Barriers to Self-Management and Quality-of-Life Outcomes in Seniors With Multimorbidities

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ABSTRACT

PURPOSE Persons with multiple chronic diseases must integrate self-management tasks for potentially interacting conditions to attain desired clinical outcomes. Our goal was to identify barriers to self-management that were associated with lower perceived health status and, secondarily, with lower reported physical functioning for a population of seniors with multimorbidities.

METHODS We conducted a cross-sectional telephone survey of 352 health maintenance organization members aged 65 years or older with, at a minimum, coexisting diagnoses of diabetes, depression, and osteoarthritis. Validated questions were based on previous qualitative interviews that had elicited potential barriers to the self-management process for persons with multimorbidities. We analyzed associations between morbidity burden, potential barriers to self-management, and the 2 outcomes using multivariate linear regression modeling.

RESULTS Our response rate was 47%. Sixty-six percent of respondents were female; 55% were aged 65 to 74 years, and 45% were aged 75 years or older. Fifty percent reported fair or poor health. On average they had 8.7 chronic diseases. In multivariate analysis, higher level of morbidity, lower level of physical functioning, less knowledge about medical conditions, less social activity, persistent depressive symptoms, greater financial constraints, and male sex were associated with lower perceived health status. Potential barriers to self-management significantly associated with lower levels of physical functioning were higher level of morbidity, greater financial constraints, greater number of compound effects of conditions, persistent depressive symptoms, higher level of patient-clinician communication, and lower income.

CONCLUSIONS In addition to morbidity burden, specific psychosocial factors are independently associated with lower reported health status and lower reported physical functioning in seniors with multimorbidities. Many factors are amenable to intervention to improve health outcomes.

Conflicts of interest: none reported

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INTRODUCTION

Optimal health outcomes for persons with chronic diseases depend heavily on medical self-management.[1-5] This process is complex for persons with multimorbidities who must integrate self-management tasks for coexisting and often interacting diseases. Improvements in medical self-management processes correlate with improved health outcomes in studies of single diseases and studies of populations with a variety of chronic illnesses.[3,6-8] Conversely, barriers to medical self-management negatively affect disease-specific outcomes, mortality, and quality of life.[9-11] Identifying barriers is a first step in collaborating with patients to improve medical self-management.

Previous investigations of barriers to medical self-management have been

largely disease specific.[12-17] Barriers reported in these investigations have included inadequate social support, difficulties with time management, troubled emotional state, low self-efficacy, conflicting personal health beliefs, physical limitations, lack of knowledge about their medical conditions, and the presence of comorbid diseases.[12,13,15,16] Barriers to self-management for persons with multiple diseases have not been well studied. Although more than 65% of persons aged 65 years or older have 2 or more diseases, few investigations have focused specifically on barriers reported by seniors.[18-21]

Two qualitative investigations have explored potential barriers to self-management for persons with multiple morbidities. Participants in these studies reported insufficient awareness of resource support, transportation problems, financial constraints including lack of insurance coverage, compound effects of diseases and medications (symptoms or treatments of conditions interfere with each other), and being overwhelmed by a single illness.[22,23] Several of these potential barriers—including high level of morbidity, low level of physical functioning, presence of depression, low level of health literacy, low level of self-efficacy, low level of social well-being, and certain demographic characteristics—negatively affect quality-of-life outcomes in persons with multimorbidities.[3,24-35] Less is known about the effects of the other potential barriers, including financial constraints, compound effects of conditions, being overwhelmed by a single condition, and knowledge about medications and diseases.

We propose that barriers can be conceived of as negative resources found to be associated with poor health outcomes by interfering with one or more aspects of the self-management process. This model is based on reported barriers, a comprehensive definition of self-management, and the literature on patient-level resources potentially helpful for self-management.[36-39] Figure 1 illustrates how barriers may affect health outcomes.

