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Barriers of Medication Adherence and Health Outcomes

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Authors' contributions

This work was carried out in collaboration between all authors. Author SHK designed the study, wrote the protocol and wrote the first draft of the manuscript. Author HC managed the literature searches, author DH managed the formatting paper and grammar and author JC supervised the paper. All authors read and approved the final manuscript.

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Commentary

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ABSTRACT

Medication adherence is a worldwide health care problem. Medication adherence refers to whether patients take medication as prescribed by the healthcare provider. Increasing medication adherence may have a great impact on the health of the population. Poor adherence is associated with adverse health effects, increased financial burden, and loss of productivity. We examined both direct and indirect measurements of medication adherence that have been previously used in order to analyze the reasons for this problem. Reasons for non-adherence include patient-related factors, condition-related factors, therapy-related factors, social and economic factors, and the health care system structure. Overall, poor adherence compromises the effectiveness of treatment and may result in adverse events along with a significant cost to healthcare. A multidisciplinary approach needs to be taken in order to provide interventions for poor medication adherence. In conclusion, the quality of the relationship between the provider and the patient is the most important in regards to improving adherence.

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1. INTRODUCTION

According to the World Health Organization (WHO), adherence is defined as the extent to which a person's behavior such as taking medication, following diet regimen, executing lifestyle changes, and/or corresponding with agreed recommendations from healthcare providers [1]. In essence, medication adherence refers to whether patients take medication as prescribed by the primary care provider as directed [2]. Current efforts to develop and provide access to medication would be meaningless without patient adherence. Increasing adherence may have a far greater impact on the health of the population than any improvement in specific medical treatments [3].

Medication adherence not only refers to taking drugs but also depends on timing, dosage and frequency. Incidence of poor adherence increased as the burden of chronic disease increased since chronic disease management involves long-term treatment [4]. Three out of four Americans have admitted that they do not always take their medication as directed by health care professionals [5]. In addition, 25 percent of initial prescriptions are never filled in the first place [5]. In addition to these US statistics, other countries are trying to combat the issue of medication non-adherence. An article in the published in British Journal of Medicine states that 30-50% of patients prescribed medications for chronic illnesses do not adhere to their prescribed medication regimen [6]. High prevalence of non-adherence is of concern as poor adherence is not only associated with adverse health effects but also increased financial burden on the health system due to increase in preventable hospitalizations and lost productivity [6,7]. The aim of this article is to comment of the process of non-adherence to drug treatment along with the resulting health outcomes.

2. MATERIALS AND METHODS

2.1 Measuring Medication Adherence

While there are numerous methods to measure medication adherence, Osterberg et al. [8] broadly categorized as either direct or indirect methods. Direct measurement includes methods such as directly observing therapy and measuring drug concentrations in blood or urine. Although direct measures tend to be more reliable, direct approaches are expensive and burdensome to patients and providers [8]. Due to convenience, indirect measurement is much more prevalent. Indirect measurement include: performing pill counts, collecting patient surveys, interviewing patients, and asking patient to keep medication diary. For best practice, combination of different methods should be utilized [8].

Adherence is measured as rate of adherence and is reported as the percentage of prescribed doses actually taken by the patient. There is no consensus on adequate amount of adherence but many take 80 percent as a standard [8]. Though many report adherence as dichotomous variable, either adherent or non-adherent, adherence should be reported as continuous variable ranging from 0 to 100 percent since patient action may range from no, partial or full adherence [9].

3. RESULTS AND DISCUSSION

3.1 Reasons for Non-adherence

Why are patients not adhering to their medications regimen? While patient action plays a central role in medication adherence, numerous literatures suggests that non-adherence involves more than a patient role [8,10]. The WHO categorized potential reasons for medication non-adherence into 5 factors: Patient, condition of the diseases, therapy response, social and economic status (SES), and health care system [1]. Note that the order of the factors does not reflect the relative importance.

3.1.1 Patient

Patient-related factors such as knowledge, beliefs, expectations, and available resources about medication regimen influence medication adherence [10]. Patients who lack knowledge of their condition may not see the point of adherence. At the same token, when patients have substantial knowledge about their illness, they are empowered and motivated to manage their illness. People with higher self-efficacy tended to believe that they can manage their illness and adhered to regimen [1].

Patients may decide to intentionally not adhere. Intentional non-adherence is when patients actively decide to terminate medication usage due to factors such as fear of side effect [8].

Patient belief shape their world view and influences adherence. Some people simply have negative views about medication in general and without adequate reassurance, or support, they may not adhere [10]. Patients can be stressed about potential side-effect of drug disrupting their lifestyle. Actual adverse events (i.e. severe headache, vomiting) would also hinder adherence. Even if a patient intends to be adherent, they might be forgetful and be unintentionally non-adherent.

3.1.2 Condition-related factors

Strong determinants of adherence are related to condition of the disease. Acute conditions such as an infection which involve visible and apparent symptoms yield greater adherence as patients place greater priority on adherence [8]. Level of discomfort brought by disease also has an impact by influencing patients' risk perception [1]. Chronic conditions involving long-term treatments are typically fairly asymptomatic and reduce adherence [4].

3.1.3 Therapy

Therapy-related factors also affect adherence. Duration of treatment, the immediacy of beneficial effects and side-effects all influences adherence. When therapy and drug regimen is complicated, adherence drops. For once daily treatment, average adherence rate is 80 percent whereas the rate drops to 50 percent for medication that must be taken 4 times daily [11]. Patients adhere to medication when symptoms are visibly alleviated. Yet, adherence for control of chronic condition such as diabetes, which involves control of glycosylated hemoglobin (HbA1c) level without visible and perceived benefit, tend to be lower [12].

