

Measuring Attributes of Primary Care: Development of a New Instrument

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BACKGROUND. The purpose of this study was to evaluate the measurement properties of an instrument developed to measure seven key aspects of the delivery of primary care from the perspective of patients visiting their family physician, and to report the association of these aspects with patient satisfaction.

METHODS. A cross-sectional study design was used to examine the responses of 2899 patients visiting 138 family physicians' offices in Northeast Ohio. A 20-item research tool, the Components of Primary Care Index (CPCI), was created to measure the domains of primary care based on the new Institute of Medicine definition and on additional domains based on the literature. Patient satisfaction was measured with the Medical Outcomes Study 9-item visit rating form. The usual provider continuity (UPC) index was calculated as the proportion of visits to the index physician with relation to all physician visits for the past year by patient report. The CPCI was subjected to item and factor analysis. Scale scores were computed, and the association with patient satisfaction with the visit was tested by correlation.

RESULTS. The factor analysis resulted in four stable and internally consistent factors. The factors were named: interpersonal communication, physician's accumulated knowledge of the patient, coordination of care, and patients' preference to see their regular physician. Each of the CPCI scale scores was significantly associated with patient satisfaction with the visit. The UPC index, length of time as a patient, and intensity of visits were not as strongly associated with the patient satisfaction measure.

CONCLUSIONS. The CPCI provides a brief and reliable measure of four important aspects of the delivery of primary care. The components of primary care are associated with patient satisfaction with visits to family physicians. The CPCI could be used with other outcomes and to assess the effect of interventions and systems changes on the delivery of critical aspects of primary care.

KEY WORDS. Primary health care; patient satisfaction; measurement; questionnaires; continuity of patient care. (*J Fam Pract* 1997; 45:64-74)

Improved delivery of primary care health services is increasingly seen as critical to efforts to improve health care access and quality while controlling costs. The building evidence for the association of primary care with quality of care^{1,2} and parsimonious resource utilization³ has increased policymakers' expectations that primary care delivery represents one important part of the cure for many health care system ills. The question of which aspects of primary care are associated with important health care outcomes has not, however, been elucidated.^{4,5} Defining and measuring the specific domains of primary care is critical to efforts to evaluate the effective-

tiveness of primary care.

The past three decades reveal a long trail of scholarly work on defining primary care and its components.⁶⁻⁸ The most current Institute of Medicine (IOM) definition^{7,8} defines primary care as "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community."^{9 (p1)} This detailed definition at its core still reflects the original 1978 IOM components: access, continuity, coordination, interpersonal communication, and comprehensive care. The definitions of primary care and its components are broad concepts that require translation into constructs that can be measured and assessed.¹⁰

The ability to evaluate the outcomes of various aspects of primary care is restricted by a lack of

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well-validated, comprehensive measures of the components of primary care. For example, continuity of care has been one of the most investigated of the domains, yet associations with various outcomes across the different definitions of continuity are mixed.¹¹ In addition, specific domains have generally been investigated in isolation from the other aspects of primary care. The interrelatedness and the relative importance of these aspects of primary care have yet to be evaluated and cannot be evaluated until multiple aspects are measured together. The advancement of research regarding the components of primary care has been limited by the lack of standardization of terminology,¹⁰ and a relative paucity of research using comprehensive measures.¹²⁻¹⁴

The purpose of this study was to develop an instrument to measure several components of primary care from the perspective of the patient, and to evaluate its measurement properties. It was hypothesized that this instrument's items would cluster into the theoretical domains of primary care, and that the designated component scales would demonstrate adequate internal consistency and would be moderately associated with each other. Further, it was hypothesized that the scale scores would be associated with patient satisfaction with the visit, and that the association would be greater than a traditional measure of continuity of care or simple indicators of the intensity and duration of patient-physician relationship.

METHODS

INSTRUMENT DEVELOPMENT

The components of primary care that were selected for the instrument are heavily based on the Institute of Medicine (IOM) 1994 definition of primary care and components identified by prominent researchers in the area of primary care. The seven components of primary care selected are: (1) comprehensiveness, (2) physician accumulated knowledge about patient, (3) interpersonal communication, (4) coordination of care and patient rating of the importance of coordination, (5) first-contact care, (6) continuity of care and patient rating of the importance of continuity, and (7) longitudinality. The instrument is oriented toward the patient's perception of the patient-physician interaction. Therefore, the instrument was designed to be completed by individual patients immediately

following a visit with a physician.

The components chosen for measurement for this instrument focus on the *process* aspects of primary care, and not the *structure* or *system* aspects.^{8,15} For example, access to care is a structure or system component of health care delivery and is not included as a component of this instrument. In addition, reliable and valid measures of access have been developed by others.^{12,16}

Components of Primary Care

For purposes of constructing the instrument, the seven components of primary care were defined as follows.

