**Research Article**

# Adherence with Prescribed Medications Among Diabetes Mellitus II Patients

**Humera Sarwar**[*1,2], **Abdullah Dayo**[1], **Muhammad Ali Ghoto**[1], **Humera Ishaq**[2], **Nadeem Baloch**[3], **Naheed Memmon**[1], **Mudassar Iqbal Arain**[1], **Ali Qureshi**[1]

[1] Faculty of Pharmacy, University of Sindh, Jamshoro, Pakistan.
[2]Faculty of Pharmacy, Hamdard University, Karachi, Pakistan.
[3]Department of Pharmacy, Shaheed Mohtarma Benazir Bhutto (SMBBMU) Medical University Larkana, Pakistan.
**\*Corresponding author's E-mail:** humera_pharmacy@yahoo.com

**ABSTRACT**

Primary objective of the research was to study the factors affecting patient compliance in DM II patients and to suggest necessary steps to resolve the problem. Quantitative descriptive correlational study was conducted by stratified sampling method in 3 different hospitals of Hyderabad city. Data were collected by an approved questionnaire. A total of 140 known DM II patients with an average age of 53.79±14.72 years (BMI= 23.82 ± 3.8) were approached and the response rate was 93.33%. 63% felt unhealthy and 95% of them were not satisfied with their health condition. 29% of the patients were diagnosed as diabetic 10 years ago and 87% people are suffering from comorbid states as well. 73% of the patients regularly monitor glucose level. 67 out of 140 were on once daily dosing of oral hypoglycemic, 61% were on insulin. There was a strong association found between prescribed medication administration and habitual forgetful attitude (p <0.02). Majority of the patients responded that hypoglycemic agents would be more affordable if they are of lowprice (n=80) and if less in no: (n=92). Only 31.4% patients consult pharmacist. 88.7% of the patients were completely satisfied with the attitude and behaviour of health professional but still 60% felt that in rush hours health professionals avoid listening to their problems. The study showed different aspects of non-compliance with medications and the factors affecting medication compliance. The individual's stand point and objectives undoubtedly affect adherence to a medical treatment plan and cannot be over looked. By provoking social sustenance and presenting information about side effects, Compliance with drug therapy can be increased and this will lead to the development of better health care system in the society.

**Keywords:** Compliance, Diabetes Mellitus II, Insulin, Medications, Oral Hypoglycemics.

## INTRODUCTION

Patient compliance/medication adherence is the degree to which the patients' attitude concurs with the health practitioners' recommendation[1,2] or, Medication compliance is the extent to which a patient is able to follow the health practitioners' instructions.[5] The associated increased complexity comparative to diagnostic and therapeutic knowledge and skills has been the detection that in many situations, drugs are not being utilized in a way conductive to optimal benefit and safety.[1]

The medication compliance especially in patients with chronic disorders is a task for the effective management of the diseases.[3,4] Subsequently non compliance can have severe adverse effects on patient health, it is important that health practitioner make use of available tactics for increasing compliance.[5] There are many factors which are associated with non-compliance; the most severe of them are poly pharmacy, complexity of regimen design and patient inconvenience in taking medications, social beliefs and socio economic problems.[6] These factors may be broadly categorized as patient-centered aspects, therapy-related aspects, social and economic aspects, healthcare system aspects and disease aspects.[7-9]

Treatments can never be effective if patients do not follow prescribed treatment plan, hitherto in developed countries only 50% of patients who suffer from chronic diseases adhere to treatment recommendations. In developing countries, when taken together with poor admittance to health care, nonexistence of appropriate diagnosis and inadequate access to medicines, poor adherence is threatening to render ineffective any effort to tackle chronic conditions, such as diabetes, depression and HIV/AIDS.[10] Chronic diseases like diabetes, hypertension and asthma requires long term management in order to maintain the quality of life in an individual suffering from any of these or all of these diseases[9]. Medication noncompliance with hypoglycemic drugs may lead to the worsening of the disease and also the development of comorbid states.[6,9] Patient compliance can be measured by many ways like pill count method, by interviewing the patient, prescription refills and by measuring clinical outcomes but no method is considered as gold standard.[11,12] Diabetes mellitus II (DM II) is a major chronic metabolic disorder that fallouts from defects in both insulin secretion and insulin action. Elevation in the rate of basal hepatic glucose production; after food intake, impairment in suppression of glucose production by Insulin and lessened insulin mediated glucose uptake by muscle add into postprandial hyperglycaemia.[13] Glycemic control is important to reduce the risk of comorbidities associated with DM II.[14] Research suggests that adherence to treatment recommendations is low. DM II slowly leads to serious vascular, nephrologic, neurologic and ophthalmological

impediments; it can be presumed that enhancing compliance to treatment recommendations may lead to a reduction of impediments. Treatment procedures in DM II are complicated, encompassing life-style adaptations and medication intake.[15]

