ₹50,000 range. Demographic characteristics of the participants are given in the table 1. The most frequently observed comorbidities included hypertension, affecting 87% of patients, and

chronic kidney disease, present in 63% of cases. Comorbidities observed among the participants are given in the table 2.

Medication usage patterns among study population

In this study population, polypharmacy was notably prevalent, with 48% of patients receiving over 10 different medications. Among antidiabetic treatments, insulin injections were predominantly used as monotherapy, accounting for 85% of the cases. As for oral hypoglycemic agents, biguanides were prescribed to 66% of patients, closely followed by sulfonylureas at 56.3%. Additionally, the co-prescription of antilipidemic agents was common, with statins making up 95% of these therapies. Regarding antihypertensives, ACE inhibitors emerged as the most frequently prescribed, being used by 46% of patients. Table 3 represents the various types of medications taken by the patients.

Description of medication errors and pharmacist intervention

Among the 164 participants, 75 medication errors were identified, representing 46% of the population. Of these, 69% were prescription-related errors, (Drug related problems) 19% were administration errors, and 12% were documentation issues. Figure 1 categorizes the types of medication error. Out of the 52 prescription errors, 33 involved wrong doses. Notably, prescribing excessively high doses in patients with renal impairment was a frequent drug-related issue. Pharmacists often recommended dose adjustments for antibiotics based on creatinine clearance, particularly for meropenem, nitrofurantoin, vancomycin and colistin. Therapeutic duplication also emerged as a common prescription error, accounting for 17%. Regarding administration errors, 14 incidents were reported, with the most common cause being incorrect timing and frequency of drug administration. For the 9 documentation errors, the primary issue was the inaccurate

recording of administration times and frequencies in the system. The acceptance rate for clinical pharmacists' interventions was notably high at 99.%. Nearly all recommendations made by clinical pharmacists were approved by physicians, resulting in adjustments to the patients' drug therapy. Table 4 represents the types of DRPs and pharmacist interventions.

Patients and caregivers attitude towards deprescribing

The rPATD Questionnaire was administered to both patients and caregivers of individuals aged 60 and above. Nearly half of the patients (48.9%) and a majority of caregivers (57.3%) acknowledged that the medications they are taking feel like a burden to them. The majority of the patients were undergoing dialysis, and the high costs associated with their treatments and medications may have contributed to their perception of medication as a burden. A significant majority of patients (69.7%) and caregivers (64.7%) did not perceive that they or their care recipients were on unnecessary medications. However, they expressed a desire for their physicians to consider reducing the dosage of their prescribed medications. A substantial portion of patients (58.3%) and an overwhelming majority of caregivers (85.2%) affirmed that they possess a clear understanding of the medications they or their care recipients are using. Additionally, both patients and caregivers expressed satisfaction with the current medications being taken by themselves or their care recipients. The questionnaire of both patients and caregivers are represented in table 7 and 8 respectively. The response of each individual factors in the questionnaire is expressed in figure 2,3,4,5,and 6.

Participant related factors associated with willingness:

The Chi-square test of independence was used to explore the relationship between categorical variables and found a significant link between patient-related factors and their willingness to stop

medications. Notably, the female patients were most engaged in managing their medications, showing 76% involvement. The Chi-square test revealed a strong correlation between gender and involvement in patients, with a Pearson Chi-Square value of 138.926 and a p-value of .000. Conversely, the male patients aged were least involved with their medication regimen. The analysis is shown in table 5.

The study also looked at the impact of how caregivers' monthly medical expense, burdened them in managing their care recipient's medication within a private hospital. The Chi-square test showed a significant correlation (Pearson Chi Square = 22.032, p = 0.001), indicating that caregivers who had spent more (Rs.41k-50k) were more likely to be burdened due to their care recipient's medications, highlighting the importance of a cost efficient, yet effective treatment. The analysis of monthly medical expense and burden factor is shown in table 6.

DISCUSSION

This study marks the first to simultaneously examine medication errors and evaluate the attitudes of both patients and caregivers toward deprescribing in type 2 diabetes patients with comorbidities in Kerala. Polypharmacy is a significant risk factor for the emergence of drug-related problems, and one effective approach to address this issue is by reviewing treatment charts to identify and discontinue inappropriate medications. Deprescribing through this method helps mitigate the risks associated with excessive medication use.

