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Research Article

Medication Non-Adherence Behaviors and Potential Barriers among Chronically Ill Patients

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Abstract:

Background: Poor adherence to medications represents a major barrier to achieving the desired health outcomes in patients with chronic diseases.

Objective: This study aimed to evaluate medication non-adherence and its associated factors among chronically ill patients.

Methodology: In this cross-sectional study, the 4-item medication adherence scale was used to assess medication adherence among chronically ill patients attending the outpatient clinic of governmental primary healthcare center in the period from June through November 2024. The logistic regression statistic model was used to determine the factors associated with medication non-adherence.

Results: In total, 160 patients were included in the study with a non-adherence rate of 43.1%. Not receiving information about medication (OR= 2.87; CI: 1.4 -3.9), number of daily pills (OR= 1.61; CI: 1.1-2.3), polypharmacy (OR= 2.30; CI: 1.3-3.3), changes in treatment (OR= 3.10; CI: 2.2-4.6), and lack of appropriate knowledge (OR= 2.88; CI: 1.2-4.1) were associated with medication non-adherence. On the other hand, incorporating treatment plans into daily activities (OR= 0.17; CI: 0.05-0.6) was inversely associated with medication non-adherence.

Conclusion: The poor medication adherence in the present study sheds light on the importance of implementing intervention programs that focus on enrich patients' information and knowledge, prescribing the least possible number of medications and daily pills, and encouraging incorporating medication received into daily activities.

Keywords: medication non-adherence behavior; multidimensional model; chronic illness; medication adherence scale; healthcare system variables

Introduction

Pharmacological therapies were the mainstay interventions for treatment of chronic ill patients reduce complications and improve their quality of life's [1-3] . Non-adherence to medication therapies will negatively affect patients' outcomes; it may lead to a further worsening of symptoms and increased morbidity and mortality [4, 5] . The negative impact of non-adherence was reported in many studies around the world [6-8]. One study in Europe revealed that about 9% of cardiovascular patients' admissions to the emergency departments were due to non-adherence to medications. Cutler et al. in their systematic review they were assessed the cost of non-adherence among 14 chronic conditions; the estimated disease-specific cost per person

ranged from $949 to $44 190 [9]. The estimated cost of non-adherence includes; direct and indirect costs like medication cost, emergency department visit and hospital admissions costs.

The non-adherence is complex and multifactorial, as classified by World Health organization (WHO) include: patients' related factors, systemic aspects, pharmacological elements, and condition-specific elements [10]. Beliefs about medicines, number of pills, comorbidities, and cost of treatment have been taken into consideration by WHO.

Non-adherence was more reported in poor, low income with limited resources developing countries [11-14]. Individuals in low-to- middle income families that cannot afford medications and health cost are more likely to skip doses and prone to non-adherence. Adherence to prescribed medications in developed countries among chronic ill patients was 50% as estimated by the WHO. In developing countries, the rates are even lower [10, 14]. Few studies conducted in West Bank, Palestine regarding the impact of non-adherence and its risk factors were conducted within a particular patients, disease or treatment [15-17]. The variety of reasons linked to pharmaceutical non-adherence, particularly among chronically ill patients, requires further investigation to ascertain the precise factors contributing to medication non-adherence among this group of patients. In West Bank, medication non-adherence among chronically ill patients have not yet been investigated. The objective of this study is to evaluate medication adherence and examine the factors linked to medication non-adherence among the chronic ill patients in West Bank, Palestine. The study findings should provide insight for healthcare providers on the factors that should be discussed in particular when evolving interventions to improve adherence in patients with chronic diseases [18-20].

Methods

Study design and subjects

This is a cross sectional, questionnaire-based study in which patients visiting the outpatient clinic of governmental primary healthcare center in Ramallah, West Bank, were randomly selected to participate in the study in the period between June and November 2024.

The distribution of population rate per Ramallah center was 5114 and the average number of patient's visits per doctor's visits per year was 0.9 [21]. Due to the lack of literature studies which estimates the prevalence of adherence among chronic ill patients in West Bank, and as previous described in the literature we assumed 50% of patients were non-adhere to their medications, with 95% confident level and 0.05 error level, the minimum sample size was estimated to be 142 patients. Assuming 30% drop out from the study, the target sample size was 195 patients.