Comprehensiveness of care is defined as the patients' perception that the majority of their care can be addressed by their primary care physician, and that they seek almost all of their medical care from this physician.

Accumulated knowledge is defined as the patient's perception that the physician knows his or her values and preferences about medical care issues, clearly understands his or her health needs, and knows the family medical history. Also the idea that the patient and physician had "been through a lot together" was considered a part of this attribute. This aspect of primary care is based on the work by Hjortdahl.¹⁷

Interpersonal communication is defined as patients' reports of how well the physician listens and explains during their interactions. Aspects of interpersonal communication have been shown to be an important part of the patient-physician relationship,¹⁸ and related to patient satisfaction,¹⁹ compliance,²⁰ and health outcomes.²¹

Coordination of care is defined as the patients' perception of their physician's knowledge of other visits and visits to specialists, as well as the follow-up of problems through subsequent visits or phone calls. The patient's perception of the importance of coordination was also assessed. This component appears to be increasingly important as the health care delivery system becomes more complex.

First-contact care involves the patient seeking care from a primary care source as an entrée into the health care system.⁸ First-contact care was measured from the patient's perspective of his or her usual way of seeking care.

Continuity of care is defined as continuous care by a physician or team over time.⁷ Starfield⁸ makes

the distinction between continuity, ie, sequential or continuous care, and longitudinality, which is simply the duration of the physician-patient relationship. The distinction was also identified by Hjortdahl,¹⁷ who reported differing associations with health outcomes between duration and intensity of the doctor-patient relationship. Patient report of the total number of visits in the past year and the number of visits to the index physician were used to calculate a measure called the usual provider continuity index (UPC), which has been used in the literature as a simple measure of continuity of care.^{22,23} In addition to the UPC measure, patients' beliefs about the importance of and preference for continuity of care were assessed.²⁴

Longitudinality is defined as the length of the relationship with the physician.

Item Development

Multiple items were written for each of the components and were evaluated on several aspects. Any item that was exceptionally lengthy, double-barreled, lacked clarity, had questionable relevance, or had undesirable similarity to other items was either rewritten or dropped.²⁵

Next, the wording of the items was made as simple as possible so that they would be comprehended by the vast majority of patients in the sample. All the items are at or below an 8th grade reading level.²⁶ Approximately one quarter of the items are negatively worded to avoid halo effects.²⁵ Negatively worded items are reversed for proper scoring.

Response Format

The response format for the items is a 5-point Likert-type scale, ranging from 1=strongly disagree to 5=strongly agree, with neutral as the center option. The choice of a 5-point Likert scale was based on consideration of the patient's ability to discriminate between the response levels and the acknowledgment that fewer categories reduce the burden of the task for respondents.²⁵

The way in which the items are phrased, along with the strongly-agree to strongly-disagree response format, requires patients to report rather than rate their interaction with the physician. Ratings involve evaluations (eg, excellent to poor) and are inherently subjective. Reporting, on the other hand, involves indications (eg, what was done, how many times) and is more objective than

ratings.²⁷ Since patients are usually reluctant to rate their physicians poorly, the less judgmental reporting format is more likely to yield variation in responses. In addition, reporting potentially can be confirmed by another means.²⁷ A few of the items of our instrument can be confirmed through a review of the patient's medical record.

Content Validity

A panel of diverse and skilled experts in primary care were asked to evaluate the content validity of the components of primary care. Among them were practicing family physicians and researchers, including two physicians with PhD degrees in research, a health service researcher-biostatistician, a psychometrician-biostatistician, a sociologist, and a nurse administrator. The panel evaluated the relevance of the items to the component they proposed to measure and assessed the items for clarity and conciseness. Revisions were made based on the group discussion and specific comments.

PILOT TESTING

Three different sites were used to pilot test preliminary drafts of the primary care instrument. A total of 43 patients visiting family practice physicians completed the pilot instrument. Several revisions to the wording of the items were made based on comments from the patients. In addition, those items on which the vast majority of patients (ie, $\geq 95\%$) similarly agreed or disagreed were reworded to increase the variation of response to the item. The primary goal of the pilot testing was to focus on the wording of the items, comprehensibility, and item content.

OTHER MEASURES

The usual provider continuity (UPC) index is the proportion of visits to the index physician relative to the total number of visits in the past year. The duration of the patient-physician relationship, or longitudinality, is the patient-reported number of years the patient has been a patient of the index physician. Patients were also asked how long they had been a patient of the practice. The intensity of the patient-physician relationship is the patient-reported number of visits to the index physician in the past year. Patient satisfaction was measured with the 9-item visit rating form from the Medical Outcomes Study.²⁸ An additional satisfaction item asked, "To what

extent were your expectations met today?" with the potential responses: a lot, quite a bit, moderately, slightly, not at all.