Medication errors are frequently observed in hospitalized patients, and our study revealed a 46% occurrence rate, which is notably higher compared to studies conducted in Gujarat (36%) and France (27.6%). [13] Possible reasons for this include heavy workloads, time constraints for physicians, outdated knowledge of guidelines, complex cases, and interruptions during the

prescribing process. In our study, prescription errors were the most frequent, with 52 out of 74 medication errors being related to prescribing. This is similar to a study in Gujarat, where 262 out of 403 errors were prescription errors. [14] This may be due to lack of proper patient characteristics (age, weight, serum creatinine in CKD patients) and history taking or dose miscalculations.

American Society of Health-System Pharmacists (ASHP) categorizes DRPs based on 5 key areas such as need for additional therapy, wrong drug, dose too low, dose too high, adverse drug reactions. In this study, females (53%) experienced drug-related problems (DRPs) more than males, which contrasts with findings from studies in Karnataka and Gujarat. However, in a study conducted in Kerala, both males (81.4%) and females (75.7%) had a nearly equal risk of developing DRPs.[15] In our study, we found that the geriatric population (aged 65 and older) experienced a higher rate of drug-related problems (72%), which is similar to findings from a study conducted in Ethiopia. [16] This may be because older adults often have multiple health conditions, leading to polypharmacy, and they also have changes in pharmacokinetics and pharmacodynamics.

In the present study, wrong dosing was observed in 36% of cases, followed by errors in frequency and timing at 29%, and therapeutic duplication at 19%. These findings align with a study from Thailand but differ from studies in Bangalore, which reported a 45% incidence of ADRs, Ethiopia with 52.7% for suboptimal treatment, and Kerala where 99% of cases involved inappropriate medication selection.[17] Incorrect dosing was particularly common among patients with renal impairment, as they require dose adjustments based on creatinine clearance levels. Our study found that antibiotics like meropenem, nitrofurantoin, vancomycin, and colistin required dose adjustments for patients with renal impairment, which aligns with findings from a study conducted in Thailand.[18]

In our study, the acceptance rate for pharmacist interventions was notably high at 99%, similar to findings in Thailand (99.12%) and China (97%), but higher than rates observed in Bangalore (67.6%), Ethiopia (79.8%), and Kerala (59.5%). The proactive identification and resolution of clinically significant DRPs by clinical pharmacists, along with strong prescriber support for these interventions, highlight the essential role of pharmacists in reducing DRPs and optimizing patient drug therapy outcomes.

This research also aims to examine medication errors and assess the attitudes of patients and caregivers toward deprescribing in type 2 diabetes with comorbidities in Kerala. The study underscores the risks of polypharmacy and the benefits of deprescribing inappropriate medications, which helps mitigate excessive medication use and its associated risks. From the statistical analysis conducted, a significance was found among gender and their involvement in using their medications; and the monthly expense of patients and their financial burden. Female patients showed greater involvement in managing their medications (76%), as demonstrated by a strong correlation between gender and involvement. This was supported by a Pearson Chi-Square value of 138.926 and a p-value of .000. Male patients were less involved in their medication regimen. This finding was previously contradicted in a previous study conducted by The University of Michigan in which women are generally less likely to adhere to their medications compared to men. A study using claim data found that women had lower adherence rates, which could be attributed to various factors, including socioeconomic and cultural influences. [19] Another study conducted in Pondicherry implied that Male patients demonstrated better adherence to their prescribed medication regimens compared to female patients.[20] The financial burden faced by caregivers due to monthly medical expenses significantly impacted their willingness to

deprescribe. Caregivers spending ₹41,000–₹50,000 on medications were more likely to experience burden. A significant correlation was observed (Pearson Chi Square = 22.032, p = 0.001), emphasizing the need for cost-effective treatment options.

