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Review Article

Medication Adherence in Diabetes Mellitus: An Overview on Pharmacist Role

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ABSTRACT

Diabetes mellitus is chronic disease where the medication regimen contains many aspects that make compliance difficult. Whatever is the efficacy of a drug, it cannot act unless the patient takes it. Treatment may be complex, intrusive and inconvenient. Many patients are prescribed very complicated regime of diet, exercise, and medication including several pills a day. Such complexity of treatment and factors like age, duration of diseases, depression, disabilities, psychosocial issues and life style changes directly or indirectly influences diseases self management. Adherence to treatment regimen is the key link between treatment and outcome in medical care. Low medication adherence has assumed importance as it seriously undermines the benefits of current medical care and imposes a significant financial burden on individual patients and the health care system as a whole. Poor adherence to the prescribed medication regimen is a critical health care concern for the health care providers all over the world. The problem of making sure the patient follow prescriptions is as old as medicine itself. Pharmacist can contribute and play major role in the assessment of patients understanding of the illness and therapy, communicate the benefits or treatment, assess the patient's readiness to the care plan, and discuss any barriers to adherence that patients may have. Medication adherence richly deserves attention and much impetus is needed to develop new ideas and theories to improve it. WHO has emphasized the pressing need to undertake more research in developing countries as data from developing country concerning the prevalence and treatment adherence in diabetes patients are particularly scarce.

Keywords: Adherence, Diabetes Mellitus, Adherence barriers, Pharmacist, compliance

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INTRODUCTION

In the fifth Century BC Hippocrates reminded physicians '….to check patients behavior because often they lie about having taken prescribed drugs. This unadmitted negligence may lead the physician into error'[1-34].

Medication adherence is defined as the extent to which a patient medication taking behavior coincides with the intention of the health advice he or she has been given. It is the most important factors that determine therapeutic outcome, especially in patient suffering from chronic illness like diabetes mellitus[1].

Diabetes mellitus is term that describes a series of complex and chronic heterogeneous metabolic disorder characterized by symptomatic glucose intolerance as well as disordered lipid and protein metabolism. Whatever is the efficacy of drug it cannot act unless the patient takes it, as the treatment may be complex, intrusive and inconvenient many patients are prescribed very complicated regimen of diet, exercise, and medication including several pills a day. Such complexity of treatment and factors like age, duration, depression, disabilities or psychosocial issues and life style modification directly or indirectly influences adherence to treatment. Behavioral changes and adherence to pharmacological treatment are essential for improving the prognosis of diabetes mellitus[2-4].

The majority of adherence research has been carried out by healthcare providers and by the pharmaceutical industry, and has focused on patient determinants of non-adherence rather than on shared responsibilities of the doctor and patient. The first three decades of compliance research from 1970 to 2000 have yielded little information to improve medication adherence[1]. The reasons for this inadequacy include the lack of a gold standard to measure medication adherence, lack of experimental evidence for many models, failure of measurement methods to gather valid information on the extent of patient adherence, uncertain reliability and validity of some scales used in medication adherence research studies, lack of patient centric information and lack of long term follow up data. High quality research studies in this area would perhaps establish the causes of medication non-adherence, and suggest strategies to improve medication adherence[1-3].

Adherence Importance

There are many situations in clinical practice where adherence is extremely important for better therapeutic outcomes. These include:

- Chronic diseases: such as diabetes and hypertension
- Replacement therapy: e.g. Thyroxin and insulin.
- Maintenance of pharmacological effect: antihypertensive and oral hypoglycemic agents.
- Maintenance of serum drug concentration to control a particular disorder: e.g. anticonvulsants.
- Some diseases of public health importance where non-adherence is a major obstacle to achieving control: tuberculosis, HIV, and related opportunistic infections[1].

