

Online Supplementary Material

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**Supplemental Appendix. Patient-Centered Communication and Diagnostic Testing: Detailed Methods**

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This online supplement provides additional details about the Measure of Patient-Centered Communication (MPCC), the calculation of health care costs, and the analyses.

**Measures of Patient-Centered Communication**

How to measure patient-centered communication is the subject of controversy and is reviewed in a recent article by our group.<sup>1</sup> Rather than using post-hoc patient-centeredness indices derived from measures of patient-physician communication developed independently of a patient-centered model,<sup>2-6</sup> we chose to analyze the audio recordings using the Measure of Patient-Centered Communication (MPCC),<sup>7</sup> which has been validated, is based on a model of patient-centered communication, includes the 3 major communication elements of patient-centered communication, measures physician responsiveness to patient concerns, and has been positively correlated with patient trust<sup>8</sup> and patient perceptions of patient-centeredness.<sup>9</sup> Current and earlier versions of the scale show interrater reliabilities (intraclass correlations) of 0.80-0.83.

For component 1 (Exploring Both the Disease and the Illness Experience), the coder notes patient statements about symptoms, ideas, expectations, feelings, and the effect of the symptoms on functioning. Scoring the physician's response to each concern raised by the patient is based on whether the response is coded as a "cutoff," "preliminary exploration," "further exploration," or "validation" of that concern. Component 2 (Understanding the Whole Person) uses a similar method to measure the degree to which the physician explores the patient's family, social network, job, and interests. Component 3 (Finding Common Ground) measures the degree to which the physician explains and involves the patient in discussions about the nature of the problem and the management plan. The total MPCC score represents the mean of the 3 component scores. Scoring ranges from 0 (not patient centered) to 1 (very patient centered). Two coders with a background in social work and experience as standardized patients were trained to score the audio recordings using the MPCC; each coded one half of the recordings. The coders and the coding supervisor (CGS) were trained in a 20-hour course offered by the developers of the scale. The first 10% and then an additional 10% at random were dual-coded for reliability. There were weekly coding meetings during which all visits were discussed and coding dilemmas were clarified; the developers of the coding system were available for ongoing consultation. Our reliability data as well as means and standard deviations of the scores were identical to those reported by the developers.

**Standardized Utilization Data**

To assess standardized utilization, we derived standardized expenditures in discrete categories from the managed care organization (MCO) 1996-1999 claims data. Details about the claims data used in these analyses and the primary care physicians in the MCO have been published elsewhere.<sup>10</sup> All the patients in the claims data set were privately insured and were 21 to 64 years of age. We examined standardized expenditures generated per patient. This approach was taken to express utilization of different health care resources in terms of a common metric, standardized expenditures. These analyses focus on standardized expenditures in 3 areas: diagnostic testing (excluding testing for preventive purposes), inpatient care, and total expenditures. Diagnostic testing expenditures were selected because diagnostic testing has been shown in previous research to be related to patient-centered communication.<sup>9,11</sup> Standardized inpatient expenditures were selected as a control, because reimbursement is largely based on diagnostic related groups (DRGs). Thus, inpatient expenditures were considered unlikely to be significantly affected by physician patient-centered communication style but likely to be significantly affected by patient case-mix (a

potential confounder). Total standardized expenditures were examined to assess the net relationship between patient-centeredness and diagnostic testing.

### Standardized Expenditures

Total standardized expenditures per patient per year were calculated from the "allowed amount" variable in the claims files. The allowed amount is the sum of the amount paid, the copayment, deductible, and amount withheld for the risk pool. The allowed amounts varied across physician groups (primarily the specialty categories: internists, family physicians, and other specialists), so we standardized prices for specific services using the claims data. We also standardized prices to 1996 dollars. For inpatient claims, the standardized price was the average of allowed amounts by DRG. For all other claims, the standardized price was the average amount allowed by *Current Procedural Terminology* (CPT) code, with separate facility and nonfacility categories. Total standardized expenditures for each patient were defined as the sum of the standardized prices for all services listed on the patient's claims for the calendar year. Pharmacy expenditures were excluded, because this information was incompletely captured in the database.

### Case-Mix

Case-mix adjustment used the ambulatory care groups (ACG) system.<sup>12</sup> We used the ambulatory diagnostic groups (ADGs) of the ACG system because ADGs explain more of the variation in resource use than the ACG indicators.<sup>13</sup> The ADGs consist of more than 30 diagnostic clusters spanning acute, self-limited conditions, to chronic, progressive disorders. Based on the diagnoses in the claims data accumulated by the patient each year, a dummy indicator was derived for each ADG.

### Analyses

Data were analyzed at the individual patient level using Stata (Version 8.2, StataCorp, College Station, Tex); all analyses adjusted for the nesting of patient observations within PCP. Robust standard errors were used.<sup>14</sup> The analysis of expenditure data is a complex and unresolved issue, largely because of the nonnormal distribution of expenditures. A significant number of persons are clumped at zero, and those with expenditures produce a right-skewed distribution. Because our focus was on the potential effect of a physician style on the amount of health care resource utilization, we considered that nonusers were less important, because the initial decision to use outpatient health care services is typically made by the patient. Thus, our analyses focused on users, and we used the logarithm of expenditures to normalize the distribution. We used ordinary least squares regression to examine factors affecting the standardized expenditures generated. All analyses were adjusted for patient age (mean age - age)<sup>2</sup>, sex, Zip code-based socioeconomic status (using the Zip code of the patient's address),<sup>10</sup> year (1996 to 1999), year of enrollment (1 to 4), total years of enrollment (1 to 4), case-mix (a dummy variable for each ADG), and physician specialty (family practice or internal medicine, to adjust for specialty style differences and overrecruitment of family physicians). Analyses were weighted to adjust for the oversampling of family physicians. The key independent variable of interest, the physician's MPCC score, was expressed in terciles. Each patient appears in the analysis only once. Thus, only 1 year of the possible 4 years each patient was enrolled was randomly selected for inclusion in the analysis. In additional analyses other covariates were included to explore possible mechanistic pathways, including the mean duration of the standardized patient visits, and the effect of prompted suspicion that the patient was an standardized patient.

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