## MATERIALS AND METHODS

### Study Design

Quantitative descriptive correlation research was conducted by using a random sampling method on population suffering from Diabetes Mellitus II.

### Data Collection

A study was conducted at outpatient departments of three different district hospitals of Hyderabad City, Pakistan. 150 patients visiting out patients department were approached for the interview. 10 of them refused to answer the questions therefore the response rate was 93.33%. Demographic data was collected from 140 patients, targeting the factors influencing medication/ drug compliance/adherence by using questionnaires. The questionnaire was designed to focus on the attitude towards health and medical needs, knowledge of patient, socioeconomic considerations, health professional and patient interactions.

### Inclusion criteria

The inclusion criteria of the study population were: patients diagnosed with Diabetes mellitus II, Patients were on treatment for at least one year prior to data collection, patients aged between 18 and 80 years, Patients who were residents of Hyderabad, Pakistan and mentally sound as well.

### Exclusion criteria

The exclusion criteria of the study population were: Individuals who were not able to undergo an interview, patients aged below 18 and above 80 years, all those patients who did not agree to participate in the research and mentally unstable.

### Data analysis

After the collection of required amount of data which fulfilled the inclusion and exclusion criteria, the analysis was done using various statistical methods available in SPSS software version 20. Medication compliance was analyzed by using MoriskyScale.[16]

## RESULTS

### Baseline Characteristics

A total of 140 patients were included in the study (n=140). Out of them 58 (41.4%) were Males with a mean age of 50.75 ± 13.24 years, and 82 (58.6%) were Females with a mean age of 54.8 ± 15.9years.

Mean height, weight and Body Mass Index (BMI) are shown in Table 1.

**Table 1:** Baseline Characteristics of the respondents

|  | N | Range | Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|---|---|---|
| Age | 140 | 56 | 24 | 80 | 53.79 | 14.718 |
| Weight (Kg) | 140 | 37 | 45 | 82 | 62.70 | 8.440 |
| Height (cm) | 140 | 36.6 | 149.3 | 185.9 | 164.376 | 9.870 |
| BMI | 140 | 17 | 17 | 34 | 23.82 | 3.898 |

### Socio demographic Variables

Out of n=140 respondents visiting outpatient departments of hospitals 73 % were married, which was the highest proportion of patients suffering from diabetes mellitus II (DM II). 23 % of the respondents were illiterate while 77 % of the respondents were literate having different levels of education as specified in Table 2. 57.1 % of the people who responded the survey were smokers.

### Disease State

Among 140 respondents 29% (n=40) were diagnosed 10years ago with DM II, 17 % (n=24) were diagnosed 5 years back with DM II, 23% (n=32) were told 3 years back that they have DM II, since 2 years 18% (n=26) of the respondents were suffering from DM II and 13% (n=18) were diagnosed a year ago with DM II. 87% (n= 122) of the patients were having comorbidities while 13 % (n=18) only had Diabetes. 72.9% (n=102) of the respondents said that they regularly monitor there glucose levels, out of them 74.5% (n=76) monitor by blood analysis, where 43.4 % (n=33) used home based tests like glucometer, 10.5%

(n=8) were found to rely on laboratory investigation whereas 46.1% (n=35) of the respondents said that they uses both home based and laboratory analysis for glucose monitoring. 25.5% (n=26) of the respondents were going for urinalysis in order to monitor their glucose levels.

### Medications related to diabetes

42.2% (n=59) respondents were taking oral hypoglycemic agents only for the management of Diabetes,50.7% (n=71) were using injectable Insulin along with oral hypoglycemic agents, whereas 7.1% (n=10) were using Insulin only (Table 3). The frequency of oral hypoglycemic agents per day varied among the respondents who were taking oral medications. 51.5% (n=67) were on once a day dosing, 42.3% (n=55) were taking two times a day,4.2% (n=6) were taking three times a day whereas 3.1% (n=4) were on four times a day dosing. Among the respondents who were on injectable Insulin 32.9% (n=28) were on once a day dosing, 47.1% (n=40) were injecting two times a day and 20% (n=17) had to inject Insulin three times a day in order to maintain their blood.