CONCLUSION

Medication errors, particularly prescription errors, are among the most frequently encountered issues in healthcare settings, with patients on polypharmacy being at a higher risk. Clinical pharmacists play a pivotal role in identifying and preventing these errors, ensuring patient safety and optimizing therapeutic outcomes. Their interventions significantly contribute to minimizing potential harm and enhancing the quality of care in healthcare facilities.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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TABLES

Table 1: Patient demographics

Details	Characteristics	Number (%)
Gender	Male female	68 (41.4%) 96 (58.6%)
Age	30-40 41-50 51-60 61-70 71-80	6 (3.6%) 13(7.9%) 29(17.6%) 45(27.4%) 71(43.2%)
Education	Illiterate primary Secondary Higher secondary UG PG	29(17.7%) 38(23.1%) 59(36%) 13(8%) 17(10.3%) 8(4.9%)
Income	0-10K 11-20K	49(29.9%) 74(45.1%)

	21-30K 31-40K 41-50K	24(14.7%) 12(7.3%) 5(3%)
Monthly Medical Expense	0-10k 11k-20k 21k-30k 31k-40k 41k-50k	22(13.4%) 36(22%) 17(10.3%) 8(5%) 81(49.3%)
Number Of Medications prescribed	5 6-10 >10	13 (8%) 72 (44%) 79 (48%)

Table 2: comorbid conditions found in Type 2 DM patients

Comorbid condition	Number of patients	Percentage
Hypertension	143	87.1%
Dyslipidemia	33	20%
CKD	103	62.8%
CVD	85	51.8%
Asthma/COPD	10	6.09%
Thyroid disorder	18	10.9%
Others	73	44.5%

Table 3: Medication usage pattern among participants in the study conducted at a private hospital

Variables	Type of medications	n	%
Anti diabetic medications	Insulin Biguanides Sulfonylureas DPP4 Inhibitors SGL2 Inhibitors	141 109 93 51 17	85 66 56.3 31 10.3
Anti Hypertensives	Angiotensin converting enzyme inhibitors Angiotensin Receptor Blockers Calcium channel blockers Beta Blockers	76 39 61 29	46 23.6 37 18
CKD medications	Diuretics Erythropoietin K-bind sachets	61 88 23	37 53.3 14

	Tacrolimus Mycophenolate sodium prednisolone	59 55 47	35.7 33.3 28.4
Lipid lowering agents	Statins	157	95
Others	Acid suppressants, antibiotics, vitamin and calcium supplements	92	55.7

Table 4: Types of drug-related problems and pharmacists' interventions

Case	Description of drug related problems	Pharmacist intervention
A 66-year-old patient with, Type 2 DM, dyslipidemia, CKD, NSTEMI, hypothyroidism and LA GRADE B esophagitis.	Furosemide 40mg 0-1-0 and Torsemide 10mg 1-0-0 was prescribed together in this patient. T. Thyroxine 125mcg was prescribed and administered to the patient. Sodium bicarbonate 1g BD was given to the patient and later its frequency was changed to 1g TDS.	Both are loop diuretics and it's a therapeutic duplication. Combining both could lead to excessive diuresis and electrolyte imbalance. Only T. Thyroxine 100mcg was needed as per the patient's TFT. The doctor has not canceled the previous order. It should have been discontinued before initiating the new dose.
A 61-year-old patient with type 2 DM, HTN, CVD, diabetic Nephropathy and Parkinsons disease admitted for an infection.	Patient was prescribed with T. Oseltamivir 75mg 1-0-1 and his creatinine level was 2.47. Patient was given T Oka met 500mg BD and T glyciphage 500mg BD.	Dose adjustment was required for this patient. Dose should be reduced to 30mg 1-0-1. Therapeutic duplication. Metformin 2g per day was not required for this patient.
A 71-year-old male patient (weight: 65kg) with type 1 DM, HTN, CKD and stroke was admitted in the hospital and the patient had a Sr. Cr 1.9	Inj Meropenem 1g IV Q8hrly was administered for this patient.	Based on the patient's serum creatinine levels, the dose of meropenem should be adjusted to 500 mg Q12hr.

