# A RAND NOTE

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With Chronic Conditions:  Results From the
Medical Outcomes Study

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# Functional Status and Well-being of Patients With Chronic Conditions

## Results From the Medical Outcomes Study

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Enhancing daily functioning and well-being is an increasingly advocated goal in the treatment of patients with chronic conditions. We evaluated the functioning and well-being of 9385 adults at the time of office visits to 362 physicians in three US cities, using brief surveys completed by both patients and physicians. For eight of nine common chronic medical conditions, patients with the condition showed markedly worse physical, role, and social functioning; mental health; health perceptions; and/or bodily pain compared with patients with no chronic conditions. Each condition had a unique profile among the various health components. Hypertension had the least overall impact; heart disease and patient-reported gastrointestinal disorders had the greatest impact. Patients with multiple conditions showed greater decrements in functioning and well-being than those with only one condition. Substantial variations in functioning and well-being within each chronic condition group remain to be explained.

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PATIENTS with chronic conditions account for the majority of US health care expenditures.[1-3] The primary goal of health care for such patients is to maximize function in everyday life and to achieve the highest level of well-being.[4-11] Accomplishing this goal may reduce health care costs.[12-14] For these reasons, and because functional status and

well-being are highly valued by patients, they are essential outcomes of medical care, in addition to disease-specific measures. Although physicians are intuitively aware of the impact of different chronic conditions on functioning and well-being, they need precise measures of these outcomes that are also practical for use in the office setting. Without them, physicians cannot keep track of the effects of various chronic conditions on functioning and well-being, nor can they routinely monitor the effects of their care on these outcomes.

While numerous studies have ad-

dressed the impact of chronic disease and its treatment on such health outcomes,[15-29] we still know very little about the relative impact of different chronic conditions on patients' functioning and well-being. Most studies focus on only one chronic condition. When more than one condition has been studied, only one or two components of health have been evaluated. Most samples are small or nonrepresentative. Comparison groups have usually not been available; thus, we do not know how much functioning and well-being are affected relative to those with no chronic conditions. Finally, we are unaware of any studies that have attempted to estimate the effects of each condition while controlling for the effects of other comorbid conditions.

Measures of functioning and well-being have been shown to predict health care expenditures and death.[12,13,30] However, before they will be useful in studies of quality of care or to monitor patient care in clinical practice, their clinical utility must be demonstrated. There are six ways in which clinical utility can be evaluated, the first four of which are examined in this article: (1) the set of measures should be comprehensive in terms of the outcomes that are important to patients; (2) measures must be short and easy to administer; (3) patients with chronic conditions should score lower on the measures than patients with no chronic condition; (4) scores on each health component should correspond to specific features of each

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disease (eg, those with arthritis should have more pain than those with hypertension); (5) within each condition, scores should vary for patients whose conditions differ in severity at a point in and over time; and (6) measures should be sensitive to the beneficial or harmful effects of treatments over time.

We present results from the first large-scale attempt to describe the profiles of the functioning and well-being of patients with a variety of chronic conditions. We compare their profiles with those for patients without any chronic medical conditions and with those of a general population. Our goals were to explore the impact of chronic conditions on functioning and well-being and to test the usefulness of a standardized health survey in light of the first four of the criteria listed previously. Although the effects of treatment and the duration and the severity of the condition will certainly have an effect on functioning and well-being, in addition to the effect of the presence of the condition, analysis of these effects requires a disease-specific analytic approach and is thus beyond the scope of this article. We also comment on the extent of comorbidity among the nine conditions and the extent of unexplained variation in functioning and well-being among patients with the same chronic condition.

## METHODS
### Sample and Data Collection

The Medical Outcomes Study (MOS) is a study of variations in physicians' practice styles and patients' outcomes in competing systems of care. The MOS has a cross-sectional and a 2-year longitudinal component. For details of site, physician, and patient sampling, the reader is referred to the accompanying overview.[31] This article pertains to a part of the cross-sectional portion of the MOS.