**Table 2:** Socio demographic Variables

|  | N | Percentage |
|---|---|---|
| Marital Status | 140 | 100.0 |
| Single | 30 | 21.4 |
| Married | 102 | 72.9 |
| Separated | 4 | 2.9 |
| Widowed | 4 | 2.9 |
| Educational Level | 140 | 100.0 |
| No schooling | 32 | 22.9 |
| Primary | 18 | 12.9 |
| Middle | 36 | 25.7 |
| Matric | 18 | 12.9 |
| Inter | 18 | 12.9 |
| Graduate | 8 | 5.7 |
| Masters | 10 | 7.1 |
| Smoking status | 140 | 100.0 |
| Smokers | 80 | 57.1 |
| Non Smokers | 60 | 42.9 |

**Notes:** No Schooling means Illeterate; Primary, up to 5 years of education; Middle, up to 8 years of education; Matric; up to 10 years of education; Inter, up to 12 years of education; Graduate, up to 14 years of education; Masters, up to or more than 16 years of education.

**Table 3:** Medications used for the management of DM II

|  | N | Percentage | Cumulative Percentage |
|---|---|---|---|
| Oral Hypoglycemic Agents | 59 | 42.2 | 42.2 |
| Oral Hypoglycemics + Injectable insulin | 71 | 50.7 | 92.9 |
| Injectable Insulin | 10 | 7.1 | 100.0 |
| Total | 140 | 100 |  |

### Compliance with medications

Compliance with medication was checked using Morisky scale[16], in which the respondents were classified as highly compliant, intermediate compliance and less compliant. 14.3 %( n=20) were highly complying with their treatment regimens, 45.7 % (n=64) were found to have intermediate compliance with medications, whereas 40 % (n=56) were having less adherence with the treatment recommendations in order to manage DM II (Table 4).

**Table 4:** Compliance with medications

| Level of Compliance | N | Percentage | Cumulative Percentage |
|---|---|---|---|
| Highly Compliant | 20 | 14.3 | 14.3 |
| Intermediate Compliance | 64 | 45.7 | 60 |
| Low Compliance | 56 | 40 | 100.0 |
| Total | 140 | 100.0 |  |

### Assessment of Factors

### Patient's knowledge

In order to asses respondents' knowledge about their disease, treatment and need for consultation with health practitioner, eleven different questions were asked. The level of knowledge were assessed as they completely know or yes they do understand, they somewhat know and they don't know or completely disagree. The results are shown in table 5. There was a strong association found between different perspectives of knowledge and the medication usage as they were prescribed (Table 6).

**Table 5:** Descriptive statistics of patients' Knowledge

|  | Level of knowledge | N | Percentage |
|---|---|---|---|
| Knowledge about nature and severity of the disease | Completely/Yes | 78 | 55.7 |
|  | Somewhat | 36 | 25.7 |
|  | Don't know/No | 26 | 18.6 |
| Need for treatment | Completely/Yes | 60 | 42.9 |
|  | Somewhat | 44 | 31.4 |
|  | Don't know/No | 36 | 25.7 |
| Understanding of treatment plan | Completely/Yes | 60 | 42.9 |
|  | Somewhat | 44 | 31.4 |
|  | Don't know/No | 36 | 25.7 |
| Understanding of the diet plan to be followed | Completely/Yes | 58 | 41.4 |
|  | Somewhat | 42 | 30.0 |
|  | Don't know/No | 40 | 28.6 |
| Reason of taking drugs | Completely/Yes | 44 | 31.4 |
|  | Somewhat | 48 | 34.3 |
|  | Don't know/No | 48 | 34.3 |
| Knowledge about side effects of medicines? | Completely/Yes | 20 | 14.3 |
|  | Somewhat | 20 | 14.3 |
|  | Don't know/No | 100 | 71.4 |
| Knowledge about drug Interactions | Completely/Yes | 16 | 11.4 |
|  | Somewhat | 32 | 22.9 |
|  | Don't know/No | 92 | 65.7 |
| Readable hand writing on the prescription order | Completely/Yes | 36 | 25.7 |
|  | Somewhat | 28 | 20.0 |
|  | Don't know/No | 76 | 54.3 |
| Understandable dosing schedule on the prescription order | Completely/Yes | 50 | 35.7 |
|  | Somewhat | 48 | 34.3 |
|  | Don't know/No | 42 | 30.0 |
| Verbal Information about timing and schedule of drugs | Completely/Yes | 40 | 28.6 |
|  | Somewhat | 76 | 54.3 |
|  | Don't know/No | 24 | 17.1 |
| Consultation with pharmacist for medical information | Completely/Yes | 44 | 31.4 |
|  | Somewhat | 50 | 35.7 |
|  | Don't know/No | 46 | 32.9 |