Adherence

As far as adherence is concerned, the term implies passive submission of the patient to the prescriber's authority and obeys treatment regimens. Adherence Implies the self-initiated choice of the patient to closely follow a treatment plans. The prescribers have to monitor the patient's adherence to the medication, usage instruction so that they are benefited from the therapy[1].

Even after careful diagnosis and concern given to improve the patient's quality of life, the patient often deviates from the instructions. Patient who are adherent in one situation may not so be in another. Stimuli that have positive influences on one individual may have a negative influence on another. Non-adherence may have many different manifestations none of which are mutually exclusive[1,2].

The extent of non-adherence in the general population in the out patient setting estimated that as many as 50 percent of prescriptions fail to produce desired results because of improper use and 14-21 percent of patient's never even fill their original prescriptions. It has been noted that adherence tends to decrease with time, and prospective long-term studies should ideally be considered when evaluating therapeutic efficacy new drugs and its outcome[1,2].

There are different situation in which patient's demonstrate medication Non-adherence. They have been categorized whether the prescriptions was honored, underused or overuse of the prescription medication or use of non-prescription medicines. Non-adherence has been further categorized based on whether it was done on the patient's own volition. It is possible that each condition and each doctor–patient involve different motivating factors, which affect adherence[1,2,3].

Categorizing medication adherence

- Adherent
- Partially adherent
- Non-adherent

Partially adherent is defined as adherence to more than 70 percent of the medication regimen, while complying with more than 80 percent of the prescribed regimen is termed as adherent. Patient medication adherence may vary on a day-to-day basis, and may vary for different medications depending on the patient beliefs about the need for and efficacy of a particular medication[1].

Medication adherence and non-adherence is the result of a complex interaction among many factors. Some of these factors are seen to improve medication adherence and some factors may negatively influence the medication adherence of a patient. The situation is almost unique to each patient and this is one of the reasons why it is so difficult to predict medication adherence[1].

Factors Influencing Adherence

The factors, which may influence adherence, or for that matter any health related behavior, can be divided into three categories:

Predisposing factors include demographic factors (age, gender, educational achievements, socio-economic status, employment) also include the patient's knowledge, attitudes, beliefs and perceptions about illness and its severity, cause, prevention and treatment[1].

Enabling factors are the skills and resources needed for adherence. the term skills refers to the patients ability to adopt behaviors which will assist adherence and resources includes the availability and accessibility of healthcare facilities such as doctors, pharmacies, clinics or hospitals[1].

Reinforcing factors are those factors, which determine whether adherence is supported by family members, peers, healthcare providers, the local community, and society in general. The reinforcement may be positive or negative depending on the attitudes or behavior of significant people, some of whom will be more influential than others. Reinforcing factors such as communication with the patient, the ability to resolve the patient's concern regarding their disease and medication, regular follow up, and quality and quantity of time spent with

patient and family members, giving written instructions to the patients may improve medication adherence[1].

Potential risk factors for Non-adherence

Demographic

Age, gender, educational achievements, socio-economic status, and employment affect adherence.

Drug and treatment related Number of drugs and doses to be taken (complexity of treatment), treatment duration, cost of medication, compatibility of dose regimen of daily activities[1,7].

Diseases related presence or absence of symptoms, intermittent or variable condition, chronic or acute illness.

Patient related

Understanding of the diseases and its consequences, perception of the threat pose by the diseases, acceptance of the diseases, comprehension of the cost benefit of the treatment, motivation of the patient family, involvement of the patient in decisions, decreased physical abilities[1,7].

Patient-healthcare professional relationships

Circumstances surrounding the patient visit (easy access to physician/health care), quality and effectiveness of the interaction, time spent by the health care provider, attitude of the physician towards the patient's and treatments, quality of the communication and adequacy of the information provider, interval between the visits[1,7].

Psychological factors

Some feel guilty about taking medication whereas others see it as a social stigma. Fear of becoming dependent on treatment is another reason for Non-adherence[1,7].

Health belief model

Knowledge and attitude of the patient also affects adherence. Patient feels that the consequences of the disease could have a serious impact on their well-being[1-3].

