

The Relationship Between Multimorbidity and Patients' Ratings of Communication

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BACKGROUND: The growing interest in pay-for-performance and other quality improvement programs has generated concerns about potential performance measurement penalties for providers who care for more complex patients, such as patients with more chronic conditions. Few data are available on how multimorbidity affects common performance metrics.

OBJECTIVE: To examine the relationship between multimorbidity and patients' ratings of communication, a common performance metric.

DESIGN: Cross-sectional study

SETTING: Nationally representative sample of U.S. residents

PARTICIPANTS: A total of 15,709 noninstitutionalized adults living in the United States participated in a telephone interview.

MEASUREMENTS: We used 2 different measures of multimorbidity: 1) "individual conditions" approach disregards similarities/concordance among chronic conditions and 2) "condition-groups" approach considers similarities/concordance among conditions. We used a composite measure of patients' ratings of patient-physician communication.

RESULTS: A higher number of individual conditions is associated with lower ratings of communication, although the magnitude of the relationship is small (adjusted average communication scores: 0 conditions, 12.20; 1-2 conditions, 12.06; 3+ conditions, 11.90; scale range 5 = worst, 15 = best). This relationship remains statistically significant when concordant relationships among conditions are considered (0 condition groups 12.19; 1-2 condition groups 12.03; 3+ condition groups 11.94).

CONCLUSIONS: In our nationally representative sample, patients with more chronic conditions gave their doctors modestly lower patient-doctor communication scores than their healthier counterparts. Accounting for concordance among conditions does not widen the difference in communication scores. Concerns about performance measurement penalty related to patient complexity cannot be entirely addressed by adjusting for multimorbidity. Future

studies should focus on other aspects of clinical complexity (e.g., severity, specific combinations of conditions).

KEY WORDS: multimorbidity; pay-for-performance; patient-physician communication.

J Gen Intern Med 23(6):788-93
DOI: 10.1007/s11606-008-0602-4
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INTRODUCTION

Measures of patients' experiences with care are increasingly being used to assess quality of care delivered by individual providers, medical groups, hospitals, and health plans.¹⁻³ These performance measures focus on dimensions of care that consumers identify as important aspects of interpersonal quality, including patient-physician communication.^{4,5} Patient experience measures are increasingly being included in public reports of performance data to increase transparency of care and make providers more accountable for their actions.⁶ In addition, some pay-for-performance programs are already asking patients to rate their experiences with care.^{7,8}

The proliferation of health care report cards and pay-for-performance programs has raised concerns that reports of patient experience measures need to account more adequately for patient clinical complexity.⁹ One major concern is that clinically complex patients require more time and effort to achieve the same levels of care as less clinically complex patients. Some argue that failure to consider patients' clinical complexity in such programs could favor providers whose practices have fewer clinically complex patients and create a performance measure penalty for providers who care for more clinically complex patients. Failure to account for clinical complexity could provide perverse incentives that may lead to unintended consequences, such as dismissal of clinically complex patients from practices.⁹

Clinical complexity is difficult to define. Suggested elements include but are not limited to disease severity and newly diagnosed conditions.¹⁰ Perhaps the most common suggested element, however, is multimorbidity, often operationalized as a patient having 2 or more chronic conditions.¹¹ Multimorbid patients are frequent users of primary care clinics and are more likely to report lower health-related quality of life.^{12,13} They may pose special challenges to patient-physician communication, as they likely have an increased volume of information to commu-

Received October 6, 2007

Revised February 27, 2008

Accepted March 12, 2008

Published online April 22, 2008

nicate to their physician and vice versa.¹⁴ Because visit lengths are relatively fixed within most physicians' practice settings,¹⁵ patient-physician communication involving encounters with more chronic conditions may result in less time spent per topic and use of communication strategies (e.g., forced response questions) that enable the physician to deliver a large amount of information in a short period of time. Indeed, a study of time allocation in primary care office visits involving patients age 65 or older,¹⁵ a group more likely to have multiple chronic conditions,¹³ found a very limited amount of time dedicated to any individual topic discussed during the visit (median = 6 topics, median visit length = 15.7 minutes).

