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Medication Beliefs and Self-Reported Adherence Among Community-Dwelling Older Adults

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Keywords

Adherence; Community; Aging; Beliefs

Introduction

Older adults of age 65 and above are prescribed more medications than any other age group, averaging 5.7 prescriptions [1]. Rates of medication nonadherence are high among older adults, especially among patients with chronic illnesses where rates can approach 50% [2, 3]. Adherence to medications is essential for effective treatment. While some factors associated with nonadherence may not be modified (e.g., gender, age), nonadherence behaviors guided by attitudes and beliefs about medication may be potentially modifiable deterrents to quality care [4].

A growing body of literature has documented the relationship between beliefs or attitudes about medications and adherence behaviors among older adults seen in primary care and other treatment settings [2, 5, 6]. These beliefs include illness perceptions, beliefs of control (over one's health), attitudes about medication efficacy, perceived harmful effects of medications, confidence in the physician's knowledge and perceived overprescribing of medication by physicians. Recent research has found that middle-aged adults who perceive greater personal costs, anticipate stigma and have more concerns about medications were more likely to report nonadherence [7]. Perceived need for care was a better predictor of adherence than objective depressive symptom severity ratings among older adults offered depression treatment [8, 9]. Better medication adherence has been associated with perceptions that a medication is necessary and the illness being treated is serious [9].

The Theory of Reasoned Action frames health behavior as a balance between norms, beliefs and motivations to engage in a specific action [11]. As a consequence, taking medication as prescribed emerges from weighing the risks and benefits associated with that behavior [12]; this process may be conscious or unconscious [13]. Factors that affect adherence may be modifiable (e.g. attitudes) or not modifiable (e.g., race and gender) [4]. Recent reviews of factors that affect nonadherence emphasize the role of medication beliefs along with

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depression, cost-sharing and regimen complexity as key modifiable factors [9, 14]. Our earlier work found that positive attitudes (perceived need) and negative attitudes (e.g., stigma, myths about care) were predictive of treatment adherence and participation [8, 16]. To examine factors that affect adherence for older adults, we grouped potential barriers into three areas to capture the multiple individual factors that affect adherence and the impact of attitudes, medical illness and disability so common in older adults: 1. psychological barriers (e.g., negative beliefs about medication efficacy and its usefulness); 2. illness barriers (e.g., medical comorbidity, disability, depressive symptoms); and 3. tangible barriers (e.g., costs, inability to read labels) [17, 18]. In the present study, we examined the relation of psychological, illness and tangible barriers to reported medication adherence among older adults in a community, non-medical setting. Much of the previous research on the relation of barriers to medication adherence among older adults has been conducted in clinical settings such as primary care or psychiatric clinics, where prescribing and adhering to medication is the norm. The goal of the present study is to examine the factors that affect adherence in older adults without the expectations of compliance that exist when adherence is measured in a healthcare delivery environment. The Aging Services Network is a group of agencies funded by the Administration on Aging to provide home and community-based services that are responsive to the needs and preferences of older people and their family caregivers. The agencies in this network provide a unique portal to evaluate ‘typical’ patterns of adherence in older persons with psychological distress and high medical burden outside of the medical setting [20, 21]. Identification of barriers to medication adherence in this population may provide a foundation for community-based interventions. Specifically, we predict that nonadherence (defined as at least one nonadherent behavior) will be associated with: 1) psychological barriers, such as lower perceived risk/benefit of medications (more concerns about medications and less perceived need for medications); 2) illness barriers, such as depression, disability and medical burden; and 3) tangible barriers, such as financial difficulty, number of medications, difficulty handling medications or cost of medications.

Patients and Methods

Patient Sample

As part of an academic-community partnership supported through the National Institute of Mental Health (P30 085943) [22], we examined attitudes towards medications, functioning and adherence among a community-dwelling population of older adults (age ≥ 60) who required nutrition assistance. This partnership facilitated identification of homebound older adults with mental health needs. Study participants were volunteers from a subset (63%, 15/24) of Elderly Nutrition Program (ENP) sites who are part of the Aging Services Network. The ENP is a Title III program supported by the Older Americans Act (OAA); it supports older individuals by sustaining adequate dietary patterns and nutritional intake [23]. ENPs are delivered through federally supported Area Agencies on Aging (AAA) who oversee congregate sites that provide daily meals to adults aged 60 and older. For this study, the largest ENP meal sites and those sites that served a racially, ethnically and economically diverse group of older persons were selected for participation. At each site, the study procedures were described; volunteers signed informed consent and were interviewed on location. Individuals who had severe hearing or vision impairment that would prevent completion of the cognitive assessment, an inability to converse in English or Spanish, cognitive impairment (Mini Mental State Exam [MMSE] score <24) or inability to give informed consent were excluded. The study procedures were approved by the Institutional Review Board of Weill Cornell Medical College.