To assess the association of potential barriers to self-management with quality-of-life outcomes, we surveyed a population of persons aged 65 years or older with the specific combination of diabetes, depression, and osteoarthritis (plus other incidental diseases). These inclusion diseases were chosen based on their high prevalence in the population, potential for interactions of symptoms and treatment between diseases, and the need for self-management to optimize successful health outcomes. We hypothesized that specific barriers to the self-management process, as well as overall level of morbidity, would be associated with lower perceived health status and physical functioning. We chose these subjective outcomes as relevant for seniors, because lower perceived health status is predictive of mortality, and low levels of physical functioning predict mortality and functional dependence.[40-45]
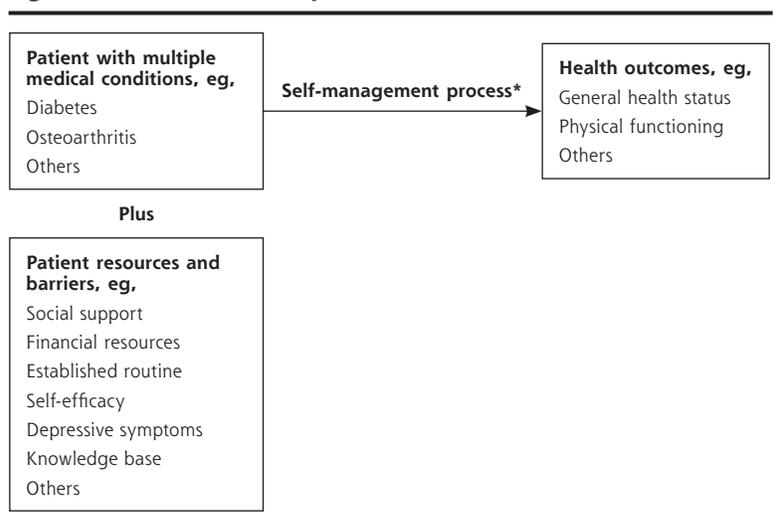
METHODS

We conducted a cross-sectional survey of members of a not-for-profit health maintenance organization (HMO) who were aged 65 years or older and who had coexisting diagnoses of diabetes, depression, and osteoarthritis for the 2-year period before the study. Patients with diagnoses of diabetes and depression were drawn from diagnosis-specific registries. These registry diagnoses had been validated based on a combination of the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes, laboratory values, and specific medication use. We considered 2 *ICD-9-CM* diagnoses of osteoarthritis within the preceding 2 years as an indicator of osteoarthritis symptomatic enough to require medical care.[46]

Measures
We had previously developed and completed initial validation of a survey instrument to assess potential barriers to self-management.[22,47] As there is no reference standard against which to compare our measures, this process involved developing and pilot testing questions based on the existing literature and a series of qualita-

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Figure 1. How barriers may affect health outcomes.

Patient with multiple medical conditions, eg,		Health outcomes, eg,
Diabetes	Self-management process* →	General health status
Osteoarthritis		Physical functioning
Others		Others

Plus

Patient resources and barriers, eg,
Social support
Financial resources
Established routine
Self-efficacy
Depressive symptoms
Knowledge base
Others

* Activities to promote physical/psychological health, interactions with health care clinicians, adhering to treatment recommendations, monitor health status, and make decisions.

tive interviews, assessing internal consistency, and subsequently evaluating associations with quality-of-life outcomes (comparable to those used in the current investigation). For example, the questions on physician-patient communication were developed based on qualitative interviews with patients with multimorbidities, supplemented by recommendations of a team of chronic care nurse care managers, pilot tested for comprehension, and assessed for internal consistency (coefficient $\alpha = .83$). In the current investigation we expanded the construct validity of the survey instrument by proposing a mechanism by which barriers affect certain health outcomes. We additionally assessed the potential barrier of health literacy, which has been independently associated with health status in older adults.[33,48] We assessed the number and severity of chronic diseases through a self-report process in which respondents reacted to a list of common chronic diseases. Respondents rated each condition on a 5-point scale from 1 (interferes with daily activities "not at all") to 5 (interferes with daily activities "a lot"). The total score representing level of morbidity (which we also refer to as disease burden) was the sum of diseases weighted by the level of interference for each condition.[49]

As we were unable to assess disease burden for the nonrespondents, we compared the level of morbidity of respondents and nonrespondents using the ICD-9-CM–based Quan comorbidity index.[50] Depression has fluctuating symptoms and is also amenable to long-term treatment; therefore, we assessed current depressive symptoms with a short validated screening test rather than relying on a diagnosis of depression.[51] We assessed perceived health status using the well-validated question in which respondents describe their health as "excellent," "very good," "good," "fair," or "poor"; and we assessed physical functioning using the physical function measure from the Medical Outcomes Study.[25,40,52,53]

Survey Process

Prospective participants received a letter inviting participation and were contacted within 3 weeks of the letter to complete the survey instrument unless they declined participation by telephone or return mail card. The survey instrument was administered by telephone according to the general methods of Aday[54] and required approximately 30 minutes to complete. Because of its length, participants could opt to complete the survey instrument in 2 separate telephone calls.

Sample Size

We estimated that we would need a minimum of 290 participants to have 80% power to detect an R^2 of 0.02 attributed to any given variable with a significance

level of 0.05 and adjusted for an additional 10 independent variables.