Patients were sampled for the cross-sectional phase of the study between February and October 1986. To be eligible, patients had to be English speaking, 18 years of age and older, and visiting one of the MOS physicians during a 9-day (on average) screening period. Of all the MOS patients who were eligible, 74% of those treated in group practices and 65% of those treated in solo and small group practices (n = 22 462) completed questionnaires. Patients of medical providers (those included in this article) had slightly higher response rates than the total sample, which included patients of mental health care providers. Eligible patients who did not participate tended to be slightly older, slightly less advantaged in terms of education

and income, and more likely to be nonwhite.[32]

To reduce the respondents' burden, patients were randomly assigned one of two versions of a screening form, and only one included the health measures described in this article. The 9385 patients represented are thus a 50% random sample of the eligible patients of the 362 medical providers who completed the questionnaires. Physicians provided encounter forms for 96% of the patients who completed questionnaires. The majority of patients analyzed were female (61%), married (55%), white (78%), and reported high school graduation (86%). Ages ranged from 18 to 103 years and averaged 46 years. The median household income was $24 022 in 1985 dollars.

### Chronic Condition and Comparison Groups

Patients with hypertension, diabetes (type I or type II), a myocardial infarction that occurred in the prior 12 months, and congestive heart failure were identified solely by the physician on the encounter forms. The following five additional conditions were identified only from patients' reports: arthritis, chronic lung problems (asthma or other severe lung problems such as chronic bronchitis or emphysema), back problems, chronic gastrointestinal disorders (duodenal, stomach, or peptic ulcer, chronic inflamed bowel, enteritis, or colitis), and angina. Patients with angina who had a myocardial infarction or congestive heart failure were grouped only with the latter conditions. Thus, the angina group includes patients with angina but no other cardiac conditions.

For the four physician-reported conditions, we relied on physicians' interpretations of the diagnoses rather than specifying our own criteria. However, in each case we sought at least one piece of independent information to confirm the validity of the physicians' reports, such as the patients' reports or additional information provided by the physician. For example, physicians stated that hypertension or diabetes was the main diagnosis or problem addressed during the screening visit for more than 98% of the patients classified as hypertensive or diabetic. Among hypertensive patients identified by physicians, 91% reported awareness of their condition, and physician reports indicated that 87% were receiving antihypertensive medication.

Approximately 60% of hypertensive patients had a diastolic blood pressure, as reported by the physician, of less

than 90 mm Hg; 37% had a diastolic blood pressure between 90 and 104 mm Hg; and only 3% had a diastolic blood pressure greater than 104 mm Hg. Ninety-two percent of those with diabetes were type II diabetics. Forty-four percent of the diabetics had one or more physician-reported complication(s) (ie, eye, foot, kidney, or heart disease related to the diabetes). Approximately 61% of patients who had a myocardial infarction had physician-reported complications (ie, angina, congestive heart failure, or premature ventricular contractions). Forty-three percent of those who had a myocardial infarction had the infarction within the prior 6 months.

We defined a comparison group of patients without any chronic medical conditions. This group excluded those with any of the nine physician- and patient-reported conditions as well as any other common chronic medical conditions (eg, kidney disease, neurological deficits, recently diagnosed cancer), other serious health problems (eg, major surgery in the last 6 months), and amputation of an arm or leg. The most common reasons for visits by patients in this comparison group included acute medical problems (eg, allergy, upper respiratory or urinary tract infection, and musculoskeletal pain), 30%; general examination, 19%; and depression or family problems, 4%. The remainder reported other reasons (other than the prespecified list of major chronic and acute conditions). Even the acute problems, which tend to be self-limiting, should not affect functioning and well-being to the same extent as for patients with chronic conditions.

