

# Development and Validation of the Patient Assessment of Chronic Illness Care (PACIC)

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**Rationale:** There is a need for a brief, validated patient self-report instrument to assess the extent to which patients with chronic illness receive care that aligns with the Chronic Care Model—measuring care that is patient-centered, proactive, planned and includes collaborative goal setting; problem-solving and follow-up support.

**Sample:** A total of 283 adults reporting one or more chronic illness from a large integrated health care delivery system were studied.

**Methods:** Participants completed the 20-item Patient Assessment of Chronic Illness Care (PACIC) as well as measures of demographic factors, a patient activation scale, and subscales from a primary care assessment instrument so that we could evaluate measurement performance, construct, and concurrent validity of the PACIC.

**Results:** The PACIC consists of 5 scales and an overall summary score, each having good internal consistency for brief scales. As predicted, the PACIC was only slightly correlated with age and gender, and unrelated to education. Contrary to prediction, it was only slightly correlated ( $r = 0.13$ ) with number of chronic conditions. The PACIC demonstrated moderate test-retest reliability ( $r = 0.58$  during the course of 3 months) and was correlated moderately, as predicted ( $r = 0.32$ – $0.60$ , median =  $0.50$ ,  $P < 0.001$ ) to measures of primary care and patient activation.

**Discussion:** The PACIC appears to be a practical instrument that is reliable and has face, construct, and concurrent validity. The resulting questionnaire is in the public domain, and recommendations for its use in research and quality improvement are outlined.

**Key Words:** chronic illness, survey, assessment, Chronic Care Model, reliability

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The increasingly well-documented gap between clinical research findings and practice<sup>1–3</sup> has spurred a number of efforts to improve the quality of chronic illness care.<sup>4,5</sup> It also is apparent that this problem cannot be solved by simply trying to do more; instead, fundamental changes are needed in the way that care is structured and delivered. For chronic illness care, this change entails shifting from medical care that is reactive and event-driven to care that is proactive and planned.

The Chronic Care Model, or CCM,<sup>5,6</sup> is one approach to improving chronic illness care that is being used increasingly to assess and improve care. The CCM is based on evidence-based practices and reviews of the literature on effective care.<sup>5–7</sup> The model was extensively reviewed by a panel of experts in the area of chronic illness management and revised accordingly. It was then used to organize data collection and analysis of semistructured interviews with 72 programs and 14 site visits of innovative care delivery systems recommended by the experts. On the basis of these recommendations and experiences of the “best practice” systems, the CCM proposes to change reactive acute-oriented care to care that is planned, proactive population-based and patient-centered ([www.improvingchroniccare.org](http://www.improvingchroniccare.org)).<sup>8</sup>

The 6 key dimensions of the CCM are organization of health care, clinical information systems, delivery system design, decision support, self-management support, and community resources. The CCM has been used, often in the form of “Breakthrough Series Collaboratives,” which involve different health care teams working together to improve care for one or more chronic illnesses, to improve both processes and outcomes of care on population or panel-wide basis (<http://www.rand.org/health/ICICE>).<sup>9,10</sup>

Our group has previously developed a tool for clinicians and health care teams to assess the extent to which they are employing elements of CCM in the routine care provided to their patients—the Assessment of Chronic Illness Care (ACIC). This instrument has been used for quality improvement and found to be related to other indices of quality of care and sensitive to CCM-based improvement efforts.<sup>11</sup> To our knowledge, there are no comparable patient-report instruments to assess quality of patient-centered care for chronic

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illness consistent with the CCM. Such an instrument is important (1) to provide convergent evidence of care delivery, (2) to understand and incorporate patient perspectives, and (3) to overcome potential over-reporting biases of clinicians in describing their care delivery.

There are several validated measures of related constructs, such as patient-provider communication, provider autonomy support, and patient empowerment or activation.<sup>12–14</sup> There are also measures of the extent to which patients receive care congruent with the Institute of Medicine recommendations for primary care.<sup>15–20</sup> These measures, however, are not directly related to the CCM, generally report on overall receipt of care, and are not specific to chronic illness.

This article reports on the development and validation of a new instrument, the Patient Assessment of Chronic Illness Care (PACIC), which is designed to complement the ACIC by providing a patient perspective on receipt of CCM-related chronic illness care. The PACIC collects patient reports of the extent to which they have *received* specific actions and care during the past 6 months that are congruent with various aspects of the CCM. This scale is intended to assess the receipt of patient-centered care, which emphasizes the key elements of modern self-management support (eg, collaborative goal settings, problem-solving and follow-up)<sup>10,13,21</sup> and planned, proactive, and population-based care.<sup>4–7</sup> Our goal was to develop a relatively brief instrument that could be used in a variety of health care settings and would be applicable to adult patients having one or more of many different chronic illnesses.