A 70-year-old male Patient with type 2 DM, HTN, CKD, dyslipidemia was admitted in the ward.	T. lisphos dose was mistakenly written in the prescription as 665mg 1-1-0. This patient was given inj lactagard (cefaperaxone and sulbactam) and inj pantoprazole at the same time.	It is supposed to be T. lisphos 667g 1-1-0. Inj pantoprazole should be given atleast 30 ins before antibiotics.
A 62-year-old woman with Type 2 DM, HTN, dyslipidemia and NSTEMI was admitted to the ward.	The patient was prescribed with T. Amlokind 40mg in doctor's order.	The dose was supposed to be T. Amlokind 5mg 1-0-0.
A 64-year-old male patient with type 2 DM, HTN, and CVA was admitted.	The patient was given T. Ecospirin Gold 0-1-0.	The frequency was supposed to be 0-0-1.
A 66-year-old woman with Type 2DM, CVD was admitted to the ward.	Patient is prescribed with T. pantoprazole 40mg OD and T. Ranitidine 150mg BD	Therapeutic duplication- Ranitidine could have been discontinued.
a 72-year-old male pacemaker patient was prescribed with furosemide.	Furosemide 40mg BD is prescribed to the patient.	Daily oral furosemide might increase the risk of developing AF after pacemaker implantation in elderly patients. It is contraindicated in pacemaker patient.
A 46-year-old male patient who underwent lumbar disc surgery was given Tramadol.	The patient was given tramadol as verbal order and hasn't filled the form.	Doctor has to sign the narcotics form within 24 hrs. but

Table 5: chi square analysis of gender and involvement factor of patients in private hospital

Crosstab

Count

		Private Hosp Patient's Involvement Factor		Total
		Yes	No	
Gender of Private Hosp Patient	Male	31	37	68
	Female	73	23	96
Total		104	60	164

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	138.926.[a]	1	.000		
Continuity Correction[b]	136.463	1	.000		
Likelihood Ratio	160.900	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	138.568	1	.000		
N of Valid Cases	68				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.36
b. Computed only for a 2x2 table

The above table describes the correlation between Patient's Gender and their Involvement factors in Private Hospital using Chi Square Analysis with significance of <0.001

Table 6: chi square analysis of monthly medical expense and burden factor of caretakers in private hospital

Crosstab

Count

		Private Hosp Patient's Burden Factor		Total
		Yes	No	
Monthly Medical Expenses of Private Hosp Patients	Rs.0-10k	5	17	22
	Rs.11-20k	15	21	36
	Rs.21-30k	11	6	17
	Rs.31-40k	5	3	8
	Rs.41-50k	65	16	81
Total		101	63	164

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)

Pearson Chi-Square	22.032[a]	1	.000		
Continuity Correction[b]	17.009	1	.000		
Likelihood Ratio	12.301	1	.000		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	21.943	1	.000		
N of Valid Cases	164				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is .88
b. Computed only for a 2x2 table

The above tables describe the correlation between Patients Monthly Medical Expense and their Burden factors in Private Hospital using Chi Square Analysis with significance of <0.001.

Table 7: rPATD Questionnaire response of patients

Item	Disagree (1)	Neutral (2)	Agree (3)
Burden Factor			
I spend a lot of money on medicines	35(36.4)	14(14.5)	47(48.9)
Taking my medicines every day is very inconvenient	24(25)	8(8.3)	64(66.6)
I feel that I am taking a large number of medicines	30(31.2)	25(26)	41(42.7)
I feel that my medicines are a burden to me	44(45.8)	17(17.7)	35(36.4)
Sometimes I think I take too many medicines	30(31.2)	25(26)	41(42.7)
Appropriateness			
I feel that I may be taking one or more medicines that I no longer need	67(69.7)	21(21.8)	8(8.3)
I would like to try stopping one of my medicines to see how I feel without it	57(59.3)	34(35.4)	5(5.2)
I would like my doctor to reduce the dose of one or more of my medicines	43(44.7)	28(29.1)	25(26)