Outcome Measure: Medication adherence

The outcome in this study is self-reported medication adherence, measured using the 4-item Morisky Medication Adherence Scale (MMAS) [24]. The scale generates a total adherence score (0–4) where a higher score means greater nonadherence. The scale can be used to classify adherence into three groups (high, medium and low) based on the endorsement of nonadherence behaviors. Responses from our sample were dichotomized into adherent (high; zero yes-items) or nonadherent (low and medium combined; one or more yes-items) groups [1, 25].

Independent variables

Psychological barriers—To capture an individual's attitudes towards medications, we used a risk/benefit score based on Horne's Beliefs about Medicines Questionnaire (BMQ) [26]. The BMQ scale has two subscales, Necessity and Concern. The risk/benefit score, as defined by the necessity-concerns differential (Necessity score minus Concerns score), can reflect the risk/benefit analysis of each participant. This difference weighs perception of cost (concerns) against perception of benefit (necessity) of medications [27]. The subscales have been used in a wide variety of adult populations with acceptable reliability and validity [27–29].

Illness barriers—The presence of a depression diagnosis was evaluated using the Structured Clinical Interview for DSM-IV Disorders (SCID) [30]; responses were compared with the criteria for duration and severity to diagnose minor and major depression. The SCID was administered by trained research assistants supervised by a Clinical Psychologist. In our previous work, use of the SCID as a diagnostic tool has yielded reliable assessments [31].

Cognitive functioning was assessed using the MMSE [32]. The number of medical conditions, or medical burden, was assessed for each participant using a Multi-level Assessment Instrument (MAI) subscale, which reviews a checklist of current medical conditions [33]. Disability was defined as the number of impairments in carrying out Instrumental Activities of Daily Living (IADL) as measured by the MAI IADL subscale [33]. IADL activities assessed included shopping, meal preparation, housework, laundry, managing money, using the telephone and carrying a heavy object.

Tangible barriers—Each participant's total number of prescribed medications was recorded. Behaviors reflecting difficulty handling medications (e.g., difficulty opening medication bottles and reading the medication label) were assessed using a subset of questions from the BMQ specific to medication handling [34]. To explore patient-reported financial difficulty associated with medication use, we asked participants to indicate "how financially secure they felt" and specifically whether they had "ever taken less medication due to cost."

Data Analysis

A total of 299 participants reported on their adherence. Both attitude measures were completed by 288 (96%). There were no demographic differences between subjects who completed both of the attitude measures and those participants who did not. Since the number of observations missing is small, and we cannot assume values for the predictor variable, we chose not to impute any missing values.

Bivariate comparisons using chi-square for dichotomous variables and t-tests for continuous variables were conducted to identify associations between demographic characteristics, and psychological, illness and tangible barriers with medication nonadherence. Those variables

with nominal 2-sided *P* values of 0.10 or less in the bivariate analyses were entered into a stepwise multivariable logistic regression analysis. Variables were retained in the multivariable model based on a .05 significance level and corresponding Wald chi-square values. The final model was evaluated for assumptions of goodness of fit (Homer and Lemeshow Test) and colinearity. Odds ratios were calculated for each predictor variable using 95% confidence intervals.

Results

More than one third of the sample (41%; 122/299) reported at least one nonadherent behavior. The most common nonadherent behavior was forgetting to take medication (33%; 98/299). Almost 10% of participants (28/299) reported being careless about taking their medication; 7% (21/299) said they stopped medications when they felt better without physician input. More than one in ten of the older adults (11%; 34/299) stopped medications without consultation with a physician when they felt worse.

Table 1 presents demographic information and bivariate comparisons of barrier type and adherence status. There were no demographic differences (e.g., age, race, gender or educational level) between participants who were adherent and those participants who were nonadherent. The nonadherent group reported greater concerns, but no difference in perceived necessity, on the subscales of the BMQ. In both groups, the mean risk/benefit score was positive, indicating that in the majority of participants the perceived necessity of medications was greater than the concerns as measured on the BMQ. However, adherent individuals reported higher risk/benefit scores than those individuals who reported being nonadherent.