The specific purposes of this work are to (1) summarize the development of the PACIC, (2) report initial data on its psychometric characteristics (eg, scale distributions, test-retest reliability, internal consistency) and relationship to patient demographic and medical characteristics, and (3) assess its relationship to leading measures of other constructs, such as patient activation<sup>12</sup> and primary care.<sup>20</sup>

Our hypotheses were that:

1. The overall PACIC and its scales would reliably characterize receipt of several dimensions of CCM-related care and have good psychometric characteristics (eg, internal consistency and test-retest reliability).
2. The PACIC and its scales would (a) generally not be related to patient demographics (eg, gender, age, education) but (b) would be related to disease characteristics (eg, number of comorbid conditions).
3. The PACIC would be moderately related to, but not redundant, with measures of primary care and patient activation.

We also developed *a priori* subhypotheses about the PACIC subscales that are reported in the results section.

## METHODS

### Recruitment and Respondents

Five hundred enrollees age 50 or older receiving care from 7 primary care clinics within Group Health Cooperative, a large managed care organization in the states of Washington and Idaho, were sent a package containing an introductory letter, a demographic questionnaire, the PACIC, 1 of 2 other instruments described in this article, and informed consent form. As an incentive, a \$5 gift card was included in the packet. After 2 weeks, nonrespondents received an identical packet without the gift card. After 2 additional weeks, nonrespondents were contacted by phone and offered the option of completing the survey by phone or having a third packet mailed. The study was approved by the Group Health Cooperative Institutional Review Board.

A total of 379 persons (76% response rate, conservatively assuming that all received the mailing and were alive and eligible) responded to the survey, 283 (75%) having 1 or more chronic illness (210 after the initial mailing and 73 after follow-up calls). Ninety-six did not report a chronic illness and were excluded. Of the 283 reporting a chronic illness, 266 answered greater than 50% of the survey questions and were included in the analyses. Characteristics of these 266 participants are summarized in Table 1. Considerable variability was found on most patient characteristics. The average age was 64, 56% were female, and most had at least 2 chronic conditions. The most common chronic illnesses were hypertension and arthritis, followed by depression, diabetes, asthma, and pain. Most respondents had been diagnosed with chronic illness for at least 4 years (Table 1). The average rating on the overall health rating was 2.7 on a 4-point scale.

Information available from automated data indicates that participants ( $n = 379$ ) and nonparticipants ( $n = 122$ ) were similar on characteristics available to us. No differences were found on gender, and nonrespondents were slightly but significantly older than respondents (mean age = 64.9 versus 63.4,  $P < 0.001$ ). One hundred persons who responded to the first mailing were sent a second mailing approximately 12 weeks later, again with a second packet mailed after 2 weeks. Eighty-two completed the PACIC a second time, 63 of whom reported at least one chronic condition. No telephone follow-up was conducted with the retest sample.

### Measures

*The Patient Assessment of Chronic Illness Care (PACIC) Survey* is a 20-item patient report instrument that assesses patient's receipt of clinical services and actions consistent with the CCM (Appendix, with permission from Improving Chronic Illness Care, a national program of The Robert Wood Johnson Foundation; the instrument is also available at: <http://improvingchroniccare.org/tools/pacic.htm>). Respondents rated how often they experienced the content

**TABLE 1.** Respondent Characteristics and Relationship to PACIC Scores

Patient Characteristics	Correlation to PACIC Scores							
	Mean or %	SD	Overall PACIC	Patient Activation	Delivery System Design/ Decision Support	Goal Setting/ Tailoring	Problem Solving/ Contextual	Follow-up/ Coordination
Age*	64.2	(10.5)	0.16 <sup>†</sup>	0.01	0.09	0.11	0.23 <sup>†</sup>	0.19 <sup>†</sup>
% Female	56%		0.24 <sup>†</sup>	0.14 <sup>†</sup>	0.21 <sup>†</sup>	0.25 <sup>†</sup>	0.20 <sup>†</sup>	0.22 <sup>†</sup>
Education* (n = 251)			−0.05	0.05	−0.03	−0.04	−0.06	−0.05
<9th grade	2%							
10–11th grade	4%							
High school	22%							
1–2 years college	37%							
College degree	20%							
Post-Graduate	16%							
No. chronic conditions*	2.3	(1.3)	0.13 <sup>†</sup>	0.07	0.02	0.09	0.13 <sup>†</sup>	0.25 <sup>†</sup>
Overall health (n = 245)*	2.7	(0.9)	−0.04	−0.08	−0.16 <sup>†</sup>	0.00	−0.07	0.09
Years diagnosed (n = 230)*			0.01	0.06	−0.01	−0.04	0.04	0.06
<1 year	6%							
1–3 years	19%							
4–9 years	30%							
10–19 years	20%							
20 + years	24%							