The objective of this study was to evaluate how patients' ratings of communication vary with the number of chronic conditions, in a large, nationally represented dataset.

METHODS

Participant Recruitment

Our primary data set came from the Community Quality Index (CQI), a collateral study of the Community Tracking Study (CTS). We used data from the second-round survey conducted from February 2001 through September 2002 (first-round survey included 13,275 telephone interview participants, October 1998 to August 2000). Our survey included households in the CTS Household Survey's supplemental national sample (randomly selected from the 48 states in the contiguous United States)¹⁶ and participants from 12 communities (Boston, MA; Cleveland, OH; Greenville, SC; Indianapolis, IN; Lansing, MI; Little Rock, AK; Miami, FL; Newark, NJ; Orange County, CA; Phoenix, AZ; Seattle, WA; and Syracuse, NY), which were randomly selected to represent the national population living in metropolitan areas with more than 200,000 people.¹⁷

Response Rate

A total of 25,643 adults were in the initial sample. However, 3,361 persons were ineligible because we found during our attempts to recontact these individuals for telephone interviews that they had died, become incapacitated, or moved. Of the 22,012 adults eligible for the study, a total of 15,709 completed the telephone survey (71.4% response rate).

Survey Instrument and Measures

Dependent Variable: Patients' Ratings of Communication. During the telephone interview (conducted in English or Spanish), we asked participants to rate their health care experiences, including 5 separate questions about patient-physician communication: "In the last 12 months, how often did doctors or other health providers listen carefully to you?.. explain things in a way you could understand...show respect for what you had to say...spend enough time with you...were you involved as much as you wanted in decisions about your health care" (Cronbach reliability coefficient was 0.84). Possible responses included "never," "sometimes," "usually," and "always." These items were adapted from the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey.^{18,19} We followed the CAHPS recommendation of combining "never" and "sometimes" into a single category,

because multiple studies have shown that respondents rarely select "never."²⁰ The final response categories, coded from 1 to 3, were "sometimes/never" (1), "usually" (2), and "always" (3).

We constructed a composite measure from these 5 items to represent the domain, "patient-physician communication." The final composite had a possible range of 5 (worst) to 15 (best). Using the CALIS procedure available in SAS v. 9, (SAS Institute, Cary, NC), we conducted confirmatory factor analysis. Because the factor scale was highly correlated with a communication score obtained by summing the 5 survey items, all analyses were conducted using the summed-item composite measure, a score that is easier to interpret.

Primary Predictor Variable: Multimorbidity. Through the CQI and CTS interviews, we determined whether participants had any of 16 chronic health conditions: chronic obstructive lung disease, symptomatic asthma, chronic headaches, diabetes, hypertension, hyperlipidemia, heart failure, coronary artery disease, uterine bleeding, benign prostatic hyperplasia, cataracts, osteoarthritis, cancer, obesity, alcohol misuse, and depression or other mental health condition. We selected these conditions, because the data sets we analyzed contained information on them. For most conditions, participants were asked if a doctor had told them that they had specific health conditions (e.g., Has a doctor or other health provider ever told you that you have hypertension or high blood pressure?), and we classified participants as having the condition based on their responses. The survey instrument asked participants for their weight and height, which enabled us to calculate body mass index (BMI) and to classify patients with BMI >30 as obese.²¹ The survey instrument also contained items from the Alcohol Use Disorders Identification Test (AUDIT), which has a sensitivity of 57% to 97% and a specificity of 78% to 96% for identifying patients with harmful or hazardous drinking (cutoff of 8 or higher; response range 0-40).²² Participants with a score of 8 or higher were classified as having alcohol misuse. Three CQI items, which are in the Medicare Health Outcomes Survey²³, screened for depression, and 3 items asked if participants had seen or had been advised to seek counseling for a mental health condition, or had taken medications for a mental health condition. Participants who answered "yes" to any of these items, as well as participants who reported having depression in the CTS survey, were classified as having "depression or other mental health condition." Evidence supports the validity of obtaining comorbidity information from patients, particularly for more serious and well-defined disease entities.²⁴