DESIGN

The evaluation of the Components of Primary Care Instrument (CPCI) was incorporated as part of a cross-sectional multimethod study of patient visits to 138 family physician members of the Research Association of Practicing Physicians (RAPP) network. This multimethod study involved direct observation of the patient-physician encounter, review of the medical record, patient exit questionnaire, physician questionnaire, collection of billing data, a practice environment checklist, and collection of ethnographic field notes. The main source of data for this report was the patient questionnaire.

SAMPLE AND SITES

The physician sample consisted of the 138-physician RAPP network. RAPP physicians are members of the American Academy of Family Physicians within a 50-mile radius of Cleveland and Youngstown, Ohio, who volunteered to participate in a study of the content of family practice. RAPP members are demographically representative of US physicians, except that they are somewhat more likely to be female and residency trained (Stange KC, Zyzanski SJ, Smith IF, et al. Unpublished data, 1997).

The patient sample consisted of consecutive patients visiting each participating physician during 2 observation days. Those who consented to have their encounter observed and their chart reviewed (89%) were included in the study. The study protocol ensured that all patients seen by the participating physician on the observed days had the opportunity to participate.

DATA COLLECTION

Data collection began in October 1994 and concluded in August 1995. Four teams of two research nurses each spent 2 days at each physician's office in the sample. The research nurses administered patient exit questionnaires to each patient who agreed to participate in the study. The study included children; parents completed the patient questionnaire for children under the age of 14, and were asked to assist children up to the age of 17. The 2 days of data collection at each practice were separated by 4 to 5

months to allow better assessment of the day-to-day variation in the delivery of primary care.

ANALYSES

Descriptive statistics of the patients and physician characteristics and practice settings were tabulated. Two items on the CPCI (the number of years the individual was a patient of the index physician and the number of visits to the site in the past 12 months) were correlated with identical items collected from the medical record in order to validate patient report of these items.

Initial item analysis of the CPCI examined the mean, median, variance, skewness, and floor and ceiling effects of each of the CPCI items. Additionally, outliers were identified, and the problem of missing data was assessed.

An exploratory factor analysis on a random sample of 500 patients was employed to cluster the items. This sample size provided substantial power for a stable factor solution, with a subject-to-item ratio of greater than 20 to 1, and allowed for an additional random sample to be selected to replicate the solution. A principal components solution with a varimax rotation was used. Only statistically meaningful (ie, eigen values >1 after rotation) and internally consistent factors were subjected to interpretation.

A second independent random sample of 1000 respondents was selected to evaluate replication of the factor solution. Scale scores were computed, and the association among the factor scale scores was assessed by correlation. The internal consistency of each of the scale scores was assessed by Cronbach's alpha.

Correlation was used to evaluate the association of each of the scale scores with the measure of patient satisfaction. The association of patient satisfaction with other variables of interest were likewise tested by correlation: for example, alternative aspects of continuity such as duration and intensity of patient-physician relationship and the UPC index. These indicators have previously been used as measures of important primary care aspects and sometimes have been used alone to represent the degree of primary care.^{22,29}

RESULTS

Data were collected on 4454 patient visits, representing 89% of the patients visiting physicians during

the 2 sampling days. Of those, 3284, or 74%, completed the patient exit questionnaire. Any respondent skipping six or more CPCI items was excluded from these analyses, leaving 2899 respondents on which the analyses were performed.

Characteristics of the sample of patients and visits are reported in Table 1. Respondents were in their mid-40s on average, and 62% were female. Fifty-seven percent of the visits were for acute care, 24% were for chronic care, and 13% were well-care visits. On average, respondents reported about 2 problems addressed during the visit. Type of health insurance

TABLE 1

Characteristics of the Study Sample (n=2899)

Characteristic	Value
Age, mean y (SD)	42 (23)
% Female	62
Reason for visit, %	
Acute	57
Chronic	24
Well care	13
Other	6
No. of problems addressed, mean (SD)	2.3 (1.5)
Health insurance type, %	
IPA/PPO	39
Fee-for-service	24
Medicare	22
None	7
Medicaid	5
Other	3
Health status,* mean (SD)	3.8 (.8)
Satisfaction with visit	4.2 (.7)
MOS 9-item visit rating form,† mean (SD)	
Global satisfaction item,† mean (SD)	4.4 (.8)
Expectations about visit‡	4.4 (.8)

* Response in Likert-type format, where 1 = extremely limited to 5 = not at all limited.

† Response in Likert-type format, where 1 = poor to 5 = excellent.

‡ Expectations about visit means the "degree to which expectations were met." Response in Likert-type format, where 1 = not at all to 5 = a lot.

