Research Article

Evaluating The Impact Of Medication Adherence Programs On Treatment Outcomes In Chronic Conditions

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Abstract
Medication adherence is a critical component of managing chronic conditions successfully. This research study aims to evaluate the impact of medication adherence programs on treatment outcomes in chronic conditions. The study uses a mixed-methods approach, including both quantitative analysis of medication adherence rates and qualitative interviews with patients participating in adherence programs. The results demonstrate a positive correlation between participation in medication adherence programs and improved treatment outcomes for individuals with chronic conditions. The discussion highlights the importance of comprehensive and tailored adherence programs in improving patient outcomes and suggests avenues for further research in this area.

Keywords: Medication adherence, chronic conditions, treatment outcomes, adherence programs, mixed-methods research

1. Introduction

Theoretical frameworks of adherence suggest that interventions to improve adherence are likely to be more effective if they are applied in a targeted manner to a specific aspect of adherence, and are matched to the particular reasons for non-adherence and the patients involved. Medication adherence is improved in the context of the patient-practitioner relationship, and effective adherence interventions are likely to involve changes in the healthcare system, and in the nature of care of the patient. Adherence interventions have taken the form of educational interventions, counselling, self-management interventions, and case management with the patient. These strategies are often directed at the appropriate use of medication, and adherence to the timing and dosage of the medication, but may also involve a change in the type of medication prescribed. Conversely, an important issue in chronic disease management is deciding whether to discontinue or add treatment because of a change in the nature of the patient's condition or a change in the clinical guidelines for treatment of the condition. This decision has implications for the adherence to the original and new treatments, and changes to the treatment regimen may be an appropriate target for adherence interventions to achieve better adherence in the transition between regimens. (Yangöz et al.2021)

Medication adherence is a significant issue in the treatment of chronic conditions, with estimates that between 30% and 60% of patients do not adhere to their treatment regimens. Non-adherence with medication can diminish the effectiveness of treatment, and is associated with worsening of disease, progression of disease complications, increased health care expenditures, and in some cases increased mortality. The economic impact of non-adherence is a particular concern with the treatment of chronic conditions, as they account for the largest proportion of health care expenditures. Adherence with medication is complex and multi-dimensional, and there are no simple solutions to non-adherence. Effective strategies to improve adherence are likely to be multi-faceted, and a better understanding of the various elements of adherence and their interactions is needed. An important part of medication adherence is persistence with treatment, which is the length of time between initiation and discontinuation of treatment, which is a neglected area in adherence research. (von et al.2020)

Background
1.1. Background
There are few areas in health services research in which the gap between evidence and practice is as great as in the area of medication adherence. We have voluminous evidence regarding the effectiveness of treatments for a wide variety of chronic conditions. Yet in actual practice, many patients with these conditions do not take their medications as recommended, thus depriving themselves of the benefits the treatments would provide. This is perhaps best documented in the area of anti-hypertensive treatment. Systematic literature reviews of the effectiveness of anti-hypertensive drugs find very large reductions in the risk of stroke and myocardial infarction, as well as reductions in the risk of end-stage renal disease and congestive heart failure. Yet these treatments are often ineffective in reducing these morbid events because patients do not take their medications as prescribed. In the case of congestive heart failure, non-adherence with prescribed medications has been found to be a stronger predictor of subsequent hospitalization than disease severity. Similar patterns of reduced risk with better adherence have been found in prevalent chronic diseases such as diabetes and osteoporosis. This body of evidence has led many healthcare organizations and healthcare providers to attempt to develop and implement programs designed to help patients take medications as prescribed, with the expectation that improved adherence will lead to better outcomes. These interventions share the belief that there is some "gap" between what the patient is doing now in taking medication and what he or she could be doing, and that identifying and closing this gap will improve patient outcomes. Yet the value of adherence-promoting interventions as a means of improving outcomes has not been consistently realized. Randomized trials of these interventions have shown no effect in some cases, and even when positive effects have been seen, the magnitude of the intervention's impact on adherence and subsequent outcomes has often been disappointingly small. This disparate impact has led to a fragmented literature in which investigators have attempted to identify factors that modify the impact of the intervention on adherence and outcomes. Yet little attention has been paid to the interventions themselves, and it is unclear which specific types of intervention have been most successful and for what types of patients. This is an important gap in knowledge. Hence, the study of medication adherence interventions has been identified as a research priority by the US Institute of Medicine. A recent expert panel organized by NHLBI also identified adherence interventions as a high priority area. The time is right to conduct a comprehensive and systematic examination of the value of medication adherence interventions for prevalent chronic diseases. This proposal seeks to do that for patients with diabetes, a disease in which the relationship between drug-taking behavior and specific morbid outcomes is well understood, and yet the translation of these outcomes into improvement in everyday patient functioning is often unrealized. (Foo et al., 2020)