Social factors

Social factors such as strong family cohesiveness local help from family, friends, and associates would help adherence[1,7].

Strategies to improve medication adherence

- Correct and complete instruction regarding medication should be given to the patient. Both verbal and written instructions may be given.
- Simple and affordable treatment regimen should be prescribed as far as possible.
- Effective physician-patient-pharmacist communication should be conducted in the atmosphere of trust and confidence.
- Patient perception about medication use should be assessed.
- Patient should be encouraged to correlate drug intake with daily events/habits, maintain required modifications, use in case of chronic disease and family members should be motivated.
- Counseling involves providing verbal information onto patients about their illness and its treatment, life style modification. After counseling, the patient understands and recall should be evaluated. Counseling is a two way process and involves listening as well as talking.
- Clarify the patient's expectations for treatment and answering questions.
- Explaining how each medication works to control or prevent symptoms.
- Determine whether the patient can afford to buy the medication prescribed and if not considering alternatives therapies or payment methods.
- Patient may benefit from the use of reminder devices such as calendars,

Pillboxes, strategically placed notes, reminder telephone calls[1,2,3,7].

Monitoring and assessment of medication adherence

Various methods to assess medication non-adherence are as follows:

- Patient interview / direct questioning
- Diary keeping
- Pill count, prescription refills methods:
- Adherence % =

$$\frac{\text{Total no. of doses since last appointment}}{\text{Total no. of doses to be consumed since last appointment}} \times 100$$

- Electronic medication containers usage, Home blood glucose and blood pressure measurement, weighing of inhaler canister.
- Measurement of plasma drug concentration/blood or urine levels of drugs.
- Utilization of healthcare services like clinic attendance, appointment making, appointment keeping[1,2,7].

Treatment Objectives for Diabetes Mellitus

- Normalize glucose metabolism
- Normalize glycosylated hemoglobin
- Urine glucose and ketones negative
- Fasting blood glucose: 3.9-6.6 mmol/L (70-120 mg/dL)
- 2 hr postprandial glucose level less than 8.8 mmol/L (160mg/dL)
- Avoid symptoms of diabetes mellitus
- Avoid hypoglycemia
- Normalize nutrition and maintain reasonable weight
- Achieve normal growth and development
- Minimize or prevent complications
- Accept diabetes with a realistic but positive attitude
- Enjoy normal and flexible lifestyle
- Promote emotional well-being; have patient take charge of condition[4-6].

Management Plan

Management plan is required for to achieve glycemic control to prevent the long-term complications of diabetes.

- A management plan include the following
- Establishment of targets of treatment
- Diet plan
- Education in self-monitoring, adjustment of treatment in approaches to cop in the emergencies
- Exercise program
- Use of oral hypoglycemic agents, if required
- Use of insulin, if required
- Risk factor reduction, e.g. smoking cessation.
- Screening for and treatment of complications of diabetes[4-6].

Pharmacist Role in Diabetes Management

As a member of the diabetes care team, the pharmacist has a useful contribution to increasing the quality of care, as:

- Pharmacist has daily contact with a large number of people
- People with diabetes have easy access to the pharmacist
- Many people look to the pharmacist for advice on health care
- Patients listen to and understand the instructions given by the pharmacist
- Pharmacists have considerable knowledge of diabetes
- Diabetes has a high incidence
- Diabetes induces severe ad irreversible late complications
- There is a high rate of diabetes morbidity and mortality
- Diabetes often diagnosed late
- Patient education[1,2].

Numerous studies have been performed to identify therapeutically non-adherent patients, to measure the degree of non-adherence, to characterize

the reasons and to develop strategies for improving adherence. Educating the patients about their disease state and medication will result in the improvement of their knowledge regarding medications and can increase their active participation in therapy and improve medication adherence, this may ultimately improve the outcomes[1,2]. Pharmacists with their professional knowledge irrespective of their working place in either hospital or community can play a vital role in educating the patients and can improve medication adherence and clinical outcome. The national pharmaceutical council of US estimated the medical cost related to prescription medicine misuse and adverse drug reaction total more than 20 billion US dollar a year. When consequences such as lost productivity are included, annual are as high as 100 billion US dollar this is particularly true for chronic diseases[1-3].