**Table 6:** Correlation of patients' Knowledge with usage of medications as they are prescribed

| Are you taking medications as they are prescribed? | | YES | NO | CHI$^2$ | P value |
|---|---|---|---|---|---|
| Knowledge about nature and severity of the disease | Completely/Yes | 16 | 62 | | |
| | Somewhat | 24 | 12 | 23.5 | <0.0001 |
| | Don't know/No | 12 | 14 | | |
| Need for treatment | Completely/Yes | 12 | 48 | | |
| | Somewhat | 20 | 24 | 14.1 | <0.001 |
| | Don't know/No | 20 | 16 | | |
| Understanding of treatment plan | Completely/Yes | 12 | 48 | | |
| | Somewhat | 28 | 16 | 21.0 | <0.0001 |
| | Don't know/No | 12 | 24 | | |
| Understanding of the diet plan to be followed | Completely/Yes | 8 | 50 | | |
| | Somewhat | 20 | 22 | 24.4 | <0.0001 |
| | Don't know/No | 24 | 16 | | |
| Reason of taking drugs | Completely/Yes | 8 | 36 | | |
| | Somewhat | 28 | 20 | 16.3 | <0.0001 |
| | Don't know/No | 16 | 32 | | |
| Knowledge about side effects of medicines? | Completely/Yes | 4 | 16 | | |
| | Somewhat | 12 | 8 | 7.05 | <0.05 |
| | Don't know/No | 36 | 64 | | |
| Knowledge about drug Interactions | Completely/Yes | 8 | 8 | | |
| | Somewhat | 0 | 32 | 24.5 | <0.0001 |
| | Don't know/No | 44 | 48 | | |
| Readable hand writing on the prescription order | Completely/Yes | 8 | 28 | | |
| | Somewhat | 0 | 28 | 33.99 | <0.0001 |
| | Don't know/No | 44 | 32 | | |
| Understandable dosing schedule on the prescription order | Completely/Yes | 4 | 46 | | |
| | Somewhat | 20 | 28 | 34.29 | <0.0001 |
| | Don't know/No | 28 | 14 | | |
| Verbal Information about timing and schedule of drugs | Completely/Yes | 8 | 32 | | |
| | Somewhat | 36 | 40 | 8.58 | <0.02 |
| | Don't know/No | 8 | 16 | | |
| Consultation with pharmacist for medical information | Completely/Yes | 8 | 36 | | |
| | Somewhat | 16 | 34 | 18.43 | <0.0001 |
| | Don't know/No | 28 | 18 | | |

## Medication Complications

The complications of medications were assessed by asking thirteen different questions covering different parameters and aspects. The descriptive statistics is shown in Table 7. 60 % (n=84) said that they had a lot many medicines to take every day,48.6% (n=68) had to take medicines more than one time a day,62.9% (n=88) said that they have to take medicines before food,57.1% (n=80) of the respondents were taking medicines with food, 51.4 % (n=72) of the respondents were taking more than one medicine at a time,37.1 % (n=52) had to wake up early in the morning to take their medicines,41.4 %

(n=58) sometimes felt difficulty in taking their medicines at work place,35.7% (n=50) said that the medicines are not easily available at their nearest pharmacies, 45.7 % (n= 64) disliked the taste of the medicines,28.6% (n=40) sometimes dislike the odor of medicines,25.7 % (n=36) felt it difficult to swallow the oral medications because of their size and 58.6% (n=82) feel difficulty in remembering the drugs due to frequent changes in dosing schedule.