\*Spearman rank order correlations conducted for these measures to assess relationship to PACIC scores.

<sup>†</sup> $P < 0.05$ .

described in each item during the past 6 months. Each item was scored on a 5-point scale ranging from 1 (no or never) to 5 (yes or always). Patients rated care received from their primary health care team (not just their personal physician) for the chronic illness that they identified as most impacting their life. The written version of the PACIC takes 2–5 minutes to complete. Phone administration times were highly variable but averaged approximately 7–8 minutes. The 20 items were selected or modified from a larger pool of 46 items generated by a national pool of experts on chronic illness care and the CCM and pilot tested with a separate, earlier sample of 130 patients. The experts suggested items for each of the PACIC domains below and reviewed and provided feedback on earlier revisions of the scale. Items retained from the larger pool were those that showed adequate variability, that patients did not have trouble understanding, and that best represented the underlying constructs (see [www.improvingchroniccare.org](http://www.improvingchroniccare.org) for listing of key change concepts).

We aggregated the 20 items into 5 *a priori* scales based on the key components of the CCM. These subscales were Patient Activation (items 1–3 in the Appendix); Delivery System Design/Decision Support (items 4–6); Goal Setting

(items 7–11); Problem-solving/Contextual Counseling (items 12–15); and Follow-up/Coordination (items 16–20). Table 2 provides a definition of each scale and its component item numbers; the corresponding items in the Appendix illustrate how each concept was operationalized. Each scale is scored by simple averaging of items completed within that scale, and the overall PACIC is scored by averaging scores across all 20 items. These scales emphasize patient-health care team interactions and, in particular, aspects of self-management support (eg, goal setting, problem solving).<sup>21,22</sup> The 5 PACIC scales do not map perfectly onto the 6 CCM components because we did not feel that most patients would be able to report on issues such as clinical information systems or organization of health care that are generally not visible to them. Delivery System Design/Decision support maps directly onto these 2 CCM components. Patient Activation, Goal Setting, and Problem-solving/Contextual counseling all map onto self-management support in the CCM, and Follow-up/Coordination is important for most CCM components.

The Patient Self-Activation Scale<sup>12</sup> is a 22-item scale that assesses the extent to which patients feel able to take responsibility for their care. Hibbard and colleagues<sup>12</sup> define self-activation as having the knowledge, skill, and confidence to self-

**TABLE 2.** Definitions of PACIC Scale Constructs

Scale	Definition
Patient Activation (items 1–3)	Actions that solicit patient input and involvement in decision-making
Delivery System Design/Decision Support (items 4–6)	Actions that organize care and provide information to patients to enhance their understanding of care
Goal Setting/Tailoring (items 7–11)	Acquiring information for and setting of specific, collaborative goals
Problem-Solving/Contextual (items 12–15)	Considering potential barriers and the patient's social and cultural environment in making treatment plans
Follow-up/Coordination (items 16–20)	Arranging care that extends and reinforces office-based treatment, and making proactive contact with patients to assess progress and coordinate care

manage and to collaborate with providers. We hypothesized that higher PACIC scores would be moderately correlated with higher self-activation since receipt of patient-centered, self-management support should enhance self-activation.

Items from 4 of the 11 subscales from the primary care module from the Ambulatory Care Experience Survey (PCP-ACES) (communication, integration, contextual knowledge of patient and preventive care)<sup>20</sup> were used to assess key aspects of primary care we thought would align with the CCM components. The 47-item PCP-ACES survey is a refinement of the Primary Care Assessment Survey that has been previously validated<sup>18,23</sup> and widely used to predict a variety of outcomes.<sup>24–26</sup> The PCP-ACES scales operationalize the key aspects of quality primary care identified by the Institute of Medicine to include access, continuity, integration, comprehensiveness, “whole-person” orientation, and sustained clinician-patient partnership.<sup>15</sup> We hypothesized that higher PACIC scores would be moderately correlated with higher levels of primary care from the PCP-ACES questionnaire (see “Validity” section of Results for specific subscale hypotheses).