Diabetes mellitus is a complex, heterogeneous endocrine disorder that necessitates a health team effort to achieve treatment objectives through a combination of diet, exercise medications, and most importantly education that results in the patients taking change of the condition, the outlook for the diabetes is improving continually. Pharmacist can educate their patients about the proper use of medications, screen for drug interactions, explain monitoring devices and make recommendations for ancillary products and services. Educating the patient with diabetes is critical to the successful management of this chronic disease. Education is self-monitoring adjustment of treatment and in approaches to coping with emergencies useful in management of diabetes. Continuing care required minimizing the development of complication. Accessed information and education to assist the skills to assist management of the disorder is critical[4-6].

According to WHOM the present review of studies has revealed that research on adherence to treatment for diabetes yields some inconsistent findings and may have several causes including variability in research design, study instruments, sampling size, sampling frames, and the use of general measures and lack of control of co founding variables. WHO has emphasized the pressing need to undertake more research in developing countries as data from developing country concerning the prevalence and treatment adherence in diabetes patients are particularly scarce. WHO estimate indicate that by 2025 the largest absolute increase in prevalence rates of diabetes worldwide will occur in developing countries. Patients and health care providers in developing nations face additional barriers to achieve adequate diabetic care and a host of other priorities that compete for national and individual attention[7].

Sridhar GR in his article has highlighted the facts and figures about diabetes mellitus in India, which is becoming more prevalent and may be consider as model of non-communicable disease. He has emphasized the predisposing factors like stress and obesity as a forerunner of the metabolic syndrome[8].

Sudhakar BL *et al*, in their article has emphasized the role of pharmacist in patient medication adherence. Pharmacist with their knowledge can employ technique in educating the patients; enhance adherence, medication knowledge assessment and counseling

to overcome the barriers associated with medication adherence of the patients[2].

Ponnusankar S *et al*., carried out a study with the aim to asses the impact of medication counseling on patients medication knowledge and compliance in out patient clinic. Their medication knowledge was assessed by a questionnaire at base line and subsequent follow up's and adherence was assessed by pill count method and self- assessment by the patient. After counseling It was observed a significant improvement in medication knowledge and adherence levels of the patient[3].

Palaian S *et al*., in their study evaluating impact of counseling on Knowledge attitude and practice outcomes in diabetic patients concluded that patient counseling by a clinical pharmacist improved medication knowledge score but this improved knowledge did not lead to appropriate attitude and practices[9].

Whitely HP *et al*., carried out a study with aim to assess to patient knowledge of diabetic goals, self reported medication adherence and goal attainment. The majority of the patients did not reach goals and were unknowledgeable of goals. Patients with diabetes mellitus who have poor adherence may have less knowledge of overall therapeutic goals and may be less likely to attain these goals. It is imperative to all healthcare team members to discuss the importance of medication adherence with every patient at every visit[10].

Leichter SB in his article emphasized that the patient with non-compliance should be evaluated for why a patient may be non-compliant rather than to complete an assessment with a conclusion that the patient is a non-compliant. It is important to have a specific approach on the part of health care team to have some protocol to assess noncompliance which can lead a step towards improving adherence[11].

Lerman I, in his article emphasized on the working out in partnership with patients to improve self management and behavioral changes as these are fundamentals of the treatment of chronic illness. Counseling the patient on how to improve adherence a combination of keeping regime as simple as possible, negotiating priorities with the patients providing education, monitoring adherence to treatment and reinforcing the patients to adhere at visit provide practical and effective help for many patients[12].