Concordant/discordant relationships among conditions may be important when counting conditions.^{9,25,26} In theory, concordant conditions (e.g., hypertension, hyperlipidemia, and heart failure) have overlapping treatments, side effects, and/or prognosis and may require less time and cognitive effort to discuss than conditions that are discordant (osteoarthritis, asthma, and hyperlipidemia). We, therefore, constructed the multimorbidity variable using 2 different approaches. In the "count of individual conditions" approach, we summed the number of chronic conditions co-occurring in each participant, without considering any concordance among the conditions.²⁷ We created a categorical variable with 3 levels to represent the number of chronic conditions (3 or more individual conditions, 1-2 individual conditions, 0 individual conditions). In the "count of condition groups" approach, we grouped together condi-

Table 1. Prevalence of Specific Types of Chronic Conditions and Condition Groups Among Participants with at Least One Chronic Condition, Weighted

Characteristic	Participants (n=12,042)	Missing
Cardiovascular plus diabetes and obesity, n (%)	8,109 (67.3)	8 (.07)
Cardiovascular, n (%)	6,403 (53.7)	16 (0.13)
Hyperlipidemia, n (%)	4,146 (34.4)	20 (0.2)
Hypertension, n (%)	3,933 (32.7)	35 (0.3)
Coronary artery disease, n (%)	753 (6.3)	58 (0.5)
Heart failure, n (%)	289 (2.4)	68 (0.6)
Endocrine, n (%)	4,119 (34.5)	6 (0.05)
Diabetes, n (%)	1,102 (9.2)	22 (0.2)
Obesity, n (%)	3,534 (29.3)	254 (2.1)
Mental health, n (%)	5,465 (45.8)	0
Depression or other mental health condition, n (%)	4,466 (37.0)	71 (0.6)
Alcohol misuse, n (%)	1,059 (8.8)	0
Genitourinary, n (%)	1,150 (9.6)	260 (2.2)
Uterine bleed, n (% of female participants with at least 1 condition)	599 (7.3)	247 (3.0)
Benign prostatic hyperplasia, n (% of males age >50 years)	539 (5.0)	14 (2.1)
Respiratory, n (%)	1,302 (10.9)	6 (0.05)
Chronic obstructive pulmonary disease, n (%)	203 (1.7)	1722 (14.3)
Symptomatic asthma (participants requiring asthma medications or symptomatic in past 2 years), n (%)	1,108 (9.2)	37 (0.3)
Musculoskeletal, n (%)	3,580 (29.7)	43 (0.4)
Osteoarthritis, n (%)	3,580 (29.7)	43 (0.4)
Neurological, n (%)	2,358 (19.6)	16 (0.1)
Headache, n (%)	2,358 (19.6)	16 (0.1)
Ophthalmologic, n (%)	1,709 (14.2)	36 (0.6)
Cataract, n (% of participants age >50 years)	1,709 (14.2)	36 (0.6)
Cancer, n (%)	1,239 (10.3)	28 (0.2)

tions if they were concordant. This approach resulted in the "condition groups" listed in Table 1. Then, we counted the number of condition groups co-occurring in each participant. We created a categorical variable with 3 levels (3 or more condition groups, 1-2 condition groups, 0 condition groups). These cut points were selected based on clinical input and reviewing the range and distribution of the number of condition groups represented in the sample.

Other Variables

We used demographic data from the CTS (age, gender, income, education, family structure, race/ethnicity, city of residence). We also linked each participant's ZIP code to U.S. Census rural/urban database to determine whether a participant lived in a rural area or not. The variable included in our models describes the percentage of the ZIP code area considered rural (some ZIP codes may be partially rural and partially suburban or urban). Through the CTS interview, we had information about the participants' health insurance status (insured vs not insured), the number of visits to the doctor in the past year, and self-rated global health status.