We also compared our estimates of functioning and well-being of the MOS patients with estimates for a general population, based on a separate study of 2008 adults sampled to represent the US general population.[33-35] The health survey was administered by telephone to this household sample between August and October 1984. Because the MOS patient sample was slightly older and more educated, had higher income, and had a higher percentage of women, scores were adjusted to reflect these differences.

Thus, we have two comparison groups to facilitate understanding the effects of chronic conditions. Neither of these groups is a perfect control group. The patient group had some acute conditions, and the general population was not limited to the three cities in which the MOS sample was taken. However, they each reflect an interesting and useful comparison. Although there are

some significant differences between the three MOS sites, these differences are partly explained by demographics and are overshadowed by the effects of the chronic conditions reported herein.

## Health Measures

The MOS Short-Form General Health Survey was used to measure functioning and well-being (Table 1).[33,34] Physical, social, and role functioning scales captured behavioral dysfunction caused by health problems. Measures of mental health in terms of emotional status, perceptions of overall health, and pain intensity reflect more subjective components of health and general well-being. These six health concepts were selected to be comprehensive in terms of those aspects of health considered most important to patients.[36] Our experience with these measures suggests that they are easy to understand and take only approximately 3 minutes, on average, to self-administer. Thus, the measures fulfill the first two of the criteria outlined previously.

All health measures were scored on scales of 0 to 100, with higher scores indicating better health. Descriptive statistics and reliability estimates for these measures are shown in Table 1 for the patient sample. Internal-consistency reliability coefficients ranged from .81 to .88; reliabilities were as good in subgroups of patients with different chronic conditions[33] and in a general population.[34] Considerable support for the validity of these scales and scales that include them has been reported.[33,34,37-41]

## Methods of Analysis

Ordinary least squares regression methods[42] were used to estimate the unique impact of each chronic condition and the combined effects of having two or more conditions on functioning and well-being. The regression method also allowed us to statistically control for other patient characteristics. One regression model was estimated for each health measure, with the nine chronic conditions defined by dummy variables. Each model controlled for differences that were due to sociodemographic characteristics (sex, age, income, and education) and the comorbid medical conditions noted previously. All estimated scores presented herein represent results for a person with average patient characteristics.

The impact of each chronic condition on each health measure was estimated as a deviation score from the mean score of patients without any chronic conditions. These deviation scores were tested for significance using Student's $t$ tests. Because of the large number of

Table 1.—Summary Statistics and Reliability Estimates for Health Measures in Patient Sample

| Measures | No. of Items | Definition | Score* | | Reliability† |
| | | | Mean | SD | |
|---|---|---|---|---|---|
| **Functioning** | | | | | |
| Physical | 6 | Capacity to perform a variety of physical activities (eg, sports, carrying groceries, climbing stairs, and walking) | 78.0 | 31.1 | 0.86 |
| Role | 2 | Extent to which health interferes with usual daily activity such as work, housework, or school | 77.8 | 38.2 | 0.81 |
| Social‡ | 1 | Extent to which health interferes with normal social activities such as visiting with friends or group activities during past month | 87.9 | 23.0 | 0.67§ |
| **Well-being** | | | | | |
| Mental health | 5 | General mood or affect, including depression, anxiety, and positive well-being during the past month | 75.2 | 18.7 | 0.88 |
| Health perceptions | 5 | Overall ratings of current health in general | 63.1 | 26.9 | 0.87 |
| Bodily pain‡ | 1 | Extent of bodily pain during the past month | 68.2 | 27.9 | 0.76§ |

*Scores range from 0 to 100, with higher scores indicating better health (n = 9385).
†Internal-consistency reliability unless otherwise indicated.
‡Not included in the general population survey.
§Estimate based on the correlation between alternate forms.

tests performed, a difference was considered statistically significant only if associated with a chance probability of .001 or less (two-tailed test).[43,44]