## Analyses

Initial descriptive analyses included means, median, standard deviation, skewedness, and distribution of scores on individual items, scales, and the overall PACIC to evaluate distributional characteristics. Internal consistency for the overall PACIC and the various scales was evaluated using coefficient alpha. We conducted a confirmatory factor analysis to evaluate the extent to which the items loaded on to the hypothesized scales and the degree to which the scales were intercorrelated. Test-retest reliability and associations among continuous measures were assessed using Pearson Product Moment correlation coefficients; partial correlations were used to control for the influence of potential confounding variables (by partialling out scores on third variables that

might provide alternative explanations for relationships). Associations between PACIC scores and categorical variables were evaluated using  $\chi^2$  or point-biserial correlations (for dichotomous characteristics) as appropriate. ANOVA and ANCOVA (to adjust for potential confounding variables) were used to evaluate potential differences among different chronic illness conditions.

## RESULTS

### Scale Characteristics

Preliminary analyses indicated that there were no differences on mean overall PACIC or scale scores between those who responded to paper and pencil versus phone administration so responses are collapsed across those subsets. Also, of 6 patient characteristics analyzed, there were significant differences between mail and phone respondents only on overall rating of health, and this effect was not large (mean of 2.65 for mail versus 2.92 for phone respondents,  $P < 0.03$ ). There were no differences on education, race, ethnicity, desire for involvement in care, or number of years with chronic illness. Most of PACIC items demonstrated adequate variability and were strongly related to their *a priori* specified subscale(s). The scales all had reasonable distributional characteristics (Table 3). Two hundred fifty-five of the 266 respondents had no missing data. At the item level, no items had ceiling effect problems. The few individual items that had a sizeable proportion at the floor or minimal level were activities that would be expected to be low in the absence of quality improvement interventions (eg, problem-solving assistance; follow-up coordination). As shown in Table 3, the median scale alpha was 0.84 (range, 0.77–0.90) and the alpha for internal consistency of the overall scale was 0.93.

A confirmatory factor analysis was conducted to evaluate how well the data fit our proposed 5-scale structure. Almost all

**TABLE 3.** Characteristics of PACIC Overall and Scale Scores

Scale	Mean	SD	Reliability	
			Cronbach Alpha	3-Month Test-Retest
Overall PACIC	2.60	(1.0)	0.93	0.58
Patient Activation	2.99	(1.3)	0.82	0.52
Delivery System Design/Decision Support	3.13	(1.1)	0.77	0.47
Goal Setting/Tailoring	2.43	(1.1)	0.84	0.60
Problem Solving/Contextual	2.87	(1.3)	0.90	0.60
Follow-up/Coordination	1.97	(1.1)	0.86	0.68

n = 255–266, except for test–retest subset, for which n = 52–57.

All correlation and alpha coefficients are significant at  $P < 0.01 < 0.001$ .

**TABLE 4.** Instrument Properties From Confirmatory Factor Analysis

Scale	Question	Standardized	t Statistic*	Reliability	Variance Extracted Estimate
Patient Activation/Involvement				0.840 <sup>†</sup>	0.687
	Q1	0.752	11.46	0.566	
	Q2	0.841	13.47	0.708	
	Q3	0.798	12.47	0.637	
Delivery System Design/Decision Support				0.784 <sup>†</sup>	0.621
	Q4	0.698	10.38	0.487	
	Q5	0.708	10.58	0.501	
	Q6	0.813	12.77	0.661	
Goal Setting/Tailoring				0.862 <sup>†</sup>	0.628
	Q7	0.870	14.61	0.756	
	Q8	0.829	13.56	0.687	
	Q9	0.782	12.42	0.612	
	Q10	0.542	7.71	0.294	
	Q11	0.677	10.18	0.459	
Problem Solving/Contextual				0.903 <sup>†</sup>	0.737
	Q12	0.769	12.13	0.591	
	Q13	0.813	13.18	0.661	
	Q14	0.888	15.15	0.788	
	Q15	0.874	14.76	0.764	
Follow-up/Coordination				0.877 <sup>†</sup>	0.651
	Q16	0.651	9.61	0.424	
	Q17	0.678	10.13	0.460	
	Q18	0.702	10.62	0.493	
	Q19	0.889	15.04	0.791	
	Q20	0.890	15.06	0.792	

\*All t statistics are significant at  $P < 0.001$ .