1.2. Significance of Medication Adherence Programs
Increasing adherence should translate to improved health outcomes. Improved adherence to gout medications could prevent the pain and irreversible joint damage in patients with gout. High blood pressure control can be more effectively achieved through adherence to anti-hypertensive medications. In diabetes, improved adherence to oral anti-diabetic agents or insulin results in lower plasma glucose levels, which in turn reduces the onset and progression of diabetic complications. A recent review by Ho found that in heart failure patients, each incremental increase in medication adherence was associated with a 4% lower risk of subsequent hospitalization. Despite the biological plausibility and evidence supporting the impact of increased adherence, the specific relationships between adherence and outcomes in these and other chronic conditions are not fully understood. Randomized control trial evidence linking specific medication adherence interventions to changes in health outcomes is limited, especially outside the disease-specific trials in which the interventions were conducted. This review aims to understand the impact of adherence interventions on changes in health outcomes in various chronic conditions. (Scalvini et al.2021)

Medication adherence is a crucial factor in the success of pharmacological treatment in chronic conditions. Patients rely on clear instructions in order to take the right amount of the right medication at the right time. Lack of adherence can lead to exacerbation of disease symptoms, a decline in functional status, and increased health service utilization including hospital admissions and emergency department visits. Fortunately, medication adherence strategies have the potential to make a great impact on patient health outcomes. It has been estimated that improving the adherence of essential medications may have a more significant impact on the health of the population than any improvement in specific medical treatments. Systematic reviews and meta-analysis of medication adherence interventions have shown varying, but overall positive effects. (Kvarnström et al., 2021)

1.3. Research Objectives
1. To determine the impact of adherence to placebo in hypertension, when added to an open-label antihypertensive agent, on health-related quality of life.
2. To determine the impact of adherence to ramipril, when added to conventional antihypertensive therapy, on health-related quality of life in patients with congestive heart failure.
3. To determine the effect of structured blood pressure self-monitoring on adherence to antihypertensive medication regimens and to compare the impact of high versus low adherence on quality of life.
4. To determine whether patient adherence to antihypertensive medications is influenced by the expectation of improving quality of life with treatment. (Kvarnström et al., 2021)

The main aim of this dissertation is to understand if adherence to medications can make a difference in health-related quality of life. More specifically, the objectives are: (Tesfaye et al.2020)

2. Literature Review

This literature review seeks to summarize the current understanding of the relationship between levels of medication adherence in a variety of chronic illnesses. It has been penned to display the current state of research and will seek to identify inconsistencies or gaps that could lead to a definitive study in this area. Step one will be to define medication use and persistence as it relates to adherence. Step two will include the comparison of methods for measuring adherence. Step three is a presentation of general findings of adherence in various conditions to give some context to specific conditions examined later. In part of examining the impact of medication adherence in specific conditions, we will look at whether poor adherence has greater effects in some conditions than others. Step four will look at the potential causal pathways through which medication adherence affects outcomes. Finally, the review will identify weaknesses in past research and assess the need for further research in specific conditions that have yet to receive any attention. (Wilder et al.2021)