## Health professional- patient interaction

Respondents were asked about their interaction with the health care provider in order to asses that weather it is associated with noncompliance or not. 62.9 % (n= 88) of

the respondents said that they get answers to all their problems from the physicians and 57.1 %( n=80) responded that they get those answers in their local language. 54.3 % (n=76) of the respondents were satisfied with the information provided. 42.9 % (n=60) said that physicians regularly monitor their blood glucose levels. 54.3 %(n= 76) were satisfied with the health professional and 88.6 % (n= 124) a vast majority of the respondents were happy with the attitude and behavior of the physician. 17.1 % (n=24) had conflicts with the health care

provider, whereas 20 % (n=28) were not satisfied with the health care setup. 54.3 % (n=76) don't let their physician know about the missed doses.54.3 % (n=76) said that their physician keep on changing medicines. 40 % (n=56) said that sometimes physician prescribe medications which are out of their range of affordability and 60 % ( n=84) of the respondents said that health professional avoids listening to their problems in case of rush hours and pay less attention. Detailed descriptive analysis is available in Table 08.

**Table 7:** Descriptive statistics on various aspects of medical complications

|  | Level of Complications | N | Percentage |
|---|---|---|---|
| Taking a lot many medications every day | Yes | 84 | 60.0 |
|  | Sometimes | 26 | 18.6 |
|  | No | 30 | 21.4 |
| Taking a lot many medication many times a day | Yes | 68 | 48.6 |
|  | Sometimes | 36 | 25.7 |
|  | No | 36 | 25.7 |
| Medications are to be taken before food | Yes | 88 | 62.9 |
|  | Sometimes | 20 | 14.3 |
|  | No | 32 | 22.9 |
| Medications are to be taken with food | Yes | 80 | 57.1 |
|  | Sometimes | 28 | 20.0 |
|  | No | 32 | 22.9 |
| Taking many medications at same time | Yes | 72 | 51.4 |
|  | Sometimes | 30 | 21.4 |
|  | No | 38 | 27.1 |
| Waking up early in order to take medications | Yes | 52 | 37.1 |
|  | Sometimes | 20 | 14.3 |
|  | No | 68 | 48.6 |
| Waking up in mid night to take medications | Yes | 34 | 24.3 |
|  | Sometimes | 16 | 11.4 |
|  | No | 90 | 64.3 |
| Difficulty in carrying medications at work place | Yes | 30 | 21.4 |
|  | Sometimes | 58 | 41.4 |
|  | No | 52 | 37.1 |
| Availability of medications at the nearest pharmacy | Yes | 46 | 32.9 |
|  | Sometimes | 44 | 31.4 |
|  | No | 50 | 35.7 |
| Dislike the taste of medicines | Yes | 64 | 45.7 |
|  | Sometimes | 22 | 15.7 |
|  | No | 54 | 38.6 |
| Dislike the odor of medicines | Yes | 28 | 20.0 |
|  | Sometimes | 40 | 28.6 |
|  | No | 72 | 51.4 |
| Difficulty in remembering dosing schedule due to frequent change in it | Yes | 82 | 58.6 |
|  | Sometimes | 36 | 25.7 |
|  | No | 22 | 15.7 |
| Difficulty in swallowing medicines because of its size | Yes | 36 | 25.7 |
|  | Sometimes | 30 | 21.4 |
|  | No | 74 | 52.9 |

## DISCUSSION

Various studies advocate that a large proportion of people with diabetes have difficulty managing their medication regimens either oral hypoglycemic or Insulin, as well as other aspects of self-management.[17] Present study shows that more than 50% of respondents were prescribed with oral and injectable medication, which make it difficult for the patient to comply with and

remain adhered with the medication furthermore it may lead to ineffective management.

Compliance is a significant model in health care and affects all extents of health care including diabetes. Non-compliance has formerly been a label attached to many patients without much thought having been given to the causes of poor compliance[18]. The present study revealed that only 14.3 % of the patients of DM II undergoing

treatment fallout under highly compliant patients with their medications when assessed using Morisky scale for adherence. While 45.7% showed Intermediate

adherence/ compliance with medications whereas 40% of the respondents were non-compliant or very less compliant.