Analysis

We used multivariate linear regression models to evaluate, separately, the dependent variables of perceived health status and physical functioning as functions of level of morbidity, potential barriers to self-management, and demographic variables. Independent variables significant at $P \leq .15$ in bivariate analyses were included in multivariate models. We developed a regression model in which variables were added in the following steps: (1) simple count of diseases and demographic variables, (2) potential barriers to self-management previously shown in the literature to affect health status (depression, physical functioning, self-efficacy, and health literacy), (3) severity-adjusted level of morbidity (disease burden), and (4) the remainder of our potential barriers to self-care of interest (compound effects of conditions, being overwhelmed by 1 condition, knowledge about conditions, etc). At each step, independent variables significant at $P \leq .05$ remained in the model. We reassessed the contributions of the independent variables by reconstructing the model, switching steps 2 and 4, and found no differences in our final model.

Although both quality-of-life outcomes met the assumptions necessary for linear regression, we decided, because of the unequal interval scales and higher degree of skewness associated with the health status outcome measure, to confirm the results of linear regression with ordinal logistic regression. Confirmation of linear models using ordinal regression has been noted previously when an ordinal scale meets the assumptions necessary for linear regression.[55] Because of the possibility that the severity-adjusted subjective measure of disease burden could account for some of the variance of the other barriers (such as depression or social well-being) relative to the outcomes, we also assessed interactions between level of morbidity and each of the potential barriers to self-management in each model. All analyses were conducted using SAS Version 9.1 (SAS Institute, Cary, NC).

RESULTS

Of the 746 invitation letters mailed, 352 participants completed the survey instrument for a response rate of 47%. Characteristics of respondents and nonrespondents are reported in Table 1. There were slightly more female than male respondents, one-half were married, they were predominantly white, and they had a lower household income level. Twelve percent reported their health status to be excellent or very good, 38% good, 36% fair, and 14% poor. On average

Table 1. Characteristics of Study Population, N = 352

Characteristic	No. (%)	
	Respondents* N = 352	Nonrespondents* N = 394
Male	124 (35)	126 (32)
Age-group, y		
65-74	193 (55)	182 (46)†
75+	159 (45)	212 (54)†
Mean Quan morbidity score (SD)‡	4.6 (3.3)	4.2 (2.8)
Mean months in health plan (SD)	166 (86)	157 (83)
Education		
Some high school or less	36 (10)	
High school graduate/GED	124 (35)	
Some college/2-y degree	109 (31)	
4-y college graduate or more	78 (22)	
Marital status		
Married	187 (53)	
Divorced/separated	50 (14)	
Never married	6 (2)	
Widowed	103 (29)	
Race		
Black/African American	7 (2)	
White	306 (90)	
Other	29 (8)	
Ethnicity		
Hispanic/Latino	37 (11)	
Non-Hispanic/Latino	308 (88)	
Income		
<$45,000	269 (76)	
$45,000+	59 (17)	
Subjective health status		
Excellent	5 (1)	
Very good	39 (11)	
Good	132 (38)	
Fair	125 (36)	
Poor	51 (14)	

GED = general equivalency diploma.

* Used χ^2 (categorical) and Wilcoxon rank sum (continuous) tests for comparisons between respondents and nonrespondents.

† Significant at $P = .010$.

‡ Used observation period of 1 year before survey date for respondents and 1 year before median survey date for nonrespondents.

they had 8.7 chronic medical diseases. Respondents were slightly younger than nonrespondents. The 2 groups did not differ on sex, level of morbidity, or duration of health plan membership.

Potential barriers to self-management are displayed in Table 2. In bivariate analyses, all potential barriers to self-management were significantly associated with perceived health status except for compound effects of medications. In multivariate linear regression, the independent variables significantly associated with lower perceived health status were higher level of morbidity, lower level of physical functioning, less knowledge about medical conditions, less social activity, persistent depres-

sive symptoms, greater financial constraints, and male sex. R^2 for this model was 0.45. Results of this multivariate analysis are displayed in Table 3. None of the interaction terms between disease burden and the potential barriers to self-management were significant in the final model for this outcome. Ordinal logistic regression confirmed the results of the linear model.