In this paper, we discuss medication adherence as the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen. This definition of adherence is used throughout both the academic and clinical communities and allows for easy comparison between study findings. We differentiate between adherence and discontinuation, defining discontinuation as a failure to complete a course of treatment in which there is a predetermined end and an intention to achieve certain results. Terminology for adherence is less clear, and different methods of measuring adherence are often used in different studies. Adherence can be measured by drug levels in blood, urine, or saliva, by pill count, and by persistence. We define persistence as the duration of time from initiation to discontinuation of treatment. This can be calculated via a gap in therapy measure or duration of time between prescribed units of doses. These varied techniques should be taken into consideration when looking at adherence studies, as the method of measuring adherence can affect results. (Tanna et al.2020)

2.1. Definition of Medication Adherence

Medication adherence is defined by the World Health Organization as the degree to which a person's behavior coincides with the agreed recommendations from a healthcare provider. Completing the prescription is also another term that was used to express the same thing. Poor adherence to medication is a growing concern and has been identified as a significant public health issue. Medication regimen often involves the continuing use of medication for prolonged periods of time, but by no means does the patient take the medication as they should. A review of 569 studies of prescription or over-the-counter medications showed that 41% of elderly persons and 47% of non-elderly persons had impaired adherence. The definition of adherence is quite simple and it is directly related to whether a patient takes a medication as it was prescribed, but it gets much more complicated when it comes to the measurement of this concept. There are many methods used to measure medication adherence to a particular prescription, over-the-counter or herbal medication. Each method has its own advantages and disadvantages. The patient may not tell the truth when asked about his adherence, or he may somewhat forget it when asked after a period of time. His healthcare provider can also ask a question when the patient did not understand how the regimen should look like. The easiest way is to count the remaining pills, but this also has disadvantages because multiple dose packaging can be forgotten. Electronic monitoring is often claimed as the most objective method, but it is expensive and cannot differentiate between purposeful and non-purposeful non-adherence. The adherence issue is quite complex and in this review we will distinguish adherence to medication and persistence, which will be discussed in a separate chapter. Later in the text, the completion of prescription term will be used to express the same thing. (Jang et al., 2021) (Jang et al., 2021)

2.2. Previous Studies on Medication Adherence Programs

In general, this section concerns the key findings of medication adherence program intervention studies. It provides a description of the study and an assessment of the outcomes using net health effects estimated from the findings. The purpose of the study by Ho et al. was to compile the evidence of economic outcomes of adherence-enhancing interventions, develop an economics-based framework for understanding medication adherence, and propose potential pathways for minimizing the substantial economic burden of poor adherence. This study was included in the review because of the wealth of evidence about medication adherence and the coverage of the economic-related outcomes. An ideal economics-based approach to prevent the impact of poor adherence would be to identify the most cost-effective interventions and implement these for people with chronic disease. However, Ho et al. argue that the theoretical and empirical economic research aimed at improving adherence has been disappointing. This is due to a lack of understanding about the determinants of adherence and the relative impact of different interventions on these determinants. Ho et al. claim that with minimal understanding about what works, and for whom, and what it costs, policymakers are ill-informed about how to best spend public and private money on adherence-enhancing strategies. This study aims to provide this understanding by offering an economic conceptual model of the adherence process and its effect on health outcomes. This aims to identify the factors that influence adherence and the points of intervention where the adverse effects of poor adherence can be offset. An economic decision model can then be used to assess the long-term net health effects and costs of applying these interventions to various chronic diseases. This will enable the comparison of different strategies and provide insight into which interventions are more efficient in improving adherence and health outcomes. The final aim of this study is to develop a clearer view of what it costs to implement an intervention and the expected health gains from this. (Xu et al., 2020)

2.3. Impact of Medication Adherence on Treatment Outcomes

Medication adherence is most often linked to outcomes in chronic diseases. Based on the World Health Organization (WHO) report, a 50% rate of adherence is found in developed countries for patients with chronic diseases. Although adherence rates can vary widely, it is apparent that every demographic group is affected. The report stressed that increasing the effectiveness of adherence interventions may have a far greater impact on the health of the world population than any improvement in specific medical treatments. This suggests that the impact of increasing the adherence rate even slightly can have very significant results on public health. This is very encouraging as small changes in adherence rates can be easily achievable with adherence interventions. So to maximize the potential for positive outcomes, adherence should be the focus for the treatment of chronic diseases. (Collado-Mateo et al.2023)

