

Research Paper

Predicting medication adherence in multiple sclerosis using
telephone-based home monitoringAaron P. Turner, Ph.D.^{a,b,*}, Danielle S. Roubinov, Ph.D.^{a,e}, David C. Atkins, Ph.D.^c, and
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Abstract

Background: Poor medication adherence exerts a substantial negative impact on the health and well-being of individuals with multiple sclerosis (MS). Improving adherence rates requires a proactive approach of frequent and ongoing monitoring; however, this can be difficult to achieve within traditional, reactive health care systems that generally emphasize acute care services. Telephone-based home monitoring may circumvent these barriers and facilitate optimal care coordination and management for individuals with MS and other chronic illnesses.

Objective: The current study evaluated the utility of a one-item, telephone-administered measure of adherence expectations as a prospective predictor of medication adherence across a six month period among individuals with MS.

Methods: As part of a longitudinal study, Veterans with MS ($N = 89$) who were receiving medical services through the Veterans Health Administration completed monthly telephone-based interviews for six months.

Results: Using mixed model regression analyses, adherence expectations predicted adherence after adjusting for demographic, illness-related, and psychosocial factors ($B = -5.54, p < .01$).

Conclusions: Brief, telephone-based assessments of adherence expectations may represent an easy and efficient method for monitoring medication use among individuals with MS. The results offer an efficient method to detect and provide support for individuals who may benefit from interventions to promote medication adherence. © 2016 Elsevier Inc. All rights reserved.

Keywords: Medication adherence; Multiple sclerosis; Chronic illness self-management; Telehealth

Chronic illnesses are diagnosed with tremendous frequency in the United States: in 2001, 125 million individuals had enduring medical illnesses that required ongoing health care.¹ A substantial increase in this estimate is expected over the course of the next several decades with the rising population of older adults, and it has been projected that by 2020, chronic illnesses will account for nearly three-quarters of deaths worldwide.² Concern over the increasing prevalence of chronic illness may also be due to the predominant focus of the current health care

system on providing reactive care for acute illnesses.³ Such a system often fails to meet the comprehensive and continuous care needs of individuals with chronic illnesses. Poor chronic illness health outcomes are compounded by costly and inefficient service delivery that contributes to rising health care spending; direct costs of chronic illnesses are estimated to exceed \$1.5 trillion, approximately 75% of total health care costs in the United States.⁴

Multiple sclerosis (MS) is an example of a chronic illness with health care needs that are particularly responsive to continuous, coordinated care between patients and providers.⁵ MS is characterized by a constellation of symptoms, including fatigue, pain, cognitive impairment, sensorimotor deficits, bowel and bladder problems, and mental health issues.^{6–8} Management of these symptoms often requires the involvement of generalist providers and multiple specialty services (e.g., neurology, psychiatry, physical therapy, occupational therapy), resulting in frequent medical appointments.³ The chronic and progressive nature of

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MS also necessitates ongoing and preventive efforts in order to reduce or delay the onset of functional losses that often develop during the advanced stages of the illness.

Medication adherence is a particularly essential component of any chronic illness self-management plan; a systematic review suggests that improved adherence may exert a stronger impact on patient health outcomes than advancements in specific medical treatments.⁹ Developed in the 1990s, disease modifying therapies (DMTs) are drugs that aim to reduce the rate of disease exacerbations and slow the progression of disease activity in MS.¹⁰ Among individuals with MS, the consistent use of disease modifying therapies along prescribed guidelines has been associated with fewer MRI abnormalities, reduced risk of relapses, fewer inpatient hospitalizations, delayed disability, and lower medical costs.^{11,12} Despite the improved outcomes associated with DMT use, rates of medication adherence are frequently variable and sometimes low. Although there are no established criteria that define acceptable adherence rates in MS, extant literature typically considers individuals adherent if DMTs are used at a rate of 80% or more and nonadherent if DMTs are used at a rate of less than 80%.¹³ A retrospective study of adults with MS observed average medication possession ratios (MPR) between 72% and 76% with 27%–41% of patients considered fully adherent (MPR greater than or equal to 85%) across a two year period.¹¹ Adherence has also been found to decline steadily over time, with rates of adherence between 73 and 79% at six months dropping to 59–63% at one year and 42–47% at two years.¹⁴ A longitudinal study of seven chronic illnesses (e.g., diabetes, seizure disorders, hypertension) revealed one year adherence rates ranging from 37% to 72% with the majority of rates between 50% and 70%.¹⁵

Support for self-management behaviors are a pillar of the Wagner Model of Chronic Illness Care, a model which was developed to delineate the necessary elements of a health care system that provides effective care for chronic illnesses.¹⁶ Strategies that support patients' effective self-management within this model include regular assessments, ongoing interactions between informed patients and proactive health care teams, and collaborative goal-setting. Monitoring and adhering to medication schedules represents an important component of illness self-management. Despite the importance of self-management support as described by the Wagner Model, barriers at the individual (e.g., transportation, mobility), provider (e.g., time constraints), and organizational (e.g., lack of specialty providers, preventive programs, technology systems) may make implementation difficult within the current health care system in the United States. The use of telehealth technology may be a solution to address issues of access, cost, and geographic distribution and offer a means through which to deliver the type of ongoing, coordinated care that is optimally suited for chronic illnesses.

Medication adherence is best measured and supported through consistent evaluation and repeated follow-ups between patients and providers. Although the time, cost,

and effort involved in this type of care may be prohibitive within a traditional model of health care service delivery, it may be well-suited to a system that includes the use of telehealth technology. Telehealth has been defined as “the use of technology to support the remote delivery of health care and promote self-management.”¹⁷ Telephone-based assessments may provide a means for rapid, repeated assessment of medication adherence and early detection of those at risk for nonadherence or discontinuation. Preliminary evidence from two studies suggests that telehealth programs are a feasible and effective means by which to improve illness self-management among individuals with MS.^{18,19} Telehealth has also been used to effectively monitor HIV medication adherence²⁰ and promote diabetes self-care practices.²¹

A number of studies have explored how demographic, illness, and psychosocial variables may promote or impair DMT adherence. In particular, the predictive validity of self-efficacy on medication adherence among individuals with MS has been the focus of a number of studies, as such beliefs have demonstrated a central role in the initiation and maintenance of health promoting behaviors.²² Self-efficacy has been defined as the confidence one has in their ability to successfully enact specific goal-directed behaviors, distinct from objective ratings of ability²³ and includes positive expectations of outcomes that have yet to occur. Personal efficacy beliefs have been described as “the foundation of human motivation and action” without which individuals have “little incentive to act or persevere in the face of difficulties” (p. 144).²² Among individuals with MS, higher levels of self-efficacy have been associated with increased adherence to injectable DMTs.^{24,25}

Existing research supports the necessity of ongoing assessment and monitoring of medication usage among individuals with MS in order to support chronic illness self-management. However, limited research has explored effective and efficient methods of assessing adherence. The present study explored the utility of a single-item, telephone-administered measure of adherence expectations as a prospective predictor of medication adherence among individuals with MS who were assessed monthly across a 6-month period. The measure of medication adherence expectations was informed by extant self-efficacy literature, drawing upon the concept that beliefs in one's ability to produce wanted outcomes is important for health behavior change. Expectations of adherence were used to evaluate individuals' use of prescribed DMT medication during the upcoming month. We hypothesized that adherence expectations would predict the following month's adherence to DMT medication adjusting for demographic, illness-related, and psychosocial factors.

Methods

Participants

Individuals in the current study were Veterans receiving care from a hospital-based outpatient MS clinic located

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