Statistical Methods

Statistical analyses were performed using SAS (version 9). Weights were employed to account for the complex, multistage nature of the survey design and non-response. We reviewed the

range, distribution, and weighted measures of central tendency for the communication scale and our primary predictor variables (multimorbidity represented as a count of individual conditions and a count of condition groups). We used both unadjusted and adjusted analyses to examine the relationship between multimorbidity and patients' ratings of communication. For the adjusted analyses, weighted multivariable linear regression models predicted the relationship between number of individual conditions and patients' ratings of communication. We then repeated the same weighted multivariable regression model, replacing number of chronic conditions with a variable representing number of condition groups. We used adjuster variables (listed in Table 2) that have been used in other similar studies.²⁸⁻³⁰ To facilitate interpretation of the parameter estimates, we also calculated the predictive margin for each multimorbidity level,³¹ which we determined by first assigning every person in the sample to a specified multimorbidity level and then calculating the average predictive

Table 2. Characteristics of the Sample, Weighted

Characteristic	Participants (n=15,709)	Missing
Mean age, y (SD)	45.8 (17.1)	0
Female, n (%)	8,204 (52.2)	0
Income, n (%)		0
<15 K	3,007 (19.1)	
15 K to 50 K	6,607 (42.1)	
>50 K	6,095 (38.8)	
Ethnicity, n (%)		0
White	11,437 (72.8)	
Black	1,485 (9.5)	
Hispanic	2,110 (13.4)	
Other	677 (4.3)	
Education, n (%)		123.3 (0.8)
Less than high school	2,124 (13.5)	
High school	5,175 (32.9)	
College	6,849 (43.6)	
Graduate school	1,438 (9.2)	
Family Structure, n (%)		0
Single person	4,702 (29.9)	
Married couple, no children	4,335 (27.6)	
Married with own/step/adopted children only	5,363 (34.1)	
Single with own/step/adopted children only	1,129 (7.2)	
None-nuclear family	180 (1.2)	
Ruralness (SD)	16.8 (28.8)	306.0 (0.02)
Not Insured, n (%)	1,916.6 (12.2)	0
Physician visits in the past year, n (%)		0
None	3,489 (22.2)	
1 to 2	4,782 (30.4)	
3 to 4	3,339 (21.3)	
5 or more	4,100 (26.1)	
Self-rated global health, n (%)		0
Fair or Poor	2,389 (15.2)	
Good	4,107 (26.1)	
Very Good	5,763 (36.7)	
Excellent	3,449 (22.0)	
Individual conditions, median (IQR)	2.0 (1.3)	
Count of individual conditions, n (%)		0
0 individual conditions	3,666 (23.3)	
1-2 individual conditions	6,661 (42.4)	
3+ individual conditions	5,381 (34.3)	
Condition groups, median (IQR)	1 (1.3)	
Count of condition groups, n (%)		0
0 condition-groups	3,666 (23.3)	
1-2 condition-groups	7,684 (48.9)	
3+ condition-groups	4,358 (27.8)	

communication score (e.g., score when everyone is assigned 3+ individual conditions, etc.).

Sensitivity Analyses

For the main analyses, the cut points for multimorbidity were determined based on clinical input. To find empirical cut points for converting the continuous variable to a categorical variable, we also used a nonparametric generalized additive model (GAM) on the count of individual conditions. We then created a count of individual conditions variable using these cut points. In a sensitivity analysis, we modeled the relationship between multimorbidity and patients' ratings of communication using a categorical variable that employed these empirical cut points.

In the main analyses, we considered diabetes mellitus and obesity to be part of the endocrine condition group. Because diabetes and obesity are strong cardiovascular risk factors and treatment of both conditions overlaps considerably with conditions grouped with the cardiovascular condition group, we conducted a sensitivity analysis in which diabetes and obesity were grouped with the cardiovascular conditions ("diabetes and obesity reclassified analysis").

The study was approved by RAND's Human Subjects Protection Committee.

RESULTS

Descriptive Statistics

Table 1 provides the prevalence of each condition and condition group. Table 2 summarizes participant characteristics.

Each item in the communication composite has a median score of 3 [interquartile range (IQR) 2, 3], except for the item, "How often did doctors or other health providers spend enough time with you," which has a median of 2 (IQR 2, 3). The median communication score was 13 (IQR 10, 15). We were missing

values for less than 0.3% of the sample for all composite items. Because the percentage of missing values was very small, we handled most missing values by deleting cases, but for 1 item ("How often...involved...in decisions"), we imputed with the item average.