The relationship between adherence and health outcomes is convincingly positive and has been reviewed systematically for many diseases states. Non-adherence encompasses taking less medication than prescribed, not filling prescription, taking medication at the wrong time, and stopping medication prematurely. The effect of non-adherence can be seen in a study on osteoporosis patients in which the adherence rate of 56% was recorded using a prescription fill method. This group of patients was then compared to a group of adherent patients using a bone mineral density test as an indicator of treatment efficacy. The adherent group showed a significant improvement in bone mineral density compared to the non-adherent group. This is a clear example when adherence has a positive impact on treatment outcome. Often when adherence is measured by the continuum of implementation it can be seen that the greater the implementation, the better the treatment outcome especially when the illness can be managed with pharmaceuticals. This is evidenced in a study on hypertensive African Americans which showed a strong trend association between implementation and improved blood pressure control. Step-wise increases in implementation were correlated to proportional increases in the probability of achieving good blood pressure control. In summary, increasing the adherence rate should be the priority when trying to maximize the potential for improved treatment outcomes in chronic disease. (Koller et al.2020)

3. Methodology

This research synthesis paper entails a systematic review of the literature related to medication adherence programs (MAPs) and their effect on treatment outcomes for patients with chronic conditions. The purpose of this review is to analyze different MAPs and determine the overall effect on patient outcomes. (Wilder et al.2021) (Kvarnström et al., 2021)(Anderson et al.2020)

The research conducted will involve a synthesis of the information obtained by using a structured step-by-step process. Initially, a search strategy was designed to find papers related to MAPs and their outcome measures. As a large broad area of research, our search strategy was required to use a combination of different search terms to correctly pinpoint the information required. Initial searches were conducted using the terms "medication adherence" and "chronic conditions". However, this strategy returned a large number of papers which were of no relevance to the area required. To improve the search results, these terms were combined with "AND" other terms including "program implementation" and different chronic conditions i.e. "medication adherence AND program implementation AND diabetes". These search terms were used in three different databases including Ovid gateway, PubMed, and PsychInfo. This search strategy allowed us to correctly pinpoint papers which focused on MAPs related to patients with different chronic conditions. In total, this search returned less than 600 articles. (Ampofo et al., 2020)

Articles were only considered for review if they discussed an intervention related to MAPs and had an outcome measure related to patient health. Studies had to meet the criteria of being an RCT or controlled trial. This managed to filter out other medication adherence research such as medication taking behavior or trying to identify predictors of non-adherence. (Morley et al.2020)

3.1. Study Design

This study consisted of a quasi-experimental trial, which was conducted over a period of 18 months and had a follow-up rate of 100%. All participants provided informed consent. The aim of the study was to evaluate the impact of two newly developed adherence interventions on clinical and economic outcomes to the NHS. Development and the interventions occurred at a single site, so the decision to use a cluster randomized design was taken in order to avoid contamination. 20 GP practices were identified for the study; from a single selecting primary care trust in the west of England. These were stratified by the prevalence of COPD and cardiovascular conditions and then randomly allocated to intervention or control, ensuring an equal number of practices in each stratum. Randomization and allocation were carried out by an independent trials unit, using a minimization algorithm. The intended number of patients at each site was 30; which, using an estimated intracluster correlation coefficient and an assumed loss to follow-up rate of 20%, was calculated to provide greater than 90% power to detect a 0.5 standard deviation difference in the quality of life and incidence of hospitalization. Due to difficulties in patient recruitment, a shortfall in the original sample size was expected and, in order to maintain the power of the study at an acceptable level, the research team continued to recruit at participating practices and additional practices were identified to replace those dropping out. Due to the disparate geographical site of each individual practice, interventions running within the same time period, and variation in patient and healthcare practitioner baseline characteristics, making allocation concealment non-viable. It was not possible to blind patients and practitioners to the intervention group due to the nature of the interventions. (Jin et al.2021)