Most participants had multiple medical conditions with a mean of 3.66 (standard deviation [SD] = 2.0). Participants took an average of 4.8 prescribed medications (SD = 3.1) daily. Almost one in five of the participants (19%; 56/296) met DSM IV diagnostic criteria for major (5 of 9 symptoms) or minor depression (3 of 9 symptoms) on the SCID. Older adults with a depression diagnosis were less adherent than those older adults with no depression diagnosis (48%; 27/56 vs. 63%; 150/240). Older adults who were nonadherent tended to have more medical conditions than adherent older adults. Adherence was not associated with an IADL disability, cognitive functioning or the total number of medications based on the bivariate comparisons (Values reported in Table 1).

Among the tangible barriers assessed, greater difficulty opening the medication bottle was associated with lower adherence (Table 1). The total number of medications prescribed, the ability to read the label, perceived level of financial resources and limited medication-taking due to cost were not associated with adherence.

In a stepwise multivariable logistic regression model, low risk/benefit score and difficulty opening the medication bottle significantly predicted medication nonadherence among community-dwelling older adults (see Table 2). The number of medical conditions (OR = 1.06; 95%CI, 0.921.23) and depression (OR = 0.82; 95%CI, 0.54–1.24), which were significant at the bivariate level, were not independent predictors of adherence. To evaluate the relation of the risk/benefit score and difficulty opening the medical bottle, we conducted a linear regression with number of nonadherent behaviors as a continuous variable. This analysis generated results comparable to the logistic regression results.

Discussion

The primary finding of this study was that in a community-dwelling sample of older adults receiving nutrition services, self-reported medication nonadherence was associated with

illness (having minor or major depression, more medical conditions), psychological (greater concerns than perceived benefits of medication) and tangible (difficulty opening medication bottles) barriers in unadjusted bivariate analyses. In a fully adjusted multivariable model, only the tangible and psychological barriers were independent predictors. Those who reported nonadherence had more concerns about the benefits of medication and had difficulty opening medication bottles. The study found no relation of number of medications to self-reported adherence.

These findings are consistent with models of medication nonadherence that differentiate types of barriers. Like studies conducted in clinical settings, we found a strong relationship between greater concerns about medications (e.g., side effects) and medication nonadherence [7, 28]. The importance of beliefs about medications is underscored by evidence that such beliefs are stable over time [35] and unrelated to health status [29]. In a diverse, low-literacy sample with high rates of nonadherence, negative beliefs about medicines were better predictors of nonadherence than low literacy [36]. While depression is not an independent predictor of adherence after adjusting for the other barriers, the hopelessness, helplessness, and negative views of oneself may influence beliefs about the usefulness of medications. In addition, the low energy and lack of activity may affect medication handling. A prospective study of adherence during depression treatment could untangle the relation between these three factors more systematically.

Our findings also demonstrate the importance of tangible obstacles to medication adherence, especially among older adults who may manage multiple medications in the context of medical burden and disability. Study participants who reported having difficulty opening medication bottles were more likely to be nonadherent. This is consistent with the findings linking nonadherence to reading difficulties reported by Moisan and colleagues [37].

Evidence that medication adherence is a function of multiple factors supports the importance of personalized, multidimensional approaches to effectively intervene on the risk of nonadherence. Developing a personalized adherence strategy begins with an assessment of the barriers affecting medication adherence and identifying those barriers that are modifiable and those barriers that are not [4, 5]. Disabilities that affect functioning (e.g., opening bottles) cannot be changed with a brief intervention; however, collaborating to identify barriers and compensatory strategies to cope with limitations may improve adherence. Other barriers, such as attitude and beliefs, may be more malleable with a psychosocial intervention. Thus if the perceived risk/benefit of taking medications is too great, then a targeted intervention with psychoeducation, goal setting and problem-solving may decrease misconceptions and increase an individual’s understanding of the need for treatment [18].

We recognize that findings from congregate meal participants may not generalize to other populations of community-dwelling older adults, some of whom are more medically, functionally, and economically disadvantaged. The setting of population studies may drive the constellation of psychological, illness and tangible barriers that are relevant to adherence behaviors. In addition, this study is only a cross-sectional snapshot of a community sample and we cannot determine causality with only an assessment of a single point in time. While the participants are taking multiple medications, we know little of their medical history, diagnoses and reason for the prescribed medications that would be available in a research study conducted at a clinical site. Additionally, self-reported adherence is a useful method in community settings, but does not capture nonadherence that may be unintentional or out of awareness. For future work, measurement of adherence could be enhanced by using an 8-item version of the Morisky Medication Adherence scale which assesses circumstances surrounding nonadherent behaviors [38].