Multimorbidity–Communication Relationship

Table 3 presents results from our models that assessed the relationship between multimorbidity and communication ratings. Adjusted average predictive communication scores are also included. In adjusted models, a higher number of conditions and condition groups was associated with worse ratings of communication ($p < .05$). A sensitivity analysis that used empirical cut points for the count of individual conditions resulted in similar findings; only 1.3% of the sample had >8 conditions, making point estimates for this group imprecise. Grouping diabetes and obesity as cardiovascular conditions did not change results overall ($p < .05$). The adjusted average predictive communication score decreased as the number of conditions and condition groups increases.

DISCUSSION

The growing interest in improving quality through public reporting and pay-for-performance has generated discussion about how best to measure performance of providers who care for clinically complex patients.^{9,32} In Donabedian's classic formulation, the quality of health care processes is divided into 2 domains, technical and interpersonal.³³ Recent studies that examined the relationship between multimorbidity and technical quality of care unexpectedly found that patients with more chronic conditions have better technical quality of care.^{34,35} However, few studies have examined the relationship between multimorbidity—one of the key elements thought to contribute to clinical complexity—and patients' experiences

Table 3. Weighted Multivariable Linear Regression Models Results and Adjusted Average Predictive Communication Scores (n=14,351)

Variable	Communication*		
	Estimate [†]	Confidence Interval	Average Predictive Communication Score*
Main Analyses			
Individual conditions			
0 individual conditions	Reference		12.20
1–2 individual conditions	–0.14	(–0.26, –0.01)	12.06
3+ individual conditions	–0.30	(–0.45, –0.15)	11.90
Condition-groups			
0 condition-groups	Reference		12.19
1–2 condition-groups	–0.16	(–0.29, –0.04)	12.03
3+ condition-groups	–0.25	(–0.41, –0.09)	11.94
Sensitivity Analyses			
Empirical Cut Points			
0–2 individual conditions	Reference		12.10
3–7 individual conditions	–0.19	(–0.31, –0.08)	11.91
8+ individual conditions	–0.13	(–0.58, 0.31)	11.97
Diabetes and Obesity Reclassified			
0 condition-groups	Reference		12.19
1–2 condition-groups	–0.17	(–0.29, –0.04)	12.02
3+ condition-groups	–0.25	(–0.42, –0.09)	11.93

*Scale range: 5 (worst) to 15 (best)

†Adjusted for age, gender, income, ethnicity, education, family structure, self-rated global health, geographic location, rural location, insurance status, and number of physician visits in the past year

with care, or interpersonal quality.^{14,36} To our knowledge, this is the first study to assess the relationship between multimorbidity and patients' ratings of communication using a nationally representative sample and to consider the influence of concordance among conditions when examining the relationship between multimorbidity and quality of care. Our results suggest that a higher number of conditions is associated with worse ratings of communication, even after adjusting for sociodemographic characteristics such as income. However, the magnitude of the decrement is small (a difference of roughly 0.3 points on a 5-to-15 scale for patients with no conditions compared to patients with more than 2 conditions).

What explains this weak relationship between the number of chronic conditions and patients' ratings of patient-physician communication? In theory, multimorbidity challenges primary care providers and patients, because of competing demands that occur when patients and providers need to address multiple chronic conditions in the context of fixed schedules and resources typical of busy outpatient clinics.^{37,38} A greater number of conditions may be associated with more medications, diagnostic tests, and specialist visits that in turn need to be discussed.¹⁴ Discussion of multiple topics within a short period may encourage providers to employ communication strategies that leave patients feeling like their providers have not listened carefully, explained matters clearly, involved the patient in decision-making, demonstrated respect, or spent enough time with the patient. Yet numerous patient/physician factors influence communication and patients' ratings of their providers (e.g., severity of the patient's chronic condition, linguistic and communication styles, patient-provider health belief system concordance).³⁹ Organizational or system-level factors also play a role.³⁹ For example, primary care practices with high patient volume have lower patient ratings of patient-physician communication than lower volume practices.⁴⁰ The number of chronic conditions, therefore, is just one of a multitude of factors that contribute to communication during a medical encounter and to patients' ratings of patient-provider communication, and it may be less determinative than some of the above factors. As this study was not able to measure some of the above factors, we do not know how these might relate to each other.