To determine whether the impact of comorbidity among the nine conditions was additive or interactive (eg, whether having two or three conditions was much worse than or not as bad as the sum of the effects of each condition), we tested for the combined effects of the nine chronic conditions. Interaction terms for all pairs of conditions reported for 50 or more patients were tested. Of a total of 113 interaction terms across all measures, only 3 were statistically significant, less than would be expected by chance. Further, the addition of all of the interaction terms did not significantly increase the amount of variance explained by the models. To further test for interactive effects of the three conditions, we included interaction terms that defined combinations of conditions most likely to affect each other in complicated ways. These include (1) congestive heart failure, myocardial infarction, and diabetes; (2) congestive heart failure, myocardial infarction, and arthritis; (3) congestive heart failure, myocardial infarction, and lung problems; and (4) arthritis, diabetes, and lung problems. Although the power was low in these tests because of the small numbers of patients in these groups, none of them were statistically significant.

For the purposes of presenting these results graphically, we standardized the mean health score for each chronic condition group and for the group with no chronic conditions. The difference

between each chronic condition group and patients with no chronic conditions (deviation score) was divided by the SD for the total sample for each health measure. This allowed us to compare the relative ordering of the average patient with each condition across each health measure. We illustrate these results graphically for four conditions (hypertension, myocardial infarction, gastrointestinal problems, and arthritis). Other graphs constructed from the tables presented herein are available from the authors.

## RESULTS
### Frequency of Chronic Conditions

Of the 9385 patients analyzed herein, 54% had at least one of the nine conditions. The percentage of patients with each chronic condition is shown in Table 2. As expected, we found a higher prevalence of these conditions than would be observed in a general population.[45,46]

Comorbidities among the nine conditions were common; 29% of the total sample had two or more conditions. Table 3 shows the percentage of those with each chronic condition who have that condition only and who have it along with one of the remaining eight conditions. The percentage of those with at least one other condition ranged from 63% for hypertension to 88% for angina.

Those patients with conditions other than hypertension were very likely to have hypertension as well: the percentage of those having hypertension given one of the other conditions ranged from 25% (back problems) to 57% (diabetes). Arthritis was reported as a comorbid

condition by 29% to 47% of those with one of the other conditions.

## Profiles of Health for Each Chronic Condition

Functional status and well-being scores are presented in Table 4. The first two rows in these tables indicate the adjusted average health score for our two comparison groups—the general-population sample and the patients without chronic conditions. (When we adjusted the mean scores for the general-population sample to reflect sociodemographic characteristics of the patient sample, differencesthout chronic conditions ($P<.01$) for physical functioning, role functioning, and health perceptions. No differences were found for mental health.

The remaining rows in Table 4 indicate the average *deviation* score of each health measure for the particular chronic condition, *relative to the patients with no chronic conditions*. For those with hypertension, only the decrement in

health perceptions was statistically significant. For diabetes, myocardial infarction, and congestive heart failure, effects were observed on each component of functioning (physical, role, and social) and on health perceptions. Effects on *all* health measures were observed for four of the five patient-reported conditions—arthritis, lung problems, gastrointestinal disorders, and angina—indicating that patients with these conditions report a wide range of effects. Back problems were associated with detrimental effects on physical and role functioning, health perceptions, and pain, although social functioning and mental health were not affected. Because of the additive nature of the effects of each condition, cumulative effects were very large.

Differences in the effects of the chronic conditions on functioning and well-being are apparent from examining the columns in Table 4. These relative effects provide information regarding which conditions tend to be associated with the poorest (and best) health across conditions. Among the chronic condition groups, health perceptions were poorest for patients with congestive heart failure and gastrointestinal disorders and best for patients with hypertension or back problems. Physical functioning was best for hypertensive patients and poorest for those who had a myocardial infarction or congestive heart failure. Role functioning varied greatly across chronic conditions. The worst role functioning was observed for patients who had congestive heart failure or a myocardial infarction. Social functioning was the worst for patients who had either a myocardial infarction or congestive heart failure and best for patients with hypertension. The condi-

tions also varied considerably in their impact on pain, which was the greatest in patients with arthritis and least in patients with hypertension.

