

Patient Non-adherence – Pervasiveness, Drivers, and Interventions

Introduction

Research shows that patients' non-adherence to treatment regimens is quite common (evidence suggests that less than half of patients follow treatment plans as recommended), resulting in a high morbidity, mortality, and cost burden. In this edition of the *Review*, we explore the non-adherence problem and its consequences, potentially predictive patient factors, and the types and effectiveness of adherence interventions. Finally, we discuss the reasons why Internet-based, tailored interventions may offer a number of advantages in addressing this serious problem.

Eleanor Herriman, MD, MBA

*Executive Vice President,
Chief Science Officer,
IC Sciences Corp*

*Executive Director,
Division of Medical
Information Sciences*

Jessica Cerretani

Medical Informatics Review Editor

Treatment Non-adherence: A Silent Epidemic?

Patient adherence to treatment regimens is crucial to successful disease management, yet a large percentage of patients do not follow their physician's recommendations. It has been estimated that patient non-adherence causes 125,000 deaths a year in the United States (Norman). Adherence refers to a patient's participation in following a treatment regimen: Simply put, patients are adherent when they do what their clinicians prescribe (Balkrishnan, DiMatteo).

Evidence has clearly established that adherence of patients to prescribed therapy for a variety of diseases is rarely more than 60 percent—an estimated

one-third of patients take all of their prescribed medications, one-third take some, and one-third never even fill their prescription (Norman). Rates of non-adherence range from 15 to 93 percent depending on condition, with an estimated average rate of 50 percent (Balkrishnan). Adherence rates have been studied for a wide variety of conditions, including HIV, child and adult asthma, diabetes, hypertension, and post-myocardial infarction (MI) care.

Studies suggest that the severity of disease influences a patient's adherence: Patients with conditions such as HIV, cancer, and seizures tend to adhere more to treatment regimens than those with pulmonary disease, diabetes, and sleep disorders (DiMatteo). Other research shows that adherence rates are higher

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among patients with acute conditions compared to those with chronic diseases. Among patients with chronic conditions, adherence drops dramatically after the first six months of treatment (van Dulmen).

However, even in the immediate period following a condition as serious as MI, adherence rates are low and linked to mortality. A recent study of adherence to post-MI medications (including aspirin, beta-blockers, and statins) found that even one month after discharge, one in five patients discontinued use of one of these medications and one in eight discontinued all three

medications. The investigators concluded, “Medication therapy discontinuation after MI is common and occurs early after discharge. Patients who discontinue taking evidence-based medications are at increased mortality risk” (Ho). Given that hospitals’ quality measures regarding mortality post MI are now being publicly reported, these findings may be relevant to hospital discharge quality initiatives.

Adherence to specific medications has also been studied, with many patients on statins becoming non-adherent by one year and almost 14 percent of patients on Plavix discontinuing treat-

Patient attitudes and understanding predict treatment adherence	Knowledge of condition/treatment	Concern over high blood pressure	Attitude toward medications
Proactive (76-91% adherent) 24% of total patients	High/Excellent	High/Excellent	High/Excellent
Confident (69-82% adherent) 12% of total patients	High/Excellent	Low/Poor	Moderate/Good
Concerned (47-64% adherent) 22% of total patients	High/Excellent	Moderate/Good	High/Excellent
Confused (37-56% adherent) 10% of total patients	Low/Poor	Moderate/Good	Moderate/Good
Resigned (13-45% adherent) 15% of total patients	Moderate/Good	High/Excellent	Moderate/Good
Skeptical (5-24% adherent) 17% of total patients	Low/Poor	Low/Poor	Low/Poor

Adapted from Hopfield. *The McKinsey Quarterly*

“Medication therapy discontinuation after MI is common and occurs early after discharge (Ho).”

ment within one month of starting the regimen (Brookhart). Another study found that 36 percent of patients taking warfarin missed more than 20 percent of their pill bottle openings in a one-month period, suggesting non-adherence (Kimmel).

A growing evidence base demonstrates both the importance of patient adherence and the consequences of non-adherence. Morbidity, mortality, and medical costs have all been linked to treatment adherence rates. For example, in a study of 31,455 elderly acute MI survivors, Rasmussen et al found that adherence to treatment regimens involving statins and beta-blockers correlated positively with survival. High medication adherence has been linked to lower hospitalization rates in patients with hypercholesterolemia, diabetes, hypertension, and congestive heart failure (Sokol).

In terms of economics, one research report estimated that patients’ failure to adhere to medication regimens may cost the United States healthcare system as much as \$300 billion (Balkrishnan). Other research suggests that nursing home admissions due to non-adherence cost \$31.3 billion and hospital admissions due to non-adherence cost \$15.2 billion (Norman). Studies have also shown that a high level of medication adherence is associated with lower disease-related medical costs for hypercholesterolemia and diabetes.

Causes of Non-adherence

Even as the rate of medical advances has accelerated, patient treatment adherence has remained virtually unchanged over the past few decades (van Dulmen). While the problem is widespread and the etiologies ill defined, various research studies have identified patient characteristics correlated with non-adherence.