Several study strengths and limitations should be noted. We used a nationally representative sample of the U.S. population, which increases the generalizability of our findings to the U.S. population. Our results may not be generalizable to vulnerable populations such as homeless individuals who may not have a telephone, as we obtained our data through a telephone survey. The purpose of the study did not include focusing on subsets of patients who might be at higher risk for poor patient-provider communication (e.g., frail patients, underserved populations, certain ethnicities), although we adjusted for these characteristics in our analyses. Although our dataset contained information about many prevalent chronic conditions, we did not have data on conditions such as kidney and liver disease and only had limited information about neurological and ophthalmologic conditions. We had limited information about severity of conditions and therefore, used a proxy, self-rated global health, in our analysis. The severity of the conditions is likely to have an effect on communication, because of the expected increase in intensity of treatment and thus volume of information that would be expected with more severe conditions. Furthermore, patients with multimorbidity could be obtaining care from providers with poorer communication skills, which we were unable to measure

in our study. We did not directly observe patient-provider communication, because we were interested in measuring the relationship between number of conditions and patients' ratings of patient-provider communication, which are currently used in public reporting systems and pay-for-performance programs. A third-party observer's assessment of the quality of patient-provider communication is a different research question warranting a separate study and different methods. Finally, the small interquartile range in our outcome variable likely affected our results. However, our data are typical of patient experience and satisfaction data, which tend to be skewed toward more favorable assessments of providers.^{41,42} Because it is unlikely that publicly reported performance data or data used for pay-for-performance programs would have normally distributed patient experience ratings data, the relationship between multimorbidity and patient experience ratings that we observed in our analysis would likely be observed in any quality improvement program that relies on patient experience ratings.

In discussions about quality assessment, public-reporting and pay-for-performance programs, some have expressed concern that performance measurement that fails to account for clinical complexity may create performance measure penalties for providers who care for more clinically complex patients. We studied the aspect of clinical complexity most commonly used, multimorbidity, and found that the difference in communication ratings among patients with fewer versus more chronic conditions is numerically small. Whether this small decrement may still have negative consequences in daily practice is unknown. What evidence is available is quite indirect. In New York State, some providers reported less willingness to treat more severely ill patients because of the Cardiac Surgery Reporting System,⁴³ despite data that the risk adjustment model accurately predicted mortality among high-risk patients and that concerns that treating more severe patients would result in worse publicly reported outcomes could not be substantiated.⁴⁴ By analogy, providers might avoid multimorbid patients if there were a perception that these patients rate their providers lower. Future studies may consider measuring other variables that affect communication such as linguistic skills, nonverbal cues, and organizational characteristics such as visit length and physical setting.^{39,45} The effects of other elements of clinical and nonclinical complexity, such as the presence of a newly diagnosed condition (e.g., cancer), severity of conditions, and homelessness, should also be investigated.^{25,46}

Acknowledgment: We are indebted to the Robert Wood Johnson Foundation for their support; to Paul Ginsburg at the Center for Studying Health System Change for his support of this collaboration; to Richard Strauss at Mathematica Policy Research for developing systems for passing the initial sample from the Community Tracking Study household survey to RAND for this study; to RAND's Survey Research Group (Josephine Levy and Laural Hill) and the telephone interviewers for recruiting participants; to Lisa Hiatt for serving as the project manager; to Allen Fremont for his role in developing the survey instrument and providing comments on an earlier version of the paper; and to Paul Shekelle for providing suggestions on the manuscript. The Robert Wood Johnson Foundation, which funded the study, did not have any role in the design, analysis, or interpretation of our study or in the decision to submit the manuscript for publication. This manuscript was supported by a grant from the Robert Wood Johnson Foundation. The views expressed in this article are those of the authors and do not necessarily represent the views of the Zynx Health, the RAND Corporation, or the Department of Veterans Affairs. Findings were presented at the 2007 AcademyHealth Annual Research Meeting (June 3-5, 2007, Orlando, Florida).

Conflict of Interests: Constance Fung is an employee of Zyrnx Health, Incorporated.

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