SD denotes standard deviation; IPA/PPO, independent provider association/preferred provider organization; MOS, Medical Outcomes Study.

was distributed as follows: 39% IPA/PPO, 24% fee-for-service, 22% Medicare, 7% no health insurance, 5% Medicaid, and 3% other. Overall, patients reported that they were highly satisfied with the visit, that their expectations had been met, and that their general health status was good.

Compared with those patients who did not complete the CPCI items (n=1555), those who did complete the CPCI (n=2899) were more likely to be white, be slightly older, and have IPA/PPO or fee-for-service insurance. Those completing the CPCI were also less likely to have Medicaid insurance than those not completing the CPCI. There was no significant difference between the groups in gender or reason for visit.

Two items from the patient exit questionnaire were verified from the medical record: the number of visits in the past year and the number of years the respondent was a patient of the practice. The correlation of the two methods of data collection (self-report and medical record) for the two variables was 0.70 and 0.73, respectively. This finding demonstrates that the patients were able to report with moderate accuracy on these two variables. The patient-reported items were used in the remaining analyses.

Each of the CPCI items was then evaluated. Table 2 displays the item stem and specific item properties grouped by the seven components. Negatively worded items have been reverse scored. As anticipated, the items are skewed toward the high end of the response scale, that is, toward endorsing the item. The mean, median, standard deviation, number missing, and number who responded "not applicable" are reported in Table 2.

The initial factor analysis of 500 randomly selected respondents resulted in four statistically significant factors (Table 3). The items are clustered by their primary loading, which is in bold type. Based on their content, the four factors were named *patient preference to see their regular physician*, *interpersonal communication*, *physician's accumulated knowledge of the patient*, and *coordination of care*. These four factors and the UPC measure represent the original components reasonably well. Components that were represented by single items (first contact and comprehensiveness of care) did not result in independent factors, but tended to cluster together on the factor named patient preference for their regular physician. This factor seems to rep-

represent a desire of the patients to see their regular doctor and rely on their doctor for most of their care. It may be that these components are truly associated such that patients cannot distinguish between the concepts, or that better coverage of the concepts with additional items would allow respondents to adequately differentiate the concepts. All the items written for the interpersonal communication component contributed to that factor; the same applies to the items written for the coordination of care and physician's accumulated knowledge of the patient.

A second independent random sample of 1000 respondents was used to replicate the factor analysis. Some items shifted primary loading to different factors, but the initial four clusters of items (patient preference for their regular physician; interpersonal

communication; knowledge of patient; and coordination) remained clustered together.

The internal consistency reliabilities of the four factors, which ranged from .68 to .79, are reported in Table 4. This level of internal consistency is considered good.³⁰ All items with a primary loading on a factor contributed to the internal consistency of the group of items with the exception of UPC. Although UPC shows an association with the patients' preference for their regular physician factor, it did not contribute to the internal consistency of that cluster of items. Therefore, it was scored separately.

Factor scale scores were created by simply adding the items contributing to the factor and dividing by the number of items summed so that each scale score has a maximum of 5. (For example,

TABLE 2

Item Analysis of Components of Primary Care Index Items Used in Study (n=2899)

Scale Component/Item No./Question	Mean	Median	SD	Missing, No.	N/A
Comprehensiveness of Care					
1. I go to this doctor for almost all of my medical care.	4.42	5.0	1.04	23	—
Accumulated Knowledge					
2. This doctor does not know my medical history very well.	3.89	5.0	1.41	56	—
3. This doctor knows a lot about the rest of my family.	3.45	4.0	1.46	84	—
4. This doctor clearly understands my health needs.	4.36	5.0	.95	56	—
9. This doctor and I have been through a lot together.	3.14	3.0	1.40	146	—
Interpersonal Communication					
5. I can easily talk about personal things with this doctor.	4.34	5.0	1.00	42	—
6. I don't always feel comfortable asking questions of this doctor.	4.09	5.0	1.30	70	—
7. This doctor always explains things to my satisfaction.	4.40	5.0	.96	38	—
8. Sometimes, this doctor does not listen to me.	4.43	5.0	1.05	71	—
Coordination of Care					
10. This doctor does not always know about care I have received at other places.	4.22	5.0	1.84	270	281
11. This doctor communicates with the other health care providers I see.	4.41	5.0	1.97	401	405
12. This doctor knows the results of my visits to other doctors.	4.51	5.0	1.84	384	365
13. This doctor always follows up on a problem I've had, either at the next visit or by phone.	4.33	5.0	1.39	161	138
18. I want one doctor to coordinate all of the health care I receive.	4.38	5.0	1.00	128	—
First Contact					
14. If I am sick, I would always contact a doctor in this office first.	4.60	5.0	.85	42	—
Continuity Belief					
15. My medical care improves when I see the same doctor that I have seen before.	4.33	5.0	.95	66	—
16. It is very important to me to see my regular doctor.	4.52	5.0	.88	42	—
17. I rarely see the same doctor when I go for medical care.	4.41	5.0	1.09	119	—
Longitudinality					
19. How many years have you been a patient of this physician?	2.54	2.0	1.51	86	—

SD denotes standard deviation; N/A, subjects responded "not applicable."