Kilbourne AM, *et al*., and Chao J, *et al*. carried out independent studies on depression influencing diabetes medication adherence in older patients and depressive symptoms associated with diabetes medication usage as a factor of non-adherence. They have observed that depression is independently associated with inadequate medication adherence. The effect of depressive symptom on diabetes medication was mediated through perceived general barriers, perceived side effect barriers and self efficacy which may partly explain the association of depression with patients belief about diabetes medication use. The findings were beneficial towards the development of strategies to improve self management of diabetes and may have a positive impact on medication adherence and well being[13,14].

Cramer JA, in his review article stated that from the through literature survey of retrospective and prospective analysis of adherence to oral hypoglycemic agents and insulin (from 1966-2003), he reported that there

exists poor adherence rates for oral hypoglycemic agents and insulin, but improved adherence rates with electronic medication devices for oral hypoglycemic agents. However, the author identified that the brief treatment persistence is major issue that could lead to deleterious health outcomes, and suggested for the development of method that may assess medication adherence as a behavior, which may significantly improve glycemic control[15].

Lewin AB, in his studies stated that family factors as predictors of metabolic control in children with type 1 diabetes and reported that family functioning and adherence behavior are strongly related to a child health status. He conducted his studies by adherence interviews taking children in the age group of (8-18yrs) and a parent and glycosylated hemoglobin (HbA1c) was the index of metabolic control. Assessment of diabetes specific family functioning in addition to adherence is an important factor in understanding metabolic control[16].

Hill-Briggs F, *et al*., carried out studies on medication adherence and diabetes control in urban African Americans with type 2 diabetes. The specific behaviors associated with poorer diabetes control were due to patients who forgot to take medication, running out of medication and knowledge of blood glucose goals differed for adherers and non-adherers, also medication adherence rates are not associated with actual levels of blood pressure or lipids respectively. These data suggest that specific medication behavior are important to diabetes control and constitute logical targets for interventions[17].

Morris AD, *et al*., in collaboration with Diabetes Audit and Research in Tayside (DARTS) database found direct evidence of poor adherence with insulin therapy in young patients with type 1 diabetes, which contributes to long term poor glycemic control and diabetic ketoacidosis episodes in this age group. The non-adherence is related to adolescence behavioral factors secondary to the hormonal changes of purbety[18].

Snoek FJ, *et al*., has recognized diabetes as one of the most emotionally and behaviorally demanding chronic illness. Psychosocial adaptation is an important outcome of diabetes care from the perspective of both quality of life and the effectiveness of treatment patient in poor psychological health lack the motivation and emotional strength to self manage their diabetes in the long term. Also the fact that “good” behavior does not always translate into good results, which is a major cause of frustration that leads to diabetes burnout and patient find it difficult to adhere to this treatment regime all of the time. Lack of knowledge or limited intellectual capacity, attitudes and beliefs regarding diabetes may be dysfunctional and adversely affect self care practice. Theory based self management education program (e.g. DESMOND) can help to empower to achieve and maintain behavioral changes and improve psychological and metabolic out comes[19].

Grant RW carried out a study to determine medication adherence (for oral hypoglycemic agents, insulin, antihypertensive, lipid lowering medicines and aspirin) and predictors of suboptimal adherence in a community, the hypothesis that adherence decreases with increased number of medication

prescribed. The study conducted by structured telephone based interviews to determine self adherence to diabetes related medicines, patient's attitudes towards their medicine and barriers to medication use. The findings reported are very high medication adherence rates regardless of number of medicines; patients with suboptimal adherence were perfectly adherent to all but one medicine because of side effects and a lack of confidence in immediate or future benefits were significant predicators of suboptimal adherence[20].