Following the screening of individuals, research assistants randomly selected participants to follow up with at the center, verified their eligibility, and extended an invitation to participate in the study. Participants in the study had to be 18 years of age or older, suffer from one or more chronic condition(s), and have been taking medicine for more than a year as part of their treatment regimen in order to be eligible. The study eliminated participants who declined to participate, those with mental health issues that interfered with their ability to answer effectively, and those with cognitive impairment. In the study, a total of 23 health issues were classified as chronic diseases (Additional file 1: Table S1). These ailments were chosen because standard treatment for them involves prescription. Every participant in the study was given a thorough

explanation of the aims, methodology, and purpose of the research before they voluntarily agreed to participate.

Study instrument

We utilized the validated Arabic version of the 4-item Medication Adherence Scale (MMAS-4) to evaluate medication adherence; a tool extensively used in adherence research. The items comprise: (1) neglecting to administer prescriptions, (2) indifference towards timely ingestion, (3) discontinuing when experiencing improvement, and (4) ceasing while feeling deteriorated. Each item is responded to with "yes" or "no." Patients who answered "yes" to any item were categorized as non-adherent, whereas "no" replies to all items signified adherence. Alongside adherence, we gathered data on factors related to non-adherence. The following items were included: Socio-demographic variables: age, gender, educational attainment, income level. Clinical factors: type of chronic disease, quantity of comorbidities, quantity of medications (polypharmacy). Factors connected to treatment: modifications in therapy, drug burden, integration of medicine into daily regimen. Healthcare system variables: perceived quality of healthcare provision and information regarding pharmaceuticals, assessed using a 5-point Likert scale (1 = extremely poor to 5 = very good) [10,11]. The items and scoring method were adapted from previously published work [24]. The four items were: Do you forget to take your medications? Are you careless about the time of taking your medications? Do you stop taking your medications when you feel better? Do you stop taking your medications when you feel worse? According to their responses, patients were divided into two groups: patients who reported one or more “yes” responses were considered non-adherent, while those who reported “no” on the four questions were considered adherent. Furthermore, the quality of healthcare

delivery as perceived by patients, along with the level of treatment information provided, was assessed using a 5-point Likert scale, where “1” indicates very poor and “5” indicates very good. Scores exceeding “3” were utilized to classify respondents as perceiving a high quality of healthcare delivery and receiving comprehensive treatment information for each item, correspondingly.

Statistical analysis

The Statistical Package for Social Sciences (SPSS) (version 21, SPSS, Chicago, IL, USA) was used for analysis. Descriptive, univariate and bivariate analysis was performed. Chi-square test was also used to investigate the correlation between different categorical variables and medication adherence. The variables significantly associated with medication adherence in the univariate analysis were entered in the stepwise ordinal regression model. Significance was determined at P value < 0.05.

Results

Patient characteristics

During the study period, 210 patients attending the outpatient clinic were evaluated for eligibility. Figure 1 provides a summary of the recruitment and enrolling process. Out of these, 195 patients satisfied the inclusion criteria. The principal reasons for exclusion at the screening phase (n=15) included being under 18 years of age, possessing a cognitive impairment that obstructed the provision of reliable responses, or having been on the current pharmaceutical regimen for less than one year. Of the 195 eligible patients, 160 provided written informed consent and completed the study questionnaire, resulting in a response rate of 82.1% among

eligible patients and 76.2% of those first approached. The 35 eligible patients who choose not to participate did so owing to time constraints or disinterest.

Of the 210 patients approached, a total of 160 patients agreed and participated in the study with a response rate of (76.2%). Patients' ages ranged from 18 to 56+ years with majority between 36-55 years (48.8%) and more than 56 years (40.0%). The majority of the participants were females (61.2 %) and 63.1% had attained basic education. Most of the patients were diagnosed with endocrine disorders (81.5%), followed by circulatory system disorders (74.3%) as classified by ICD-9-CM Figure 2. Demographic and clinical data of adherent and non-adherent groups are presented in Table 1.

Non-adherence among chronic ill patients

Results showed 43.1% prevalence rate of non-adherence, with patients living with endocrine system disorders and those with mental illness being the most non-adherents Table 2. Forgetting to take medications (36.2%), followed by being careless about taking medications (29%) last four weeks were the most common forms of non-adherence.

Factors associated with Medication Non-adherence

Univariate analysis revealed that having difficulty affording medications, not receiving information about prescribed medications, number of daily medications, changes in treatment and not incorporating the medication into daily routine activities were significantly associated with medication non-adherence.