To illustrate the differences in the patterns of the results shown in Table 4, the standardized health profiles for four conditions (hypertension, myocardial infarction, gastrointestinal problems, and arthritis) are shown graphically in the Figure, in contrast to each other and in relation to the group with no chronic conditions. We selected these four conditions as illustrative of the different patterns. The mean on each health measure for patients with no chronic conditions was set at 0. The chronic conditions are plotted in terms of their difference in standard scores from the group with no chronic conditions, controlling for the effects of other chronic conditions and sociodemographics. Each of these four conditions has a quite distinctive profile.

## Variability in Health Within Chronic Condition

We also observed substantial variability in health among patients within each chronic condition group. For each condition group, the full range of scores was observed on each health measure and the SDs of the health scores were quite large. The amount of variance in health explained by our models (squared multiple correlation coefficient [$R^2$]) was .24 for physical functioning, .20 for role functioning, .14 for social functioning, .12 for mental health, .29 for health perceptions, and .14 for pain.

## COMMENT

We draw the following conclusions: (1) The impact of chronic conditions on

Table 2.—Frequency of Occurrence of Chronic Conditions

| Chronic Condition | No. (%) of Patients* (n = 9385) |
|---|---|
| Physician reported | |
| Hypertension | 2706 (29.8) |
| Diabetes | 844 (9.4) |
| Congestive heart failure | 297 (3.2) |
| Myocardial infarction | 147 (1.6) |
| Patient reported | |
| Arthritis | 2079 (22.2) |
| Chronic lung problems | 731 (7.8) |
| Gastrointestinal disorders | 696 (7.4) |
| Back problems | 486 (5.2) |
| Angina | 413 (4.4) |

*For each condition, the percentage is of those with a nonmissing score on that chronic-condition variable (percent missing ranged from 0% to 5%).

Table 3.—Percentage of Patients With Each Condition Who Have Another Chronic Condition

| Chronic Condition | No. of Patients | No. (%) With Comorbid Condition* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Hypertension | Diabetes | Myocardial Infarction | Congestive Heart Failure | Arthritis | Chronic Lung Problems | Back Problems | Gastrointestinal Disorders | Angina† |
| Physician reported | | | | | | | | | | |
| Hypertension | 2706 | 1009 (37.3)‡ | 475 (18.1) | 59 (2.2) | 159 (5.9) | 976 (36.1) | 200 (7.4) | 119 (4.4) | 205 (7.6) | 216 (8.0) |
| Diabetes | 844 | 475 (56.9) | 170 (20.1)‡ | 38 (4.7) | 87 (10.3) | 306 (36.3) | 74 (8.8) | 31 (3.7) | 78 (9.2) | 80 (9.5) |
| Myocardial infarction | 147 | 59 (40.7) | 38 (26.4) | 35 (23.8)‡ | 33 (22.4) | 44 (29.9) | 9 (6.1) | 8 (5.4) | 17 (11.6) | ... ... |
| Congestive heart failure | 297 | 159 (54.4) | 87 (30.2) | 33 (11.5) | 42 (14.1)‡ | 128 (43.1) | 46 (15.5) | 20 (6.7) | 27 (9.1) | ... ... |
| Patient reported§ | | | | | | | | | | |
| Arthritis | 2079 | 976 (48.1) | 306 (15.3) | 44 (2.2) | 128 (6.2) | 467 (22.5)‡ | 261 (12.6) | 180 (8.7) | 314 (15.1) | 195 (9.4) |
| Chronic lung problems | 731 | 200 (27.9) | 74 (10.6) | 9 (1.3) | 46 (6.3) | 261 (35.7) | 245 (33.5)‡ | 53 (7.2) | 116 (15.9) | 55 (7.5) |
| Back problems | 486 | 119 (25.0) | 31 (6.6) | 8 (1.7) | 20 (4.1) | 180 (37.0) | 53 (10.9) | 165 (34.0)‡ | 70 (14.4) | 27 (5.6) |
| Gastrointestinal disorders | 696 | 205 (30.2) | 78 (11.6) | 17 (2.5) | 27 (3.9) | 314 (45.1) | 116 (16.7) | 70 (10.1) | 165 (23.7)‡ | 77 (11.1) |
| Angina† | 532 | 216 (52.7) | 80 (19.6) | ... ... | ... ... | 195 (47.2) | 55 (13.3) | 27 (6.5) | 77 (18.6) | 63 (11.8)‡ |