**Table 8:** Descriptive statistics of health professional-patient interaction

|  |  | N | Percentage |
|---|---|---|---|
| Get answers to all problems | Yes | 88 | 62.9 |
|  | Sometimes | 48 | 34.3 |
|  | No | 4 | 2.9 |
| Answers are in local language | Yes | 80 | 57.1 |
|  | Sometimes | 52 | 37.1 |
|  | No | 8 | 5.7 |
| Satisfied with the information provided | Yes | 40 | 28.6 |
|  | Sometimes | 76 | 54.3 |
|  | No | 24 | 17.1 |
| Physician regularly monitor blood glucose levels | Yes | 60 | 42.9 |
|  | Sometimes | 60 | 42.9 |
|  | No | 20 | 14.3 |
| Satisfied with the health professional | Yes | 76 | 54.3 |
|  | Sometimes | 52 | 37.1 |
|  | No | 12 | 8.6 |
| Satisfied with the attitude and behaviour | Yes | 124 | 88.6 |
|  | Sometimes | 12 | 8.6 |
|  | No | 4 | 2.9 |
| Conflicts with the health professional | Yes | 24 | 17.1 |
|  | Sometimes | 44 | 31.4 |
|  | No | 72 | 51.4 |
| Satisfied with health care set up | Yes | 48 | 34.3 |
|  | Sometimes | 64 | 45.7 |
|  | No | 28 | 20.0 |
| Health professional knows about the missed doses | Yes | 44 | 31.4 |
|  | Sometimes | 20 | 14.3 |
|  | No | 76 | 54.3 |
| Physician change medicines frequently | Yes | 76 | 54.3 |
|  | Sometimes | 44 | 31.4 |
|  | No | 20 | 14.3 |
| Prescribe medicines which are not affordable | Yes | 36 | 25.7 |
|  | Sometimes | 56 | 40.0 |
|  | No | 48 | 34.3 |
| Avoid listening to problems in case of rush hours | Yes | 84 | 60.0 |
|  | Sometimes | 44 | 31.4 |
|  | No | 12 | 8.6 |

The social and psychological factors thought to influence compliance are identified as (a) knowledge and understanding including communication,(b) quality of the interaction including the patient–healthcare provider relationship and patient satisfaction,(c) social isolation and social support including the effect of the family,(d) health beliefs and attitudes — health belief model variables and (e) factors associated with the illness and the treatment including the duration and the complexity of the regimen.[19] While assessing the factors influencing non compliance in patients suffering from DM II and undergoing treatment, it was found that a strong

association (p <0.05) exists between noncompliance/poor adherence and patients knowledge and beliefs about disease and drug treatments being given to manage the condition. A wide majority of the respondents claimed the cause of poor adherence being medication complications, involving large number of medications at a time; a lot many medications a day and at multiple dosing which does not suits their working conditions. Non-availability of medications at nearest pharmacies make the condition still more grave. One of the major contributing factors to non compliance/ poor adherence is socio economic status. Although 62.9% patients can

afford their medications, still 57.1% believe that it would be easier or them if cost of prescriptions falls down. Family's behavior and support regarding patient and disease management is key to compliance. In our study family members of only 47% patients had knowledge regarding disease, medication, side effects and interactions. 38.6% were not reminded by their family regarding medicine timings which further contribute in forgetful behavior of patients for medication administration. The interactions of patient, physician and systemic factors have implications for the implementation of a diabetes management model.[20] Study suggested that there was a strong interaction between health practitioner and patients. 88.6 % of the respondents were happy with the attitude and behavior of physicians. 54.3 % were quite satisfied with the information provided by the health providers. Very few of the respondent 17.1 % had conflicts with the physicians and 60 % of the respondents reported that their health practitioner avoids listening to their problems in case of rush hours which is a contributing factor in non compliance of medications for the effective management of DM II.

## CONCLUSION

Concluding the above discussion, present study on patients with DM II showed that more than 80 % of the patients had intermediate to poor adherence with their treatment regimens. Factors contributing in non compliance of patients to their medication include decrease knowledge of patients, medication complications, socioeconomic aspects and interaction of patients with their health care provider. The individual's standpoint and objectives undoubtedly affect adherence with a medical treatment plan and cannot be overlooked. However the present study showed that a single factor is not associated with noncompliance but all of the factors in contribution contribute to the poor adherence/ noncompliance of medications. By provoking social sustenance, promoting knowledge of disease and complications at community levels, dissemination of proper medication information regarding use, adverse reactions and interactions; compliance to drug therapy can be increased, thereby leading to development of better health care system in the society.

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