Adherence to medications among older adults is a complex process. The results of this study suggest that interventions to improve adherence should address the array of obstacles faced by older adults. It may be particularly effective to target beliefs about medication, as this is a critical predictor of adherence that appears to be stable over time but modifiable [39].

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Table 1

Bivariate Associations between Demographic, Psychological, Illness and Tangible Barriers and Medication Nonadherence

Variable	Nonadherent (MMAS≥1) N=122	Adherent (MMAS=0) N=177	Chi/t-test	df	*P* value
Demographic					
Age (yrs), mean (SD)	75.57(7.3)	76.72 (7.4)	1.22	297	0.224
Years of Education, mean (SD)	12.66 (3.3)	12.90 (3.2)	0.616	297	0.538
Female, n (%)	99(81%)	134 (76%)	1.24	1	0.265
Race, n (%)					
Caucasian	77 (63%)	129 (73%)	1.22	1	0.270
Of African descent	44 (36%)	48 (27%)			
Psychological Barriers					
BMQ scores, mean (SD)					
Concerns subscale	2.47 (0.7)	2.22 (0.6)	−3.19	286	0.002*
Necessity subscale	3.66 (0.7)	3.73 (0.8)	0.75	286	0.455
Risk/Benefit score	1.19 (0.9)	1.51 (1.0)	2.63	279	0.009*
Illness Barriers					
Cognitive Functioning (MMSE score)	27.60 (2.1)	27.49 (2.0)	0.62	297	0.318
Depression diagnosis (SCID), n (%)					
Has minor or major depression	29 (23%)	27 (15%)	4.01	1	0.050*
No depression	90 (74%)	150 (85%)			
Number of medical conditions (MAI), mean (SD)	3.34 (1.9)	3.75 (2.0)	−1.73	297	0.084
Has an IADL disability (MAI)	39/118 (33%)	60 (34%)	0.02	1	0.880
Tangible Barriers					
Number of medications, mean (SD)	4.80 (3.1)	4.92 (3.2)	0.32	296	0.751
Open medication bottle, n (%)					
Difficult	56 (47%)	49 (28%)	11.44	1	0.000*
Not Difficult	65 (53%)	128 (72%)			
Read the print on the bottle, n (%)					

Variable	Nonadherent (MMAS≥1) N=122	Adherent (MMAS=0) N=177	Chi/t-test	df	*P* value
Very Hard	10 (9%)	16 (9%)	2.42	2	0.298
Somewhat hard	16 (14%)	14 (8%)			
Not hard	91 (75%)	146 (83%)			
Feels financially secure, n (%)			1.08	2	0.583
Can't make ends meet	7 (6%)	10 (6%)			
Have just enough	57 (49%)	75 (43%)			
Currently comfortable	53 (45%)	92 (52%)			
Has some insurance for medication, n (%)	104 (85%)	158 (89%)	0.610	1	0.435
Has Medicaid, n (%)	22 (18%)	12 (7%)	0.00	1	0.558

* Variables with p<0.10 entered into multivariable logistic regression model

MMAS: Morisky Medication Adherence Scale
df: degrees of freedom
SD: Standard deviation
BMQ: Beliefs about Medicines Questionnaire
MMSE: Mini Mental State Exam
SCID: Structured Clinical Interview for DSM-IV Disorders
MAI: Multi-level Assessment Instrument
IADL: Instrumental Activities of Daily Living

Table 2

Multivariable Logistic Regression Model Predicting Medication Nonadherence (n=281 with complete data)

Source	OR	95% CI	Wald	*P* value
Difficulty Opening Medication Bottle	2.16	1.3–3.6	8.82	0.003
Risk/Benefit Score	0.73	0.6–0.94	6.11	0.013

Note: The Chi-square for the model was 15.76, df=2, $P<0.001$. Assumptions of goodness of fit (Homer and Lemeshow Test =7.3, df=8, $P=0.50$) and colinearity for this model were met. Individual odds ratios were tested with Wald-chi square tests, df=1.

OR: Odds ratio
CI: Confidence interval
df: degrees of freedom