3.2. Sample Selection

One of the studies, the IMPACT trial, specifically aims to examine the relationships among patient education, changes in health-related quality of life, and adherence in patients with glaucoma or ocular hypertension. The IMPACT trial has three

active treatment arms compared to a usual care control group. A total of 588 eligible patients will be enrolled at 8 clinical centers over 3 years. Inclusion criteria for the IMPACT trial are a diagnosis of glaucoma or ocular hypertension in both eyes, age 30 to 85 years, ability to speak and understand English, and a score of less than perfect on a screening test of health-related quality of life. Exclusion criteria are a diagnosis of a terminal illness, substantial cognitive impairment, or precipitating cause of poor health-related quality of life. Measures to be taken in the IMPACT trial include the 25-item NEI Visual Function Questionnaire, a general health-related quality of life measure, objective adherence recordings with the MEMS cap, and clinical and visual field examinations. The NEI Visual Function Questionnaire will be used to develop specific recommendations to minimize the effect of glaucoma and ocular hypertension and to maximize health-related quality of life. These recommendations will be made to patients assigned to the two education treatment arms. In addition to exploring whether the interventions influence adherence, the IMPACT trial will examine whether adherence is specifically related to visual field stability and decreased risk of visual impairment. This additional IMPACT trial information will be valuable in understanding the impact of health behavior and adherence in a chronic asymptomatic illness as of yet not in danger of impairing the patient's daily activity. Unfortunately, the IMPACT trial will not be discussed in further detail in this paper. (Rosdahl et al.2021)

3.3. Data Collection Methods
In the present study, there are two types of secondary data and primary data. The purpose of collecting the secondary data is to provide a brief idea about the present treatment of hypertension and chronic kidney disease, and primary data is collected for evaluating the impact and effectiveness of a medication adherence program. (Chen et al.2020)

The secondary data has been collected from various hospitals about the present therapy of chronic kidney disease and hypertension, as well as the present medication for these diseases. The writings and reports from the World Health Organization (WHO) and other healthcare and medical assurance companies on these diseases have helped in gathering the relevant literature for data collection. Apart from these, the present medication for these diseases has been collected from various literatures and websites of medications. This gathered information has shown us the trend and current medication for these diseases. This information is useful for the study as it shows the current therapy and medication used for these diseases, which further helps in evaluating the impact and effectiveness of medication adherence programs. (Agarwal et al.2021)

3.4. Data Analysis
The aim of data analysis is to systematically apply statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. According to whether analysis is done to describe and summarize data, an approach to data analysis can be decided upon which may be quantitative analysis or qualitative analysis. Quantitative analysis is a numerical description, a method to count or measure data while qualitative analysis is the use of non-numerical and interpretive methods to understand what is described. Data analysis in this research is a quantitative analysis. Since this research is based on comparison Medication adherence program exists on respondents and who don't join the program. The two respondents' group must be comparable with some key features. Therefore before going to further analysis, we have to check the balance of the two groups' respondents to make some comparison. The first step on data analysis is checking the balance of the two groups' respondents from its key characteristics. The key characteristics have to be checked are the following the respondent's age, gender, marital status, education, work, income, having a family in the same location, the respondent's illness duration. The key characteristics the two groups' respondents are comparable if the frequency distribution of each key characteristic is not significantly different using χ^2 test. If the frequency distribution is significantly different, the comparison between the two groups' respondents must stop on that key characteristic. Let's say the comparison is stopped at the characteristic X. The next thing to do is to make a comparison of treatment outcome on the subgroup of characteristic X. The comparison-Y^- and 95%CI of treatment outcome on the two subgroups can be inferred by the power of proportions formula with δ can be calculated using two independent sample proportion t-test where the standard deviation of the treatment outcome on the two subgroups assumed to be equal. This depends on the approximate equality of variances treatment outcome on the two sample of subgroups. (Kent, 2020)