The multivariate regression analysis revealed that not receiving information about medication (OR= 2.87; CI: 1.4 -3.9), number of daily medications (OR= 1.61; CI: 1.1-2.3), polypharmacy (OR= 2.30; CI: 1.3-3.3) changes in treatment (OR= 3.10; CI: 2.2-4.6), lack of knowledge (OR=

2.88; CI: 1.2-4.1), and not incorporating medications into daily activities (OR= 0.17; CI: 0.05-0.6) were significantly and independently associated with, medication non-adherence Table 3.

Discussion

The assessment of medication non-adherence and its related factors serves as a crucial initial step in the formulation of future intervention programs designed to enhance medication adherence and health outcomes among chronic ill patients. Results showed that high proportion of participants of patients (43.1%) were non-adherent; that is a slightly more than half of the participants continued adherence to long-term therapies for chronic conditions indicates significant opportunities for enhancement within the primary care setting.

The adherence rate measured in this study was marginally higher than the 39% recorded in Italian outpatient adults [23] but comparable to the 53% discovered in Chinese primary-care centers [24]. Our results were in line with earlier studies conducted in Spain on chronic patients [25], although they contrast markedly from the reported adherence rate of 18% in tertiary care settings [26].

Forgetfulness and being careless about medication time were the most frequent reported forms of non-adherence [27, 28]. A reasonable explanation for these results may attribute to multi factors include: working, travel, financial condition, and the ineffectiveness or Side effects of medicines [29, 30].

The best indicator of adherence was the patient's understanding of their prescribed medications. A significant percentage of participants experienced difficulty in explaining the quantity, number, and frequency of doses related to their prescriptions, which had an adverse effect on

their adherence. It can be difficult for individuals with chronic illnesses to comprehend their own symptoms and the intricate regimens they must follow.

Friis et al. 2020, for instance, discovered that those with chronic illnesses had greater trouble understanding the health information provided by providers [31]. Similarly, chronically unwell people frequently have misconceptions and don't grasp the purpose of their medications, according to Fredericksen et al. and Kvarnström et al. [32, 33]. Additionally, Al-Qazaz et al. found that adequate knowledge about medications is associated with better adherence to prescribed drugs and better glycemic control among patients with type 2 diabetic [34].

Poly-pharmacy and number of daily pills were showed to be independent risk factors of non-adherence; this was in the line of other studies [26, 35-37]. An earlier cohort study of medication adherence in older adults (CoSMO) demonstrated that the number of pills utilized by the older adults with hypertension was shown to be a strong predictor of poor adherence to prescribed medications in older patients, in which is consistent with other studies' findings [28, 29]. Polypharmacy, along with problems related to lack of knowledge of the prescribed medications make it difficult for older adults to adhere to treatment [30]. Another study conducted in found that patients with chronic diseases who were taking ≥ 5 drugs had 2.4 times non-adherence to their medications than those who used only one drug [31].

Moreover, changes in treatment regimens was associated with medication non-adherence in this study, which was consistent with Mansur et al. [38, 39] who revealed that number of pills, chronic conditions, changes in the therapy regimens, and increase medication dosing will negatively affect adherence.

Other patient related factors associated with low adherence in this study are the participants did not incorporate medication regimen into daily routine activities. Healthcare provider should

target those patients especially those with unintentional non-adherence and motivate them to integrate medication regimens into their daily activities which may strength the habit and making patients remember to take their medication easily [40-42]. Sanders MJ et. al. she interviewed 149 community-dwelling senior citizens showed that in 91% of the participants' taking medication was ingrained in their sleep, wake-up, and meals routines. The participants choreographed specific, personalized medicine-taking behaviors within larger everyday routines. Mostly pillboxes or homemade modifications were the equipment utilized to encourage adherence [43].

Strengths and limitations of the study:

Surveys and self-reported approaches may present certain limitations, as they are susceptible to recall biases and the possibility of overestimating adherence rates. The context of this study, being questionnaire-based, imposes limitations on the ability to explain the cause and effect of non-adherence. The study was conducted at a single medical center, which may have somewhat constrained the overall generalizability of the findings. Furthermore, it is challenging to compare this study to others due to the differing approaches employed in the literature and the lack of agreement on the best technique to assess treatment adherence. Despite these drawbacks, the estimation of treatment adherence in this study contributed to the development of a body of evidence in favor of patient-centered therapies.

5.2. Conclusion

The variety of factors linked to medication non-adherence in chronically ill patients underscores the need for additional research to uncover the actual predictors of non-adherence within this population. In West Bank, medication non-adherence among chronically ill patients has not yet been investigated. The present study revealed that medication non-adherence indicates a

potential for enhancement among patients with chronic diseases. The current research aims to offer new perspectives on the factors that healthcare providers ought to prioritize in order to enhance medication adherence in chronically ill patients. Future interventions and chronic diseases management programs should focus on enrich patients' information and knowledge, prescribe the least possible number of medications and daily pills and encourage incorporating medication receive into daily activities. Additional research is required to assess the influence of addressing the factors identified in this study on adherence levels.