*For each pair of conditions, percentages are based on cases with no missing data on those two variables. Percentages do not add to 100 because some patients have more than two conditions.
†By definition, patients with myocardial infarction or congestive heart failure were excluded from the angina group.
‡Patients with that condition only.
§Physicians did not provide information on these conditions.

Table 4.—Average Health Scores for Comparison Groups and Deviation Scores for Patients With Chronic Conditions*

| | Average Deviation (SE) of Group From Patients Without Chronic Conditions | | | | | |
| | Functioning | | | Mental Health | Health Perceptions | Bodily Pain |
| Group | Physical | Role | Social | | | |
|---|---|---|---|---|---|---|
| Average score of general population (n = 2008) | 90.8† | 91.6† | Not measured | 78.0 | 74.6† | Not measured |
| Average score of patients with no chronic conditions (n = 2595) | 86.0 | 87.2 | 92.3 | 77.6 | 72.6 | 74.2 |
| Hypertension (n = 2706) | 0.0 (0.9) | 1.2 (1.1) | 1.1 (0.7) | −1.1 (0.5) | −3.5‡ (0.7) | 3.1‡ (0.8) |
| Diabetes (n = 844) | −7.6‡ (1.3) | −9.4‡ (1.6) | −5.3‡ (0.9) | 0.1 (0.8) | −12.8‡ (1.0) | −0.6 (1.1) |
| Congestive heart failure (n = 297) | −22.5‡ (2.2) | −28.2‡ (2.7) | −11.4‡ (1.6) | −4.3‡ (1.3) | −13.4‡ (1.7) | −1.1 (2.0) |
| Myocardial infarction (n = 147) | −26.2‡ (2.9) | −33.0‡ (3.5) | −11.6‡ (2.1) | −2.8 (1.7) | −9.9‡ (2.2) | −2.5 (2.5) |
| Arthritis (n = 2079) | −9.3‡ (0.9) | −10.3‡ (1.1) | −3.9‡ (0.7) | −3.0‡ (0.6) | −7.3‡ (0.7) | −16.6‡ (0.8) |
| Chronic lung problems (n = 731) | −13.4‡ (1.2) | −12.9‡ (1.5) | −7.1‡ (0.9) | −4.4‡ (0.8) | −13.0‡ (1.0) | −4.2‡ (1.1) |
| Gastrointestinal disorders (n = 696) | −6.7‡ (1.3) | −14.2‡ (1.6) | −7.8‡ (1.0) | −7.3‡ (0.8) | −13.8‡ (1.0) | −12.1‡ (1.2) |
| Back problems (n = 486) | −9.5‡ (1.5) | −8.2‡ (1.8) | −2.1 (1.1) | −1.0 (0.9) | −4.3‡ (1.2) | −10.4‡ (1.4) |
| Angina (n = 532) | −15.7‡ (1.7) | −15.6‡ (2.1) | −5.4‡ (1.3) | −3.4‡ (1.0) | −13.2‡ (1.4) | −7.3‡ (1.6) |

*Scored on a scale of 0 to 100. High score indicates better health. Average scores for patients without chronic conditions reflect average characteristics of the patient sample and are statistically controlled for age, sex, education, and income. For the patient sample, models are also controlled statistically for other chronic conditions and serious medical problems (see text).