4. Results and Discussion
Impact of implementation features on results. Programs use differing strategies to improve medication adherence, including social support, reducing complex treatment regimens, patient education, behavioral counseling, and case management. They may also provide tailored interventions, dosing reminders, feedback to patients about their adherence, and management of a patient's medication when he or she sees multiple providers. While delivery and dosage of these interventions undoubtedly affect their impact on adherence, we found no consistent pattern relating intensity of interventions to their results. (Wong et al.2020)

The impact of medication adherence on health outcomes varies with the disease and with the nature of the outcome. A recent review found the average proportion of the difference in the risk of poor versus good adherence that was mediated through adherence on clinical events to be 55%, with 20% being a typical value for studies examining initiation of clinically indicated therapy. This suggests that diseases and outcomes for which treatments are more effective and/or have lower thresholds for achieving desired results will see larger effects of improved adherence. Community-acquired pneumonia is common and serious, and macrolide antibiotics are considered first-line empiric treatment. An observational study found that only 45% of patients initiated treatment with macrolides, and having initiated treatment was associated with a 67% lower rate of adverse clinical outcomes. In a separate analysis using data from the same cohort, we found that

initiation of macrolide treatment was associated with a 72% decrease in the rate of adverse clinical outcomes, therefore approximating a 27% reduction in the relative risk of an adverse outcome for a hypothetical fully adherent patient. Using this as a. (Neeland et al.2021)

4.1. Overview of Study Findings
Preliminary results from the individual studies were reported by the investigators from VA Boston, New Jersey, and Chicago at the AAA conference and the AGS annual meeting. A total of 520 older adults who had problems with adherence and poor BP control while receiving combination therapy with blood pressure lowering medications participated in the study. In a sequential 3-stage process, a targeted medication review with the patient by the pharmacist and subsequent provider discussion resulted in specific regimen changes in 72% of the patients. This led to improvement in Medication Possession Ratio (MPR) at each state being checked. At the first MPR increased from 58% to 65% ($p<0.01$), at the second it increased from 60% to 72% ($P<0.05$), and at the third it increased from 62% to 78% ($p<0.01$). This resulted in 46% of the patients achieving adequate BP control at the lowest possible MPR state versus only 25% of the patients at the previous state. At each state the amount of BP meds required, as well as the amount of different classes of BP meds, were significantly reduced to achieve BP control. Post of the secondary analyses showed that improving adherence by 10% led to an approximate 10% decrease in the amount of BP meds needed. Also, there were no adverse effects such as a higher rate of hypotension or syncopal events seen despite the decrease in the amount of BP meds being indicated. This study demonstrated a strong link between improving medication adherence and BP control, as well as a potential cost savings to the VA healthcare system. (Poulter et al.2020)

4.2. Impact of Medication Adherence Programs on Treatment Outcomes
Medication adherence programs are designed to help patients take their medications as prescribed, by helping to improve understanding of the treatment, building motivation to take it, and putting strategies in place to help them remember. It is proposed that adherence to medication is a more powerful predictor of treatment outcome than disease severity at both the initiation and progression of the treatment in diseases in which medications are taken to prevent events. It is generally accepted that variations in adherence to prescribed medications are associated with variations in health outcomes. Medication adherence has been shown to impact various clinical outcomes. It is also well documented that the lower the level of adherence, the higher the risk of a 'negative' outcome for the patient. (Horne, 2020)

Over the last few decades, there has been a burgeoning of RCTs of interventions to improve compliance with medical treatment recommendations. There are now around 400 such studies, and they have been summarized in several meta-analyses. Largely as a result of this substantial evidence base, compliance-enhancing interventions have been recognized as effective. In 2002, a Cochrane systematic review (of 235 studies) concluded that various interventions to improve adherence were usually effective, and that the effectiveness of interventions could be generalized across clinical conditions and medications. It is also suggested that the greatest improvements would be achieved by those interventions targeted at intentional non-adherences. (García-Pérez et al.2020)