3.1.4 Social and economic

Social and economic factors that significantly influence adherence include: poor socioeconomic status, unemployment, high cost of medication, low level of education, lack of social support network, and family dysfunction [1]. Age and race also influence adherence. In dysfunctional families, parents often shift treatment responsibility to children who are not equipped to manage their treatment. Once adolescents take over the responsibility to take medication, adherence lowered [1]. Some reasons include struggle with self-esteem and rebellious mind. Many studies have indicated that children and adolescents were less adherent and were in inferior control of disease management [1]. Elderly who take multiple drugs to manage multiple chronic conditions tended to be less adherent. Financial barrier plays a big role in reduced adherence. For instance, seniors with a $1,000 annual benefit cap under a Medicare part D plan was less likely to use medicine and suffered worse clinical outcome [13].

3.1.5 Health care

Health care system structure also plays a key role. A system with a restricted formulary and high out-of-pocket payment in the form of copayment and coinsurance decreases medication adherence [13]. Provider behavior also influence adherence. When providers do not adequately explain to a patient what the benefit of treatment is, patients may not be engaged enough to perfectly adhere. If a physician or pharmacist fails to inform potential side effects of the drug, patients would feel overwhelmed and stop taking medication. Time spent with the provider and continuity of care by the same doctor, communication style of the doctor also played an important role in medication adherence [8].

While there are multiple factors listed, it is important to recognize that non-adherence occurs as a result of combination of factors. For instance, a patient may choose not to adhere to medication due to side effect as the provider did not adequately warn about the potential adverse event. Moreover, patients may want to adhere to the treatment regimen but may lack access due to financial burden.

3.2 Implications of Non-adherence: Cost to Health Care

Poor adherence severely compromises the effectiveness of treatment and may result in secondary adverse health event. Patients who maintained 80% to 100% adherence were significantly less likely to be hospitalized than those with low adherence [7]. In the United States, 33 to 69 percent of medicine related hospitalizations resulted from patients not taking their medicine as directed [14]. A study found that as many as 40 percent of nursing home admissions was associated with non-adherence [15]. Another study found that patients with high blood pressure who were non-adherent were 17 percent more likely to be hospitalized and incurred additional health care cost of $3,575 in comparison to adherent patients [16]. Nearly

125,000 people die annually as a result of medication non-adherence [5]. It is estimated that poor adherence accounted for nearly $300 billion in avoidable costs to the health care system annually through preventable emergency room visits and hospitalizations [17]. Clearly, poor adherence compromises the quality of lives of patient and the financially burdens the health care system.

Implications of cost of non-adherence is more apparent in chronic conditions as the goal of treatment is not cure but disease management, which involves taking medication for long-term. Many studies consistently found that investing in fairly low cost interventions to improve adherence is cost-saving [7]. In an ambulatory sensitive case such as asthma, if patients regularly follow regimen as prescribed (i.e. using corticosteroids daily as prescribed), asthma can be controlled (i.e. exacerbations and hospitalizations can be avoided). For diabetes, 20% increase in drug utilization costs $177 and related medical cost reduction is $1,271 [7]. This saving comes from improved glycemic control. Return on investment ratio (ROI) is calculated as investment divided by savings. In three prevalent chronic conditions, 20% increase in drug utilization yielded: 7:1 ROI in diabetes, 4:1 in cardiovascular conditions and 5:1 in hypercholesterolemia [7]. Clearly, relatively small investment in medication adherence saves money.

3.3 Improving Medication Adherence

Poor adherence to medication is one of the primary causes of treatment failure. Knowing that poor adherence puts heavy burden on the health system, adherence should be encouraged. Interventions should not solely focus on patient factors and take the form of multidisciplinary approach.

3.3.1 System and provider

Studies have found that quality of provider patient relationship is an important determinant of adherence. To encourage adherence, providers must be trained and empowered. Healthcare providers should receive a specific training in adherence management and have an “adherence counseling toolkit” which is applicable to patients of different socioeconomic status [1].

Medical practitioners such as physician, pharmacist, and nurse should explicitly communicate with patients the mechanism for drug action and why they need to take it. Discharge counseling was associated with improved medication adherence after myocardial infarction related hospital discharge [18]. Researchers encourage providers to ask questions in a nonjudgmental way. Some probing questions include: how often they miss doses, whether they are having side effect and whether they know the benefits of medication is. These questions are good indicators of poor adherence. By asking these questions, providers can intervene to convince patients to increase adherence [19]. Medication adherence was inversely associated to frequency of dose [20]. Physicians can increase adherence by simplifying dosing (i.e. once day instead of four times a day). Adherence can be maximized when simple dosing is coupled with reinforcing follow-up visits [21].

3.3.2 Patient

According to a patient survey, the most common reason for non-adherence was forgetfulness [1]. The use of memory aids to remind patients through cell phone alerts, watch alarms, or pillboxes that are labeled were found to increase adherence [18]. Providers should work to build on intrinsic motivation of a patient so that they feel the need to adhere and believe that illness can be managed. The role of social support cannot be undermined. Shared family responsibility for treatment significantly increased adherence [1].

4. CONCLUSION

Evidence suggests that low adherence is associated with undesirable health outcome and higher cost of care. In the United States, non-adherence is projected to grow as the prevalence of chronic conditions rise. Goal of improving quality of care and reduction of sky-rocketing health care cost cannot be achieved without improving medication adherence. Recognizing the critical role, Heidenreich et al. [22] named medication adherence as the next frontier in quality improvement. Improvement of medication adherence cannot come without patients and health care professionals becoming active partners.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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