Most of the evidence suggests that there are few readily identifiable patient factors, such as gender, ethnicity, marital status, and socioeconomic class, that consistently predict adherence levels (Jacobs). Factors that have been linked to some degree with patient non-adherence include age greater than 65, failure to complete high school, the complexity and length of the regimen, poor physician-patient relationship, memory problems, and inability to pay for treatment (Ho, De Schryver). Most commonly, however, investigators’ findings are similar to those recently made by van Dijk et al., namely that “no clear risk profiles for non-adherence could be constructed. Characteristics that are correlated with non-adherence vary across different types of medication. Moreover, both patient and prescriber influence adherence.”

Recent research has suggested that patient attitudes and beliefs regarding their conditions, treatments, and physicians might predict treatment adherence, based on self-reported medication adherence behavior. In a study of 810 hypertensive patients, Hopfield and colleagues identified six types of patient segments that predicted medication adherence, with category distinctions based on patients’ self-assessments regarding level of involvement in their care, knowledge of their condition and treatment, concerns about their condition, beliefs about the safety and efficacy of medications, and interactions with their clinicians.

As illustrated in the **Figure**, the “proactive” category of patients (24 percent of those surveyed) was highly adherent to their treatment, empowered to manage their health, and felt medications were important to treating their blood pressure. The “skeptical” group (representing 17 percent of patients) only adhered to their regimens about 5

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to 24 percent of the time and reported a low trust of their providers, negative views of their medications and their long-term risks, and a dismissive attitude toward their disease. Other patient segments had intermediate levels of adherence and included categories described as “resigned” (15 percent of patients; 13 to 45 percent adherent), “confused” (10 percent of patients; 37 to 56 percent adherent); “concerned” (22 percent of total; 47 to 64 percent adherent) and “confident” (12 percent of patients; 69 to 82 percent adherent).

Types of Interventions and Their Effectiveness

Research shows that some interventions effectively increase patients’ adherence to treatment plans and improve clinical results. In a review of 57 studies, about half of the interventions tested were associated with statistically significant increases in medication adherence. About one-third of the interventions reported statistically significant improvements in treatment outcomes (Haynes). Other individual reports have described adherence interventions resulting in better clinical outcomes for conditions such as asthma, hypertension, diabetes mellitus, ulcers, HIV, dyslipidemia, and psychiatric disorders including depression and schizophrenia (Haynes, van Dulmen).

Interventions that have been employed to bolster treatment adherence use different approaches, including technical (focused on simplifying packaging and dosage regimens), behavioral (such as reminders and incentives), and educational (communications and technologies to improve knowledge and address concerns). No one type of intervention has been shown to be consistently superior to the others, but evidence suggests that interventions employing more than one approach are more effective (Rotter).

Other researchers have argued that tailoring both the type of intervention and its messaging content to the patient is critical to its ability to successfully improve adherence. Findings regarding the six distinct patient adherence categories indicate differing preferences in terms of adherence intervention type. For example, matching the patient’s attitudinal segmentation to an intervention might entail focusing differentially on the seriousness of the condition, the benefits and safety of the treatment, or the implications of discontinuing the medication to optimally bolster adherence (Hopfield).

Internet-based Treatment Adherence Interventions

Based on the current body of evidence, a robust rationale for the Internet as a potent adherence intervention platform emerges. First, the Internet can be used to assess patients’ beliefs and attitudes regarding their condition and treatment and, thereby, customize the content of the treatment support intervention in an automated manner. Second, the Internet is perhaps the only practical channel for employing a multiplicity of adherence approaches in a dynamic and interactive program that varies over the course of the treatment regimen. Such a multifaceted treatment adherence program might include dosage regimen instructions delivered through cell phones or mobile platforms, automated treatment reminders delivered on a routine schedule, interactive patient self-monitoring tools, programs for eliciting family support, secure exchange between patient and provider regarding questions and concerns, and educational programs tailored for the condition, treatment, and patient (Balkrishnan).

A growing evidence base suggests that Internet adherence programs are more effective than current approaches

to treatment instructions. In studies of asthma patients, those who receive web-based education and case management are more likely to adhere to treatment than those who received traditional, office-based management (Chan, Rasmussen LM). Other studies have shown that Internet-based programs can help improve adherence to treatment for hypertension, congestive heart failure, and smoking cessation (Roumie, Artinian, Strecher). Another study found that a computer-assisted reminder program increased patient adherence to preventive screenings like sigmoidoscopy and pneumonia vaccination (Vincent). Finally, initial research on an Australian web-based patient education program for people with chronic conditions sug-

gests that such products can increase function in patients with anxiety or depression by more than 25 percent (Andrews).

Conclusion

Despite advances in medicine and technology and the demonstrated benefits of compliance, patient adherence to treatment regimens is mediocre at best. An increasing number of studies show that interventions aimed at increasing adherence can provide concrete benefits in terms of better outcomes, improved disease management, and lower healthcare costs. Research suggests that Internet-based patient adherence interventions may be particularly effective.

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