List of Abbreviations:
CoSMO: cohort study of medication adherence in older adults
MOH: Ministry of health
SE: Standard error
OR: Odds Ratio
CI: confidence interval
SPSS: Statistical Package for Social Sciences
WHO: World Health organization

Author Contributions: Study concept and design: RG, and MK; analysis and interpretation of data: DA., RG. and MK.; drafting of the manuscript: RG and MK.; visualization: MK; critical revision of the manuscript for important intellectual content: MK.; statistical analysis: MK., and DA. Data collection: DA., and RG. All authors contributed to the drafting and critical review of the manuscript and have approved the final draft of the manuscript.

Ethical Approval and Consent to Participate

The study protocol was reviewed and approved by the Faculty of Pharmacy Committee at Al-Quds University and the Palestinian Ministry of Health (MOH) (Ref. RECPH/2023-003). Permission was obtained from the Ministry of Health (MOH) to conduct the study at the Ramallah primary healthcare clinic. Written informed consent was obtained from all participants before participation. Patients were informed that their participation was voluntary, that they could withdraw from the study at any time without any impact on their usual healthcare, and that their information would remain confidential.

Human Rights

The study was conducted in accordance with the principles of the Declaration of Helsinki.

Data Availability:

The dataset presented in the study is available on request from the corresponding author after its publication.

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest:

The authors declare that there are no conflicts of interest.

Consent for publication:

No identifiable personal information or images are included in this article.

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Supplementary Material:

Supplementary material associated with this article has been published online and is available at: Link to the DOI

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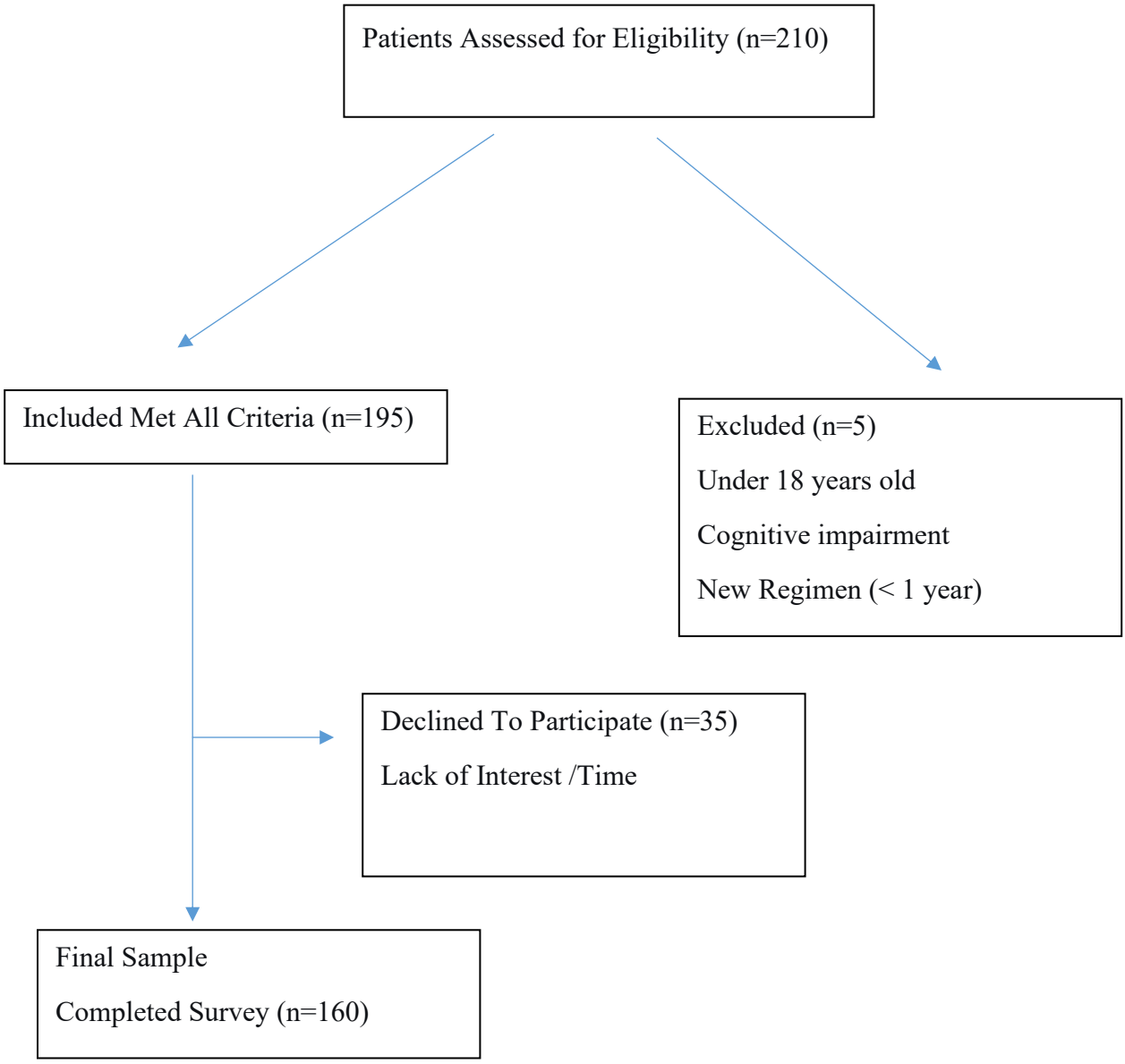