TABLE 3

Principal Components Factor Analysis Solution of 20 Items on Components of Primary Care Index Items (n=500)

Item No./Content	Preference for Regular Physician	Interpersonal Communication	Accumulated Knowledge	Coordination of Care
16 Continuity belief	.68	.35	—	—
15 Coordination preference	.65	—	—	—
18 Continuity belief	.65	—	—	—
14 First contact	.59	—	—	.34
17 Continuity belief	.58	—	—	—
1 Comprehensive care	.53	—	.30	—
1 UPC	.44	—	—	—
8 Interpersonal communication	—	.77	—	—
6 Interpersonal communication	—	.75	—	—
7 Interpersonal communication	—	.63	—	—
5 Interpersonal communication	.32	.57	.31	—
19 Longitudinality	—	—	.80	—
9 Been through a lot	—	—	.67	—
3 Knowledge of patient	—	—	.67	—
2 Knowledge of patient	—	.44	.55	—
4 Knowledge of patient	—	.37	.49	.42
12 Coordination	—	—	—	.84
11 Coordination	—	—	—	.79
10 Coordination	—	—	—	.66
13 Coordination	—	—	.39	.55
Eigen values	6.8	1.5	1.4	1.2
Percent of variance	33.9	7.6	7.0	6.2

*See Table 2 for more information on item.

UPC denotes usual provider continuity, ie, proportion of visits to index physician relative to total number of visits in past year.

responses to the 4 items with a primary loading on the coordination factor were summed and divided by 4.) The mean and standard deviation for each of the scale scores is also reported in Table 4. Like the individual items, the scores are skewed toward high scores. As Table 5 indicates, the scale scores are moderately correlated and UPC is associated to a lesser degree with the other factors.

Table 6 shows the association of each of the CPCI scale scores, UPC, duration, and the intensity of the patient-physician relationship with the scores for patient satisfaction with the visit, an overall satisfaction item, and an item rating the degree to which patient expectations with the visit were met. As the data in the table indicate, patient satisfaction is more strongly associated with each of the CPCI scales than with the single-item indicators of primary care. The magnitude of the CPCI scale score associations

across the three outcomes is consistent. The interpersonal communication scale has the strongest correlation with each of the three outcome variables, and these correlations are significantly higher

TABLE 4

Internal Consistency Reliability, Mean and Standard Deviation of Scale Scores of the Components of Primary Care Index (CPCI) (n=2899)

CPCI Scales	No. of Items	Cronbach alpha	Mean (SD)
Patient preference for their regular physician	6	.74	4.4(.6)
Interpersonal communication	4	.68	4.3(.8)
Accumulated knowledge of patient	5	.75	3.5(.9)
Coordination of care	4	.79	3.9(.9)

TABLE 5

Correlation Among the Scale Scores of the Components of Primary Care Index (CPCI) Used in Study (n=2899)

CPCI Scales	Interpersonal Communication	Knowledge of Patient	Coordination of Care	UPC
Patient preference for regular physician	.50*	.52	.54	.25
Interpersonal communication	1.0	.46	.49	.13
Accumulated knowledge of patient	—	1.0	.60	.24
Coordination of care	—	—	1.0	.18

* Correlation, all significant at $P < .001$.

UPC denotes usual provider continuity, ie, proportion of visits to index physician relative to total number of visits in past year.

($P \leq .01$) than the correlations of the outcomes with the other scale scores. This indicates that of the concepts measured, interpersonal communication may have the most impact on patient-reported satisfaction. The correlations of the UPC index, longitudinality, and intensity items with patient satisfaction are uniformly low. These data provide evidence for

TABLE 6

Correlation of the Indicators of Primary Care with Patient Satisfaction and Degree to Which Expectations Were Met (n=2899)

Patient Indicators	Satisfaction	Overall Global Satisfaction	Expectations Met
Primary care components			
Interpersonal communication	.46	.49	.45
Coordination of care	.39	.41	.35
Patient preference for their regular physician	.35	.37	.36
Accumulated knowledge of patient	.28	.32	.29
UPC	.08	.08	.07
Longitudinality			
Years with physician	.07	.09	.10
Years with practice	.03*	.05*	.07
Intensity (number of visits in last year to index physician)	.08	.09	.04*

* Nonsignificant correlations ($P > .01$); all other correlations are statistically significant.