I think one or more of my medicines may not be working	74(77)	18(18.75)	4(4.1)
I believe one or more of my medicines may currently be giving me side effects	37(38.5)	0	59(61.4)
Concerns about stopping factor			
I would be reluctant to stop a medicine that I had been taking for a long time	10(10.4)	22(22.9)	64(66.6)
If one of my medications was stopped, I would be worried about missing out on future benefits	19(19.7)	35(36.4)	42(43.7)
I get stressed whenever changes are made to my medicines	16(16.6)	46(47.9)	34(35.4)
If my doctor recommended stopping a medicine, I would feel that he/she was giving upon me.	67(69.7)	24(25)	5(5.2)
I have had a bad experience when stopping a medicine before	28(29.1)	31(32.2)	37(38.5)
Involvement factor			
I have a good understanding of the reasons I was prescribed each of my medicines	16(16.6)	24(25)	56(58.3)
I know exactly what medicines I am currently taking, and/or I keep an up-to-date list of my medications.	32(33.3)	23(23.9)	41(42.70
I like to know as much as possible about my medicines	6(6.25)	18(18.75)	72(75)
I like to be involved in making decisions about my medicines with my doctors	0	33(34.3)	63(65.6)
I always ask my doctor, pharmacist, or other healthcare professional if there is something I don't understand about my medicines	4(4.1)	11(11.4)	81(84.3)
Global factor			

If my doctor said it was possible, I would be willing to stop one or more of my regular medicines	0	12(12.5)	84(87.5)
Overall, I am satisfied with my current medicines.	13(13.5)	7(7.2)	76(79.1)

Table 8: rPATD questionnaire response of caregivers

Item	Disagree (1)	Neutral (2)	Agree (3)
Burden Factor			
My Care recipient's medicines are quite expensive	10(14.7)	19(27.9)	39(57.3)
I feel that the person I care for is taking a large number of medicines	15(22.05)	6(8.8)	47(69.1)
I feel that my care recipient's medicines are a burden to them	4(5.8)	26(38.2)	38(55.8)
Sometimes I think the person I care for takes too many medicines	15(22.05)	6(8.8)	47(69.1)
Appropriateness factor			
I feel that the person that I care for may be taking one or more medicines that they no longer need	44(64.7)	17(25)	7(10.2)
I would like the doctor to try stopping one of my care recipient's medicines to see how they feel without it	36(52.9)	23(33.8)	9(13.2)
I would like the doctor to reduce the dose of one or more of my care recipient's medicines	14(20.5)	26(38.2)	28(41.1)
I think one or more of my care recipient's medicines may not be working	40(58.8)	24(35.2)	4(5.8)
I believe one or more of my care recipient's medicines may be currently giving them side effects	18(26.4)	17(25)	33(48.5)
Concerns about stopping factor			
I would be reluctant to stop one of my care recipient's medicines that they had been taking for a long time	19(27.9)	2(2.9)	47(69.1)

I get stressed whenever changes are made to my care recipient's medicines	15(22)	24(35.2)	29(42.6)
I feel that if I agreed to stopping one of my care recipient's medicines then this is giving upon them.	43(63.2)	23(33.8)	2(2.9)
The person that I care for has had a bad experience when stopping a medicine before.	46(67.6)	5(7.3)	17(25)
Involvement factor			
I know exactly what medicines the person that I care for is currently taking, and/or I have an up-to-date list of their medications.	0	10(14.7)	58(85.2)
I like to know as much as possible about my care recipient's medicines	3(4.4)	4(5.8)	61(89.7)
I like to be involved in making decisions about my care recipients medicines with their doctors	0	7(10.2)	61(89.7)
I always ask my doctor, pharmacist, or other healthcare professional if there is something I don't understand about my care recipient's medicines	2(2.9)	9(13.2)	57(83.8)
General factor			
If their doctor said it was possible, I would be willing to stop one or more of my care recipient's medicines	3(4.4)	11(16.1)	54(79.4)
Overall, I am satisfied with my care recipient's current medicines.	7(10.2)	10(14.7)	51(75)