†General population scored significantly higher than patients without chronic conditions (P<.01).

‡Coefficients were significantly different (P≤.001) in predicted health, relative to patients without any chronic conditions. To determine the predicted health score for a patient with a particular condition, subtract (or add) the deviation score from the predicted score for patients without chronic conditions. For example, the predicted physical functioning score for patients with diabetes is 86.0 − 7.6 = 78.4.

health is substantial, varies according to condition, and, for most conditions, involves all aspects of functioning and well-being. (2) Within each condition group there is substantial variation in functioning and well-being that warrants further study. (3) Comorbidity among the conditions studied is common in clinical practice and should be routinely taken into consideration in studies of individual chronic conditions. (4) A comprehensive health assessment such as the short-form survey used herein may constitute an appropriate outcome standard for patients with chronic conditions.

## The Impact of Chronic Conditions

We observed significant negative effects on most measures of functioning and well-being for all conditions except hypertension. Our results concerning health perceptions are consistent with previous studies that have reported that persons labeled as hypertensive have poorer health perceptions than normotensive persons.[6,47] We can eliminate comorbidity as a likely explanation because we were able to control for it.

These findings contribute to our understanding of the meaning of differences in the health status scores. For example, we now know that a 9-point difference in physical functioning is equivalent to the effect of having arthritis or back problems, a clinically meaningful difference. The arthritis finding is about as high as the effect of having chronic, mild osteoarthritis in a general-population study.[6] A 13-point difference in health perceptions is equivalent to the effect of having diabetes or congestive heart failure. Our finding that having hypertension is associated with a 3.5-point decrement in health perceptions is similar to the 5-point decrement found in a general population.[6] The similarity of our findings to previous ones in the few cases where prior experience has been published suggests that our results may generalize across populations.

An exception is our finding of significant differences in mental health between patients without chronic conditions and those with any of five chronic conditions. This finding is especially noteworthy given that patients with depressive symptoms were left in the comparison group. These results differ from previous studies[16,25] that reported no such effects. The inconsistencies could be due to differences in the representativeness of the samples, in identifying cases, or the lack of control for comorbidity, age, and other sociodemographic characteristics in previous studies. Our findings suggest that clinical as well as further research attention should be paid to the level of mental health of outpatients with chronic medical conditions.

Of the six health measures, mental health was the least affected by the conditions, relative to the patient comparison group. Nevertheless, the magnitude of effects on mental health were clinically meaningful. The smallest significant effect was 3 scale points—an effect equivalent to the impact of being fired or laid off from a job.[6]

Perhaps the most important message is that no matter which chronic condition a person has, it tends to be associated with adverse effects on most aspects of functioning and well-being. Thus, regardless of which chronic condition a patient suffers from, special attention needs to be focused on these effects in providing care.

## Unexplained Variance

The finding that the majority of variance in functioning and well-being is *not* explained by the presence of these chronic conditions suggests that we need to pursue additional predictors of these outcomes such as the severity of the conditions, treatments, duration of the condition, style of medical care (eg, reassurance or information), and other patient characteristics (eg, exercise habits, weight, or will to function). Disease severity, which is the most obvious predictor not accounted for in our models, is currently being evaluated. However, it is likely that even controlling for disease severity, there will still be substantial unexplained variance.