We performed an additional multivariate analysis to determine the contribution of morbidity and the other sociodemographic and psychosocial factors to level of physical functioning. Potential barriers to self-management that were significantly associated with lower levels of physical functioning were higher level of morbidity, higher patient-clinician communication, greater financial constraints, greater number of compound effects of conditions, persistent depressive symptoms, and lower income. Income bracket and level of reported financial constraints (other financial obligations affected by health care expenses) were both significant and independent of each other. There were significant interactions between disease burden and 3 potential barriers to self-management: patient-clinician communication, financial constraints, and compound effects of conditions. At higher levels of morbidity, there were weaker associations between all 3 of these potential barriers and the outcome of physical function. R^2 for this model was 0.34. Results of this multivariate analysis are displayed in Table 4.

DISCUSSION

Maintaining health status for seniors with multiple medical diseases is an important goal in its own right. Furthermore, lower perceived health status predicts all-cause mortality, disease-specific morbidity, and functional status decline.[40-42,56,57] Optimal care of seniors with multimorbidities should therefore include assessment of factors that contribute to decreased health status and implementation of strategies to address them. Physical functioning is a significant contributor to perceived health status and a separate and important outcome reflecting quality of life in the senior population. In addition to predicting overall health status, low levels of physical functioning in seniors are predictive of increased dependency in activities of daily living, increased use of health care resources, increased use of nursing homes, and increased mortality.[58-60]

The level of biomedical morbidity is known to

Table 2. Barriers to Self-Management Reported by Study Participants: Bivariate (Spearman) Correlations With Outcomes

Potential Barrier to Self-Management*	Mean Score (SD)†	Correlation Coefficients	
		Health Status	Physical Functioning
Count of diseases (no scale)	8.7 (2.7)	- 0.41‡	- 0.38‡
Persistent depressive symptoms (yes/no: 0.0-1.0)	0.6 (0.5)	- 0.32‡	- 0.25‡
Physical functioning	43.6 (27.3)	0.55‡	…
Self-efficacy	71.6 (19.3)	0.31‡	0.28‡
Health literacy	74.9 (21.4)	0.16§	0.12‖
Disease burden	19.5 (10.3)	- 0.51‡	- 0.51‡
Compound effects of conditions	60.2 (15.8)	0.32‡	0.23‡
Overwhelmed by 1 condition	68.3 (23.4)	0.31‡	0.25‡
Knowledge about conditions	55.9 (27.9)	0.24‡	0.07
Financial constraints	66.4 (26.3)	0.34‡	0.32‡
Social activity	71.9 (21.1)	0.26‡	0.24‡
Patient-clinician communication	82.5 (17.9)	0.23‡	0.08
Medication knowledge	78.7 (16.1)	0.18§	0.09
Medication adherence	77.8 (20.7)	0.17§	0.15§
Compound effects of medications	55.3 (17.4)	0.10	0.06

* Listed in order of addition to multivariate models.

† Scales 0 to 100 except as noted. Higher scores are consistent with being better off for a given domain, eg, better knowledge, fewer financial constraints, better patient-clinician communication.

‡ $P \leq .001$.

§ $P \leq .01$.

‖ $P \leq .05$.

Table 3. Multivariate Model: Barriers to Self-Management Associated With Lower Health Status

Health Status*	Coefficient	P Value
Intercept	-19.000	.002
Disease burden/level of morbidity (range, 1-59)	0.523	<.001
Physical function	-0.331	<.001
Knowledge of medical conditions	-0.098	.006
Social activity	-0.101	.033
Persistent depressive symptoms (yes/no)	4.451	.035
Financial constraints	-0.082	.046
Male sex	4.182	.045

Note: R^2 for model = 0.447; n = 332.

* All scales 0 to 100 unless noted.

tors that may present barriers to self-management.[3,24-35]

We originally identified our independent variables of interest (potential barriers to self-management) based on qualitative interviews with members of this population.[22] In considering the potential mechanism of action of these barriers on health outcomes, we postulated that barriers interfering with the self-management process can be construed as negative resources (Figure 1). This context is important because many of the factors we have identified as associated with lower health status may be amenable to intervention in the context of patient-centered and collaborative self-management support, as well as by assessing and maximizing patient resources.[63-65] Potential barriers to self-care that may be amenable to intervention include identifying and treating depressive symptoms; providing individualized patient education regarding medical conditions; enhancing physical functioning through physical therapy, manual aids, and other support; resolving situations in which symptoms and treatments for separate conditions interfere with each other; and striving for collaborative care choices that take into account patients' financial resources.