Figure 1: Medication Errors in private hospital

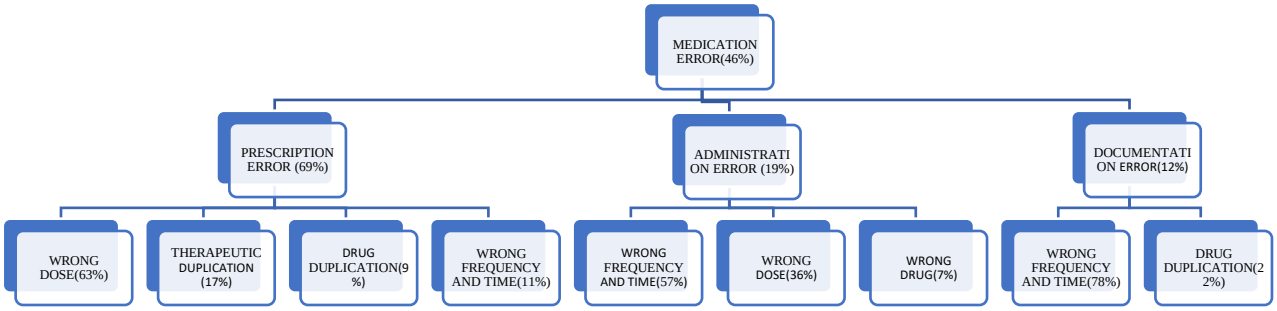

Figure 2: burden factor results of both patient and caregivers

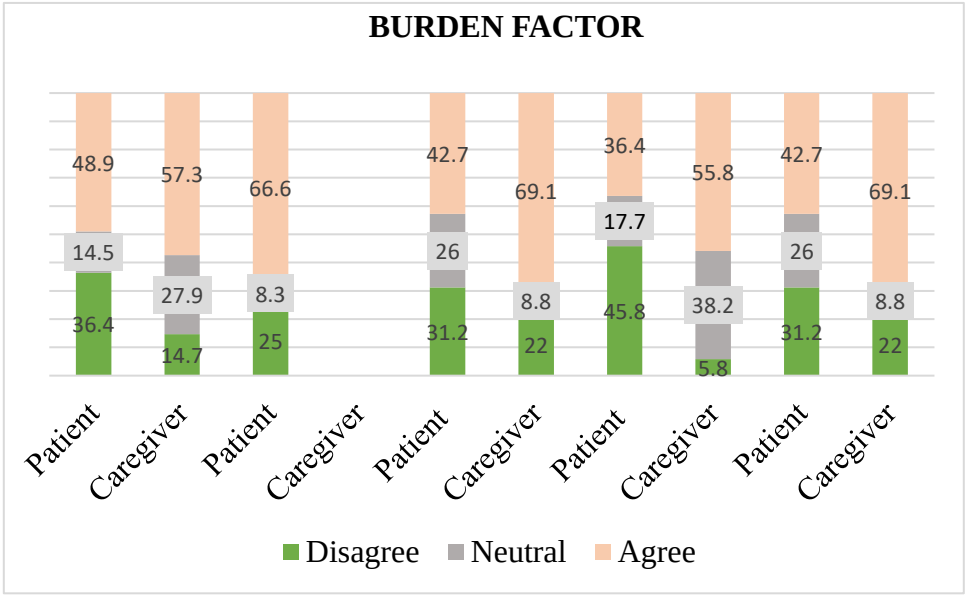

Figure 3: Appropriateness factor results of both patient and caregivers

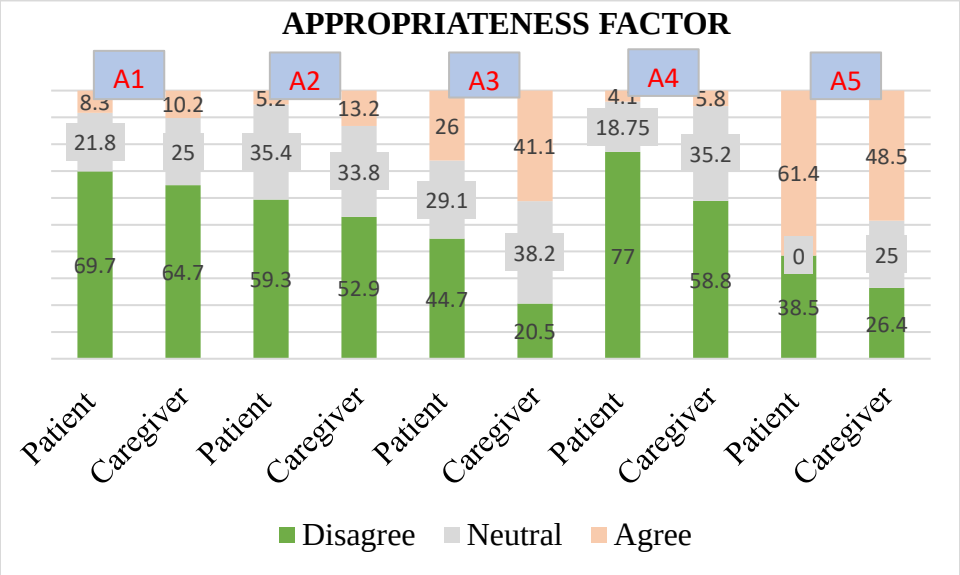