Figure 1. Participant Recruitment and Enrollment Flowchart

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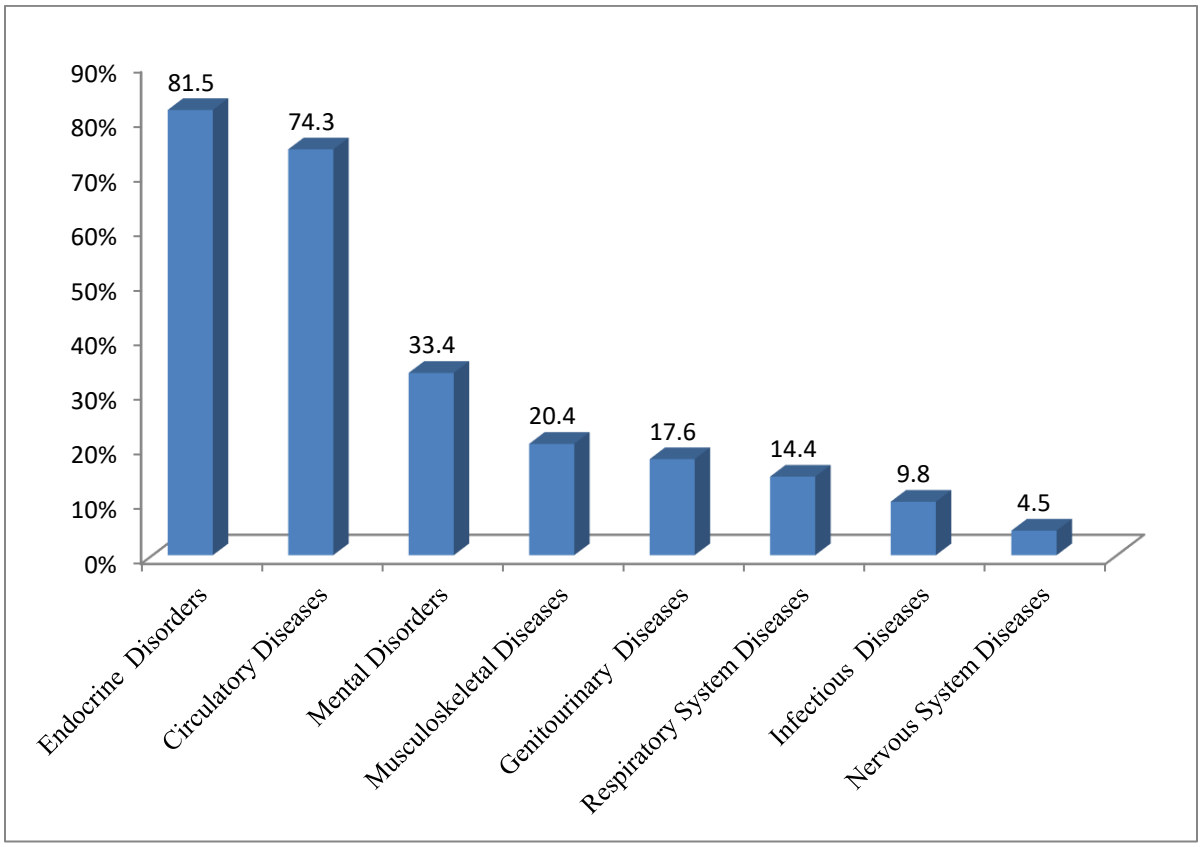