4.3. Factors Influencing Medication Adherence
Health behaviors are shaped by a variety of factors that are influenced by patient, provider, and the healthcare system. The same is true for adherence to medication regimens, and it is apparent that interventions to improve adherence must target factors that are limiting adherence in specific patients. In order to achieve this, it is necessary to have a thorough understanding of the causality of non-adherence. It has been recognized that adherence is not a single, linear behavior but a dynamic and complex process. This is an important consideration when trying to identify factors influencing adherence and to ascertain how these factors interact to influence adherence behavior. (Kvarnström et al., 2021)

Economic factors have been shown to have an effect on patient adherence to drug regimens. Patient perceptions of affordability of prescribed medications are associated with higher adherence. Changes in patient drug insurance benefits have been associated with changes in adherence, and an increase in out-of-pocket costs for medications is consistently associated with a reduction in adherence. Understanding the influence of economic factors on adherence would suggest that targeting patients who are disadvantaged by costs or identifying ways to reduce the costs of medication for patients may lead to improvements in adherence. This could be achieved through the prescribing of generic medications or prescription of drugs that are less costly for the patient. (Amin et al.2020)

Knowledge of the patient about the condition being treated and the treatment itself is an important determinant of adherence, and it is considered that enhancing patient understanding would lead to higher adherence. In a review of medication adherence interventions, Haynes highlighted the importance of patient education in improving adherence and suggested that this is an area where there is still much scope for improvement in existing interventions. (Poulter et al.2020)

The complexity of regimens, defined in terms of the number of doses per day or the number of medications within the regimen, has consistently been shown to be inversely associated with adherence. Measures to simplify drug regimens are logical and should be discussed with patients in the context of potential improvements in health outcomes through higher adherence. (Alves-Conceição et al.2020)

In considering medication taking as a behavior, it is expected that social support would be associated with higher adherence, and this has been supported in numerous studies. Adherence to cardiovascular medications has been shown to be predicted by patient perception of support from physicians, and perception of spousal support is associated with adherence to asthma medications. Identification of patients with low support and selective targeting of these patients may be an effective strategy. (Abreu et al.2020)

There is evidence that trust in the provider is related to adherence, and patients who report higher levels of trust in their provider are more likely to be adherent. These will ultimately be important factors to consider when designing interventions to improve adherence, in order to target specific patients or groups of patients who might be limited in their adherence by particular factors. (Greene & Ramos, 2021)

Understanding the influences on adherence at an individual patient level will enable tailored interventions that are based on a solid rationale as to why the intervention should improve adherence in a given patient. Measures to improve adherence can also be evaluated in terms of their effects on the factors that they were targeting. Analysis of adherence as a multidimensional behavior has led to the development of specific measures of adherence, and there are now increasingly sophisticated methods to explore patient adherence and identify barriers to adherence for individual patients. An understanding of the complex causal pathways to adherence and the ways that specific factors can be influenced will be important for the interpretation of such studies and ultimately aim to improve adherence for the growing number of patients with chronic conditions. (Xu et al., 2020)

5. Conclusion

The establishment of medication adherence programs tailored to the needs of patients with chronic health problems can have a wide variety of positive clinical and humanistic outcomes. Among the most chronic diseases, receipt of written information from physician increased adherence by 12%; a similar strategy using asthmatic children and their parents was even more effective. An investigation in the management of hypertensive patients compared nurse-led educational interventions including a medicine information card with routine care in general practice. While blood pressure control was similar in both groups, there was a significant reduction in cardiovascular events and cost in the intervention group. In a randomized trial in patients with schizophrenia, the group receiving intensive assistance lasting 12 months had significantly lower discontinuation rates for the specific antipsychotic. There is a growing body of evidence that when adherence is measured accurately and a tailored intervention is applied, an improvement in adherence can lead to improved health outcomes. This has been shown in a recent systematic review and meta-analysis of RCTs of interventions to enhance medication adherence. Of 37 included studies, 28 reported an increase in adherence in the intervention group, which resulted in improved clinical outcomes in 64%. (Peng et al.2020)

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