Figure 4: Stopping factor results of both patient and caregivers

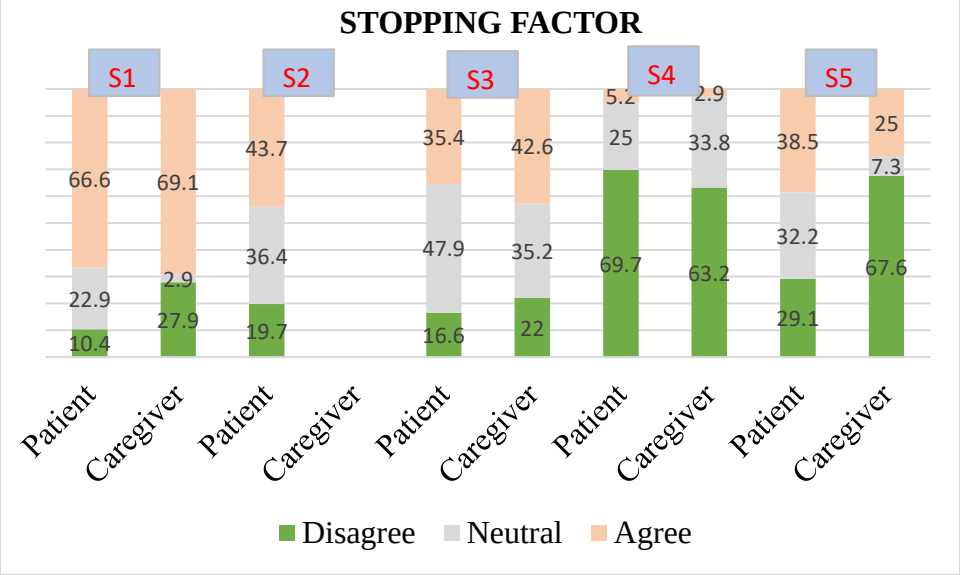

Figure 5: Involvement factor results of both patient and caregivers

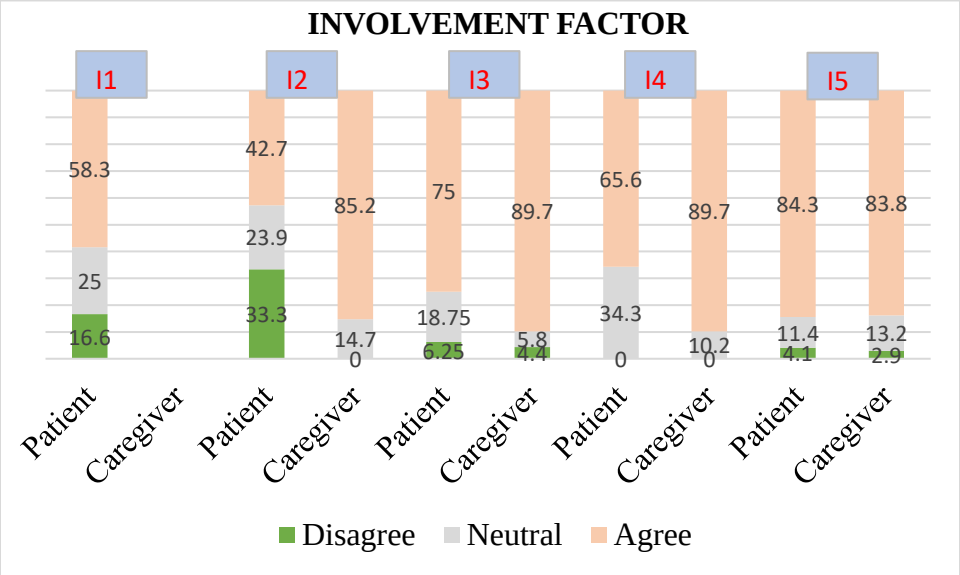

Figure 6: General Factor results of both patient and caregivers