Figure 2: Percentages of most chronic conditions defined by the ICD-9-CM

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Table 1. Patient characteristics and the results of the univariate analysis of factors with potential impact on medication adherence

Variable n (%)	All patient (160)	Adherent (91)	Nonadherent (69)	*P*-value*
Gender				
Male	62 (38.8)	35 (38.5)	27 (39.1)	0.88
Female	98 (61.2)	56 (61.5)	42 (60.1)	0.79
Age (year)				
18-35 years	18 (11.3)	8 (8.8)	10 (14.5)	0.39
36-55 years	78 (48.8)	46 (50.5)	32 (46.3)	
≥ 56 years	64 (40.0)	37 (40.7)	27 (39.1)	
Education Level				
Illiterate	11 (6.9)	9 (9.9)	2 (2.8)	0.09
School level	101 (63.1)	59 (64.8)	42 (60.8)	
College/University Level	48 (30.0)	23 (25.3)	25 (36.2)	
Living Status				
Living Alone	15 (9.3)	6 (6.6)	9 (13.0)	0.06
Living with Someone	145 (90.6)	85 (93.4)	60 (86.9)	
Number of Chronic Conditions *(mean ±SD)*				
2-3 Chronic Conditions	82 (51.3)	65 (71.4)	17 (24.6)	<0.001
4-5 Chronic Conditions	48 (30.0)	16 (17.6)	32 (46.4)	
≥ 6 Chronic Conditions	30 (18.8)	10 (11.0)	20 (29.0)	
Social and Economic Factors				
Having difficulty affording medications	98 (61.3)	51 (56.0)	47 (68.1)	0.04
Having difficulty with transport	82 (51.3)	48 (52.7)	34 (49.2)	0.66
Healthcare Team and System-Related Factors				
Receive information about medication (no)	107 (66.9)	52 (54.9)	57 (82.6)	<0.001
≤ 1visit every three months	88 (55.0)	50 (55.0)	33 (47.8)	0.04
Quality of care (*(mean ± SD)*	4.11 ± 0.76	4.29 ± 0.62	3.9 ± 0.81	0.04†
Condition-Related Factors				
≥ 1 Hospital Admission(s)	30 (18.8)	11(12.1)	19 (27.5)	0.06
No Hospital Admissions	130 (81.2)	80 (87.9)	50 (72.4)	
Therapy-Related Factors				
Polypharmacy (yes, > 5 medications)	97 (60.6)	40 (44.4)	57 (82.6)	<0.001
Number of Daily Pills (mean ± SD)	3.9 ± 1.3	3.2 ± 1.1	4.8 ± 1.6	<0.001†
Did experience changes in treatment	96 (60.0)	44 (48.3)	52 (75.3)	<0.001
Patient-Related Factors				
Did not have appropriate knowledge	64 (40.0)	30 (32.9)	34 (49.2)	0.02
Incorporation into daily routines (no)	100 (62.5)	42 (46.1)	58 (84.0)	<0.001

***Pearson's χ2 test. † Student's t-test**

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Table 2. Adherence and Non-Adherence Rates, Likely Causes of Non-Adherence among Study Participants (n= 160)

Prevalence of Adherence /Non-Adherence	**Total 160 (%)**
Adherent Patients	91 (56.9)
Non-Adherent Patients	69 (43.1)
Likely cause of non-adherence	**Total 69 (%)**
Forgetting to take medication	56 (36.2)
Careless at times about taking medications	22 (29.0)
Feeling better	13 (20.3)
Feeling worse	11 (15.9)

Table 3. Multiple regression analysis for variables predicting non-adherence

	β	SE	OR	CI	*P*-Value
Did not receive information about medication	1.054	0.56	2.87	1.4-3.9	*0.01*
Number of Daily Pills	0.470	0.13	1.61	1.1-2.3	*0.02*
Polypharmacy	0.830	0.33	2.30	1.3-3.3	*0.01*
Did experience changes in treatment	1.410	0.78	3.10	2.2-4.6	*0.005*
Did not have appropriate knowledge	1.060	0.59	2.88	1.2-4.1	*0.03*
Incorporation into daily routines (yes)	-1.714	0.91	0.18	0.05-0.6	*0.007*

β is the Regression coefficient., SE: Standard error, OR: Odds Ratio, CI, confidence interval