One possible interpretation of the unexplained variance is that medical care could have an impact on the functioning and well-being of patients even when cure of these conditions is not possible. This can be done indirectly, by selecting treatment options that minimize complications (and hence severity) as well as side effects. Croog et al[18] found that three antihypertensive medications that achieved similar blood pres-

6
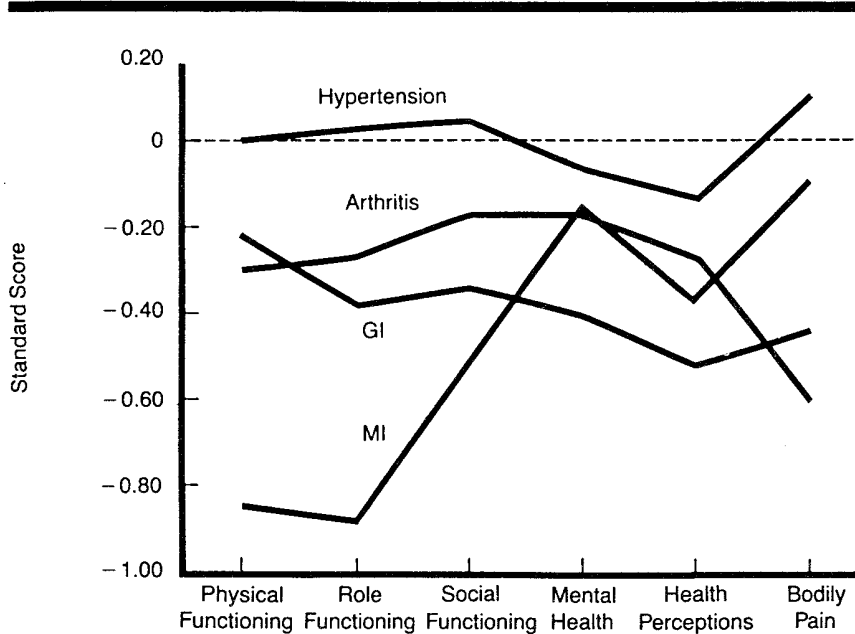


Health profiles for patients with four conditions. Dotted line indicates patients with no chronic conditions; GI, gastrointestinal disorder; and MI, myocardial infarction.

sure control differed notably in their effects on functioning and well-being. Perhaps all clinical trials should include measures of functioning and well-being to begin to shed light on these non-disease-specific treatment effects.[36,48-50] More direct approaches to improve functioning and well-being may also be possible,[51,52] although little is actually known about optimal strategies that physicians might take to accomplish this goal. Interventions that directly target functional limitations may be beneficial.[51,53,54] The challenge is to identify the more effective interventions.

## Patient Case Mix and Comorbidity

Comorbidity among the nine conditions studied herein occurred frequently, as others have found.[45] The high prevalence of comorbid conditions argues against the common practice of ex-

cluding patients with more than one chronic condition in clinical research because of severe limits on generalizability, particularly as it relates to the types of patients seen in the offices of mainstream health care providers. The additive effects of comorbid conditions on functional status and well-being underscore the importance of considering both the primary diagnosis and comorbidity in controlling for differences in patient case mix in studies of quality of care. Failure to do so is likely to lead to distorted results.[55,56]

## Usefulness of These Measures

Our findings emphasize the potential usefulness of generic (non-disease-specific) health measures for the purpose of monitoring progress and for use as outcomes in studies of patients with chronic conditions. General measures of func-

tional status and well-being have several advantages over disease-specific measures. They reflect what is most important to patients. They are useful for monitoring patients with more than one condition. They can be used to compare patients who have different conditions by providing a common yardstick, as in the current study. Finally, the same measures can be appropriately applied to both general and patient populations with the advantage of comparing patient groups against the "healthy" standard of a general population.

The measures tested here satisfied all of the criteria that were evaluated. Consistent with previous research,[37] they proved to be easy to use in a clinical practice setting. It is now also clear that they discriminate between the chronically ill patients and patients with no chronic conditions as well as a general population. The profiles of functional status and well-being at a point in time correspond well with known features of the chronic conditions studied. From all of these findings, we conclude that it is time to test such measures to see if they satisfy other essential criteria for evaluating their clinical utility, namely, whether they can detect differences in health caused by variations in disease severity as well as their sensitivity to changes in health over time that are due to any benefit or harm of treatment. We recommend taking these important next steps.

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