In our model, several factors associated with lower health status were also associated with lower physical functioning (such as greater disease burden, persistent depressive symptoms, and financial constraints). Greater compound effects of conditions (symptoms and/or treatments of conditions interfere with each other) and a lower income level were also associated with lower physical functioning. Our finding that higher levels of patient-clinician communication were associated with lower levels of physical functioning is not intuitively obvious. We suspect that low levels of patient-clinician communication may be a proxy for healthier patients' having fewer visits to or questions for their clinicians. We noted interactions

be an important predictor of perceived health status and quality of life for persons with multiple medical diseases.[24-26,61,62] Our results indicate that, after accounting for the independent effect of multimorbidity, specific psychosocial factors are additionally and independently associated with lower levels of health status and lower levels of physical functioning in this population. Although several factors we identified have previously been associated with health status, we are unaware of any other investigations that have assessed the independent contributions of each of these factors in the context of other psychosocial fac-

Table 4. Multivariate Model: Barriers to Self-Management Associated With Lower Levels of Physical Functioning

Physical Function*	Coefficient	P Value
Intercept	- 44.406	.005
Disease burden/level of morbidity	0.173	.790†
Financial constraints	- 0.434	<.001
Income	-11.437	<.001
Patient-clinician communication	0.455	.007
Compound effects of conditions	- 0.509	.009
Persistent depressive symptoms	6.111	.021
Disease burden X patient-clinician communication	- 0.020	.010
Disease burden X financial constraints	0.018	<.001
Disease burden X compound effects of conditions	0.025	.007

Note: R^2 for model = 0.341; n = 343.

* All scales 0 to 100 unless noted.
† Significance accounted for by interaction terms.

nationally 29% of seniors report less than basic levels of health literacy.[66] It is notable, however, that even this relatively literate population reported substantial barriers to self-management.

Although our investigation helps to clarify the complex relationship between disease burden and psychosocial barriers to self-care for seniors with multiple diseases, several limitations should be noted. We used a cross-sectional design and therefore are unable to assess cause and effect between our potential barriers to the self-management process and health outcomes. We also had a relatively low response rate, which we attribute in part to the anticipated amount of time required to complete the survey that we mentioned in the invitation letter. Based on the comparisons we could make, respondents differed little from nonrespondents. Finally, our results are based on the responses of seniors who are accustomed to the infrastructure of an HMO. For example, despite the level of their morbidity, members of this study population did not report significant problems with medications. We suspect this result may be due to emphasis placed on education about medications within the HMO care structure. We would continue to emphasize the importance of medication management for seniors with multimorbidities.

between disease burden and 3 potential barriers (communication, financial constraints, and the compound effect of conditions) in which the association of the barrier with physical functioning lessened at higher levels of morbidity. This finding suggests that the impact of certain barriers may not be constant across the entire range of morbidity. We suggest that, for the most medically ill participants, physical functioning was less a function of individual barriers to self-management than a function of overall frailty. This frailty was statistically accounted for by the subjective severity adjustment in the disease burden measure.

Several factors we explored were significantly associated with the outcomes of interest but did not contribute to the final models: self-efficacy, being overwhelmed by a single condition, and knowledge about medications. Previous investigations suggest that these factors are important for persons with multimorbidities and are amenable to existing interventions.[3,6,22] Being overwhelmed by a single condition lends itself to well-developed, single-disease management programs there are equally well-developed interventions to improve self-efficacy, and patient education can improve knowledge about medications.[3,6,23] Complex interactions or correlations with the other variables may explain their lack of significance in our current models. Further investigation will show whether these potential barriers to self-management are directly or indirectly associated with specific health outcomes.

Health literacy has been previously shown to affect subjective health outcomes in a multimorbid population[33]; however, it did not contribute to our final multivariate model. We suspect that we screened out some low-literacy respondents by the invitation letter mailed before the survey. Our sample of seniors exhibited acceptable levels of health literacy, whereas

Much of the care of persons with chronic diseases has been centered on concepts of disease management. The current standard of care that emphasizes management of individual diseases, however, may not be sufficiently comprehensive for persons with multiple chronic conditions, diseases, or disabilities. Although we selected a study population based on 3 specific diseases, its members reported more varied and a higher number of diseases than those in our inclusion criteria. Thus, we expect that our findings will be relevant to seniors with a broad spectrum of multimorbidities. Our investigation of 2 subjective, but important, health outcomes for the senior population illustrates the complex contribution of biological and psychosocial factors that affect the overall health status of persons with multiple medical diseases. Best care of this population should extend beyond management of medical diseases to address important psychosocial factors—with the goal of enhancing self-management support. The challenges for clinicians are to identify the individual needs of such patients, to have systematic approaches in place to match these needs with resources, and to be alert to the shifting priorities of this population so that there is periodic reassessment of needs.

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