Krueger KP, *et al*., in their article on the Pharmacist's role in improving patient adherence with the medication regimes has categorized adherence measures into four broad categories: behavioral measures, biochemical measures, clinical measures and direct observation. The first three categories are indirectly measures of adherence and are most commonly used in practice. Behavioral measures include pill counts, prescription refill counts, self-reported adherence, and electronic measures of pill-taking. Biochemical measures detect the concentration of medication in a patient's blood or urine and are a reliable gauge of adherence during the previous 12 to 48 hr. Clinical measures can be assessed on the basis of therapeutic outcomes like blood pressure, blood glucose monitoring etc, since there is no perfect measure of adherence the limitations of the methods should be kept in mind and multiple methods should be used wherever possible. A pharmacist can use principles of motivational interviewing to identify problems and address each barrier on a patient-by-patient basis. Addressing problems with treatment adherence is another contribution pharmacist can make to the multidisciplinary patient care team, the severity of the problem and the consequences for non-compliance demands attention from the profession[21].

Brain Haynes *et al*., in is article has stated low adherence to prescribed medical regimen is a ubiquitous problem and can undermine the effectiveness of care at many steps in treatment processes. One of the important difficulties in managing low adherence is lack of accurate and affordable measures. Clinicians must frequently rely on their own judgment but unfortunately demonstrate no better than chance accuracy in predicting the adherence of their patients, even among patients for whom they feel confident about their prediction. So to reap the benefits of modern medical therapies, better, more effective and efficient interaction to be employed for helping people to follow treatment regimens. Adherence can be increase by combinations of interventions like keeping regimen as simple a possible, negotiating priorities with patients, providing clear instructions, reminding about opportunities, monitor adherence with treatments, counseling and continuing support involving the help of family members and significant others, it has also shown that adherence intervention was cost effective[22].

Ponsident CJ *et al*., in their article has emphasized the importance of non-adherence to treatment regimen on health and well being of the patient which has cost financial implications and causes mortality 10% of hospital, and 23% of nursing home admission. The problem of medication non-adherence is pervasive and found that interaction can enhance medication adherence. One such intervention is motivational interviewing, which is a

skillful clinical method and style of counseling, psychologically designed for assisting patients to commit change. It is a client centered method intended to initiate change by creating dissonance between patient current status and the target behavior without making the patient fell threatened or pressured. This can be an important tool to improve medication adherence[23].

Johnson SB in his article state that the prevalence of non-adherence varies across the different components of the diabetes regimen, during the course of the disease, and across the patient life span. Conceptual problems in defining and measuring adherence include; the absence of explicit adherence standards against which the patient behavior can be compared, patient-provider miscommunication and patient knowledge and skill deficits and behavioral complexity of the diabetes regimen. Measurement method should be selected on the basis of reliability, validity, non reactivity and sensitivity to the complexity of diabetes behavior[24].

Lee YWV in their study of glycemic control and medication compliance in diabetic patients in a pharmacist managed clinic in Hongkong has evaluated the program impact on the care of diabetic patients with drug compliance problem and has concluded that medication non compliance has a significant impact on morbidity, mortality and quality of life of diabetic patients. These problems may be related to patient demographic, complexity of drug regimen, dosage frequency, adverse effects or some combination of above factors. The percentage of non compliance between the genders, however patients with more education appeared to have better compliance then those with less education and found non compliance is a significant barrier to treatment efficacy[25].

Chotai N.P *et al* had studied patient's non compliance in patients with chronic diseases like Diabetes, Hypertension and Asthma. They found that high profile of non compliance amongst patients with asthma (53.48%), Diabetes (57.8%), Hypertension (54.09%).The main reason of non compliance were deliberate deviation (32.8%), frequency (26.7%), side effects (11.6%)[26].

Morris W *et al*., in their study emphasized that Pharmacists may be able to enhance patients compliance and outcomes by engaging in pharmaceutical care activities (e.g. monitoring symptoms, providing medication counseling, helping resolve drug-related problems, facilitating communication with physicians)[27].