UPC denotes usual provider continuity index, ie, the proportion of visits to index physician relative to total number of visits in past year.

the validity of the CPCI scale scores in that the association with the three satisfaction measures is consistent with theoretically derived hypotheses about the primary care concepts measured.

DISCUSSION

INTERPRETATION OF FINDINGS

Evaluation of the instrument indicates that the CPCI provides a brief, reliable measure of four components of primary care:

patient preference for their regular physician, interpersonal communication, accumulated knowledge of the patient, and coordination. As hypothesized, the items generally cluster into the components for which they were written. The internal consistency of the scale scores is good, and the utility of the instrument is high given the small number of items per scale.

In this sample of ambulatory patients of family physicians, the perceived delivery of key aspects of primary care was high on the average. Overall, the attempt to comprehensively measure primary care from the perspective of the patient appears to measure some concepts well, but others may need refinement.

Patients' preference to see their regular physician is an important aspect of primary care. The items relating to the patient belief in the benefits of continuity of care heavily contribute to this scale. The evaluation of patients' motivation to seek care from their regular physi-

cian expands the current definition of first-contact care.³¹ This definition may be tapping a disposition that affects consumer behavior and that will in turn be related to utilization.

Comprehensiveness of care has rarely been evaluated from the patient's perspective.¹⁴ Farnum and colleagues³² report a positive association between perceived comprehensiveness and attitudes about utilization of particular services, and that on the average, patients' level of knowledge about the range of services family physicians provide was low. Comprehensiveness of care was not measured adequately on this version of the CPCI, as only a single item was included on the final copy of the questionnaire. The domain of comprehensiveness of care deserves further evaluation because of its important implication for utilization.

Interpersonal communication is an important aspect of any patient-physician relationship, and is not unique to primary care.⁸ The degree to which the other components of primary care hinge on this basic interaction makes this aspect particularly important for primary care encounters, and therefore should be included in any measure of primary care. As in other studies,^{19,20} this measure of interpersonal communication is associated with patient satisfaction.

The accumulation of physician knowledge of the patient is the product of ongoing and continuous care over time.³³ In a previous study, a single physician self-reported item of accumulated knowledge about the patient demonstrated a positive association with the frequency of visits and with the duration of the patient-physician relationship.¹⁷ In these data, longitudinality was the strongest contributor to this scale and the literature indicates it has been shown to be associated with patient satisfaction.^{11,34} When investigated as a single item in our data, longitudinality is not nearly as highly correlated with satisfaction as the accumulation of knowledge scale score. This finding indicates that the long-term patient-physician relationship is more complex than just the duration of that relationship, and that a more in-depth measure of physicians' accumulated knowledge may be necessary to show associations with health outcomes.³⁵

Coordination of care is an important aspect of the quality of primary care in the current health care system.⁷ Some measures of coordination of care in the literature are quite restrictive or limited, eg, requiring

a physician's advance knowledge of visits elsewhere,³⁶ or that the physician arranged the visit.³⁷ Other aspects of coordination of care include physician recognition of information,^{38,39} and follow-up of medical problems from one visit to another.⁴⁰ The CPCI coordination of care scale measures multiple aspects of the coordination process, including referral feedback, information from the patient regarding other visits, or follow-up care from a previous visit. It is anticipated that this information is incorporated into relevant care. Several studies have shown that the referral process and associated information transfer can be poor,^{41,42} even in a managed care system.⁴³ In our data, only about one half of the patients provided an opportunity for coordination by responding to items as "applicable." For those patients who evaluated coordination of care, the scores were moderately high, as were the other scale scores, and the association with patient satisfaction was of the same magnitude as the other scale scores.

As hypothesized, the associations of the CPCI scale scores with patient satisfaction are stronger than the more commonly used measures of continuity, longitudinality, and intensity of the physician-patient relationship. The patients' perception of their receipt of aspects of primary care may be an important mechanism by which some of these components of care affect outcomes.

LIMITATIONS AND STRENGTHS

Potential limitations of the study include two concerns regarding the use of a patient questionnaire. Patients often do not want to criticize their physician, and patient surveys of this nature tend to demonstrate low to modest variability. On the other hand, the patient is the only source for some types of data. To address these concerns, the item stems were worded so that patients were reporting rather than evaluating. In addition, an agree-to-disagree response format was used, which in a review of patient-based measures,⁴⁴ was reported as the format that yielded the greatest variability.

This study was limited to a sample of family physicians and their patients from Northeast Ohio. The RAPP network consists of a large and diverse group of *community-based* practicing family physicians, and is similar to the national membership of the American Academy of Family Physicians (AAFP) in age, percentage in rural locations, and number of patients seen per week. The study sample of physi-

icians was, however, more likely to be female and residency trained than the AAFP membership (Stange KC, Zyzanski SJ, Smith TF, et al. Unpublished data, 1997). Generalizability to other geographical regions is likely to be high.