Dimatteo R *et al*., in their meta analysis research study to correlates adherence with treatment outcomes analyzed according to disease (acute/chronic/severity), population (adult/child), type of regimen (preventive/treatment, use of medication)and type and sensitivity of adherence. They found that adherence is most strongly related to outcomes in studies of non medication regimens and where the disease is chronic. Higher adherence outcomes related to studies of less serious conditions and in studies using self reports of adherence[28].

Kyo YF *et al*., The aim of their study was to examine the relationship between inconsistency in use of diabetes drugs and risk of renal, eye, and circulation problems and death over a 7-year period in community-dwelling older Mexican Americans. Diabetes and complications were by self-report. Subjects with poor consistency in use of

medication were those who, at any time during the 7-year follow-up, discontinued or inconsistently used their diabetes medications and those who had no diabetic medications at home despite self-report of taking medicine for diabetes .Inconsistent use of diabetic medication was associated with an increased risk of kidney problems and deaths over a 7-year period in older Mexican Americans[29].

Austin RP in his article describe Polypharmacy is a term that has been used in health care for decades. In conventional use, it has meant the concurrent use of multiple medications in the same patient. However, this definition understates the potential for harm that polypharmacy may pose to the patient. Polypharmacy may be unavoidable, given that multiple drug therapy has become the standard of care in most chronic conditions.[6] The comorbidities of diabetes commonly include hypertension, dyslipidemia, depression, and coagulopathies, each of which may require one or more drugs for adequate control. Add to this other conditions that often accompany diabetes, such as hypothyroidism, heart failure, and osteoporosis, and the total number of possible medications needed become significant. Multiple drug therapy has become the standard of care in the treatment of most chronic diseases. Patient's drug regimens need regular review and evaluation to ensure that unnecessary and redundant medications are discontinued. and address concerns about adherence, cost, side effects, and other matters of significance in achieving an individualized and realistic therapeutic plan[30].

Eraker SA *et al*., in their article emphasized the problem of patient compliance as well as the ability of the physician to understand, detect, and improve compliance and are described in relation to a new model of health decisions and patient behavior. The health decisions model combines decision analysis; behavioral decisions theory and health beliefs. This model provides a frame work for modifying general health beliefs, treatment recommendations, therapeutic regimens, patient knowledge and social interactions patterns which can be utilized to encourage patient compliance with treatment[31].

Patel MX *et al*., in their article have outlined the general factors that predict variance in adherence and stressed on behavioral techniques which are more likely to succeed in enhancing adherence. The need to strive to understand patients from their individual perspectives, giving them the opportunity to have their voices adequately heard will reduce the adverse clinical and economic impact of non adherence[32].

Osterberg L *et al*., in their article on adherence to medication has emphasized poor adherence to medication regimens is contributing to substantial worsening of disease, death and increase health care costs. Patients who have difficulty in maintaining adequate adherence need more intensive strategies than do patients who have less difficulty with adherence, with the help of new technologies and innovative methods a collaborative approach is urged to care and augments adherence in managing chronic diseases[33].

Marie T. Brown and Jennifer K. Bussell, in their review study had concluded that strong evidence persists which shows that many patients with chronic illnesses have difficulty adhering to their

recommended medication regimen and believing that medication non adherence is the "fault" of the patient is an uninformed and destructive model that is best abandoned. "Drugs don't work in patients who don't take them." Thus Physicians and Pharmacist as an integral part of health care team must recognize that poor medication adherence contributes to suboptimal clinical benefits, particularly in light of the WHO's statement that increasing adherence may have a greater effect on health than any improvement in specific medical treatments[7]. Hippocrates' exhortation to the physician to "not only be prepared to do what is right himself, but also to make the patient…cooperate" has consistently failed for more than 2000 years. Today's ever more complicated medical regimens make it even less likely that physicians will be able to compel compliance and more important that they partner with patients in doing what is right together. The multi factorial nature of poor medication adherence implies that only a sustained, coordinated effort will ensure optimal medication adherence and realization of the full benefits of medication therapies[34].

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