Consecutive patients were invited to participate in the study, and those who participated may not represent the entire patient population of each practice. Those who completed the patient questionnaire underrepresent nonwhite and Medicaid patients, and thus the results may not be generalizable to those specific groups. Nevertheless, the age and percentage of women in this sample are similar to those of patients who came to see family physicians participating in the 1992 National Ambulatory Care Survey (NAMCS).⁴⁵

CONCLUSIONS

The IOM calls for development and adoption of uniform methods and measures to monitor the performance of health care systems and individual clinicians in delivering primary care as defined in the 1996 IOM report. The utility of the initial instrument has led to the development of a revised instrument. The revised instrument includes an additional 1 to 3 items for each of the four scales: interpersonal communication, physician's accumulated knowledge, patient coordination of care, and patient desire to see their regular doctor. Also, five new items to measure comprehensive care are included. Finally, items were written to measure the domains of patient advocacy and family and community context, and have been added to the revised instrument. This revised version of the instrument will be the focus of future work, and could serve as a measure of performance as suggested by the IOM.

While other instruments to measure attributes of primary care as defined by the IOM may be developed, none so far has been published in the literature that permits the making of comparisons. Recently published research continues to focus on single attributes such as longitudinality⁴⁶ and communication style,¹⁸ and a unidimensional perspective such as having a usual source of care.^{47,48}

Further studies evaluating the multidimensional nature of primary care are needed to advance the understanding of the association of primary care with health outcomes. Observational study and ultimately

interventions based on an emerging understanding of which components of primary care have value for which type of health outcomes, have great potential to increase the quality of health care for Americans.

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REFERENCES

1. Franks P, Clancy CM, Nutting PA. Gatekeeping revisited—protecting patients from overtreatment. *N Engl J Med* 1992; 327:424-7.
2. Greenfield S, Rogers W, Mangotich M, Carney MF, Tarlov AR. Outcomes of patients with hypertension and non-insulin-dependent diabetes mellitus treated by different systems and specialties: results from the Medical Outcomes Study. *JAMA* 1995; 274:1436-44.
3. Greenfield S, Nelson EC, Zubkoff M, et al. Variations in resource utilization among medical specialties and systems of care. *JAMA* 1992; 267:1624.
4. Grumbach K. Separating fact from fiction: family medicine, primary care, and the role of health services research. *J Fam Pract* 1996; 43:30-2.
5. Povar G. Primary care: questions raised by a definition. *J Fam Pract* 1996; 42:124-8.
6. Institute of Medicine. Report of a study: a manpower policy for primary health care. Washington, DC: National Academy of Sciences, 1978.
7. Institute of Medicine. Defining primary care: an interim report. Washington, DC: National Academy Press, 1994.
8. Starfield B. Primary care: concept, evaluation, and policy. New York, NY: Oxford University Press, 1992.
9. Institute of Medicine. The future of primary care. Washington, DC: National Academy Press, 1996.
10. Starfield B. Commonalties in primary care research: a view from pediatrics. In: Proceedings from AHCPR, primary care research: an agenda for the 90's. Washington DC: US Government Printing Office, 1990. DHHS publication No. (PHS)90-3460.
11. Dietrich AJ, Marton KI. Does continuous care from a physician make a difference? *J Fam Pract* 1982; 15:929-37.
12. Safran DG, Tarlov AR, Rogers WH. Primary care performance in fee-for-service and prepaid health care systems: results from the Medical Outcomes Study. *JAMA* 1994; 271:1579-86.
13. Smith WG, Buesching D. Measures of primary medical care and patient characteristics. *J Ambulatory Care Manage* 1986; 9:49-57.
14. Bindman AB, Grumbach K, Osmond D, Vranizan K, Stewart AL. Primary care and receipt of preventive services. *J Gen Intern Med* 1996; 11:269-76.
15. Tarlov A, Ware J, Greenfield S, Nelson E, Perrin E, Zubkoff M. The Medical Outcomes Study: an application of methods for monitoring the results of medical care. *JAMA* 1989; 262:925-30.
16. Ware J, Snyder M, Wright W. Development and validation of scales to measure patient satisfaction with health care ser-

- vices. Vol 1 of a final report. Part B: results regarding scales constructed from the patient satisfaction questionnaire and measures of other health care perceptions. Springfield, Va: National Technical Information Service, 1976.
17. Hjortdahl P. Continuity of care: general practitioners' knowledge about and sense of responsibility toward their patients. *Fam Pract* 1992; 9:3-8.
 18. Thom D, Campbell B. Patient-physician trust: an exploratory study. *J Fam Pract* 1997; 44:169-76.
 19. Bertakis KD, Roter D, Putnam SM. The relationship of physician medical interview style to patient satisfaction. *J Fam Pract* 1991; 32:175-81.
 20. Hall J, Roter D, Katz N. Meta-analysis of correlates of provider behavior in medical encounters. *Med Care* 1988; 26:657-75.
 21. Kaplan SH, Greenfield S, Ware JE. Assessing the effects of physician-patient interactions on the outcomes of chronic disease. *Med Care* 1989; 27:S110-S127.
 22. Bresleu N, Reeb K. Continuity of care on a university-based practice. *J Med Educ* 1975; 50:965-9.
 23. Chao J. Continuity of care: incorporating patient perceptions. *Fam Med* 1988; 20:333-7.
 24. Ross C, Steward C, Sinacore J. The importance of patient preferences in the measurement of health care satisfaction. *Med Care* 1993; 31:1138-49.
 25. DeVellis R. Scale development: theory and applications. Newbury Park, Calif: Sage Publications, 1991.
 26. Fry E. A readability formula that saves time. *J Reading* 1968; 11:513-16.
 27. Davies A, Ware J. Involving consumers in quality of care assessment. *Health Aff* 1988; 7:33-48.
 28. Rubin H, Gandek B, Roger WH, Kosinski M, McHorney C, Ware J. Patients' ratings of outpatient visits in different practice settings. *JAMA* 1993; 270:835-40.
 29. Hjortdahl P. Ideology and reality of continuity of care. *Fam Med* 1990; 22:361-4.
 30. Nunnally J, Bernstein I. Psychometric theory. New York, NY: McGraw-Hill, 1994.
 31. Forrest C, Starfield B. The effect of first-contact care with primary care clinicians on ambulatory health care expenditures. *J Fam Pract* 1996; 43:40-8.
 32. Farnum E, Flynn S, Hazey J. Family practice: a well kept secret or not? Paper presented at the Ohio Academy of Physicians Annual Research Day, Cleveland, Ohio, 1993.
 33. Hjortdahl P, Borchgrevink C. Continuity of care: influence of general practitioners' knowledge about their patients on use of resources in consultations. *BMJ* 1991; 303:1181-4.
 34. Hjortdahl P, Laerum E. Continuity of care in general practice: effect on patient satisfaction. *BMJ* 1992; 304:1287-90.
 35. Weyrauch K. The personal knowledge of family physicians for their patients. *Fam Med* 1994; 26:452-5.
 36. Dietrich A, Nelson E, Kirk J, Zubkoff M, O'Conner G. Do primary physicians actually manage their patients' fee-for-service care? *JAMA* 1988; 259:3145-9.
 37. Fletcher R, O'Malley M, Fletcher S, Earp J, Alexander J. Measuring the continuity and coordination of medical care in a system involving multiple providers. *Med Care* 1984; 22:403-11.
 38. Starfield B, Simborg D, Horn S, Yourtee S. Continuity and coordination in primary care: their achievement and utility. *Med Care* 1976; 95:625-36.
 39. Starfield B, Simborg D, Johns C, Horn S. Coordination of care and its relationship to continuity and medical records. *Med Care* 1977; 15:929-38.
 40. Starfield B. Measuring the attainment of primary care. *J Med Educ* 1979; 54:361-9.
 41. Grace J, Armstrong D. Referral to hospital: perceptions of patients, general practitioners and consultants about necessity and suitability of referral. *Fam Pract* 1987; 4:170-5.
 42. McPhee S, Lo B, Saika G, Meltzer R. How good is communication between primary care physicians and subspecialty consultants? *Arch Intern Med* 1984; 144:1265-8.
 43. Roulidis Z, Schulman K. Physician communication in managed care organizations: opinions of primary care physicians. *J Fam Pract* 1994; 39:446-51.
 44. Wensing M, Grol R, Smits A. Quality judgments by patients on general practice care: a literature analysis. *Soc Sci Med* 1994; 38:45-53.
 45. Schappert S. National Ambulatory Medical Care Survey: 1994 summary. Advance data from vital and Health Statistics, No. 273. Hyattsville, Md: National Center for Health Statistics, 1996.
 46. Weiss LJ, Blustein J. Faithful patients: the effect of long-term physician-patient relationships on the costs and use of health care by older Americans. *Am J Public Health* 1996; 86:1742-7.
 47. Ettner S. The timing of preventive services for women and children: the effect of having a usual source of care. *Am J Public Health* 1996; 86:1748-54.
 48. Gill JM. Can hospitalizations be avoided by having a regular source of care? *Fam Med* 1997; 29:166-71.