<sup>†</sup>Composite reliability for scale.

of the items loaded highly on the proposed scales (see Table 4). Only 3 items had standardized factor loadings less than 0.70, and 10 of the 20 items had factor loadings of 0.80 or greater. Our

hypothesized model allowed for correlated factors because we felt that many of the different CCM activities were inter-related. For three-quarters of the items, item reliability (defined as the



prevent variation explained by their corresponding factor) was greater than 0.50 (Table 4). The variance extracted estimate for the scales ranged from 0.62 to 0.74, with values in excess of the 0.50 considered acceptable.<sup>27</sup>

Finally, the goodness of the fit of the overall model was moderate. Because of the relatively small sample size, we used the non-normed fit index and the comparative fit index to assess model fit,<sup>28</sup> whose values were 0.87 and 0.89, respectively. Residual analysis revealed relatively poor fit for one item in particular (#16, "Contacted after a visit to see how things were going.") However, we retained this item because we feel this is an essential element of follow-up support. The resulting 5 subscales are moderately to highly intercorrelated (as would be expected, given that they are all indices of CCM congruent care: median,  $r = 0.65$ , sharing 42% of the variance; range, 0.49–0.80). The Follow-up Coordination scale was the least correlated with other scales, and the Goal Setting and Problem-Solving scales were most highly correlated with each other. The PACIC summary score, and most of its scales, were moderately stable during the 3 months. The test-retest reliability for the overall PACIC was 0.58, and individual scale reliabilities ranged from 0.47 to 0.68 (Table 3).

### Relationship to Demographic and Medical Characteristics

Overall, respondents reported receiving a moderate number of the services and activities that support the CCM (mean = 2.6 of 5). Of the 5 subscales, average scores were highest on Delivery System Design/Decision Support and lowest on Follow-up/Coordination (Table 3). Correlations between PACIC scores and patient characteristics were all  $\leq 0.25$  (Table 1). Our hypothesis that patients reporting more chronic illnesses would have higher scores on the PACIC than those with fewer received only weak support ( $r = 0.13$ ,  $P < 0.05$ ). The only PACIC scale that correlated meaningfully with number of conditions reported was Follow-up

Coordination ( $r = 0.25$ ,  $P < 0.001$ ). Gender was the only patient characteristic that was consistently related to PACIC scales and these correlations were modest (point biserial correlations = 0.14–0.25). Women consistently reported higher levels of receipt of CCM practices on both the overall and individual subscales. No other demographic or medical condition variable was consistently related to PACIC scales, but to control for potential moderating variables, analyses below assessing the relationship of the PACIC to other instruments were conducted both with and without controlling for gender, age, and number of chronic conditions.

As shown in Table 5, there were few meaningful differences among patients responding based on the 6 most frequently reported chronic conditions. The only significant difference revealed by one-way analysis of variance was on the Follow-up/Coordination subscale. Tukey Honest Significant Difference follow-up tests revealed that the diabetes patients reported higher levels of follow-up than other conditions (see Table 5). It may be that diabetes patients receive more frequent follow-up care and appointments, which could account for this difference. The conclusions of these analyses were not changed when employing covariance analyses that controlled for gender, age, and comorbid conditions.

### Validity

Table 6 presents correlations of the PACIC scales and the overall PACIC with the measures of convergent validity. As shown, the overall PACIC and most of the component scales were moderately correlated as predicted with both the Hibbard patient activation instrument and with the modified PCP-ACES scales. The overall PACIC was correlated moderately to strongly (0.42–0.60) with 4 of the convergent validity measures and  $r = 0.32$  with the final measure (Integration scale from PCP-ACES). This was true for both unadjusted correlations (above the diagonal in Table 6) and for partial correlations controlling for gender, age, and number comorbid conditions (below the diagonal).

**TABLE 5.** Mean (and SD) of PACIC Summary Score and Subscales by Chronic Illnesses

Condition	n	Overall PACIC	Patient Activation	Delivery System Design/Decision Support	Goal Setting/Tailoring	Problem Solving/Contextual	Follow-up/Coordination
Hypertension	130	2.62 (1.0)	2.87 (1.3)	3.14 (1.1)	2.47 (1.1)	2.93 (1.3)	2.08 <sup>2</sup> (1.2)
Arthritis	109	2.67 (1.1)	3.11 (1.3)	3.12 (1.1)	2.51 (1.1)	3.06 (1.4)	2.01 <sup>2</sup> (1.1)
Depression	51	2.71 (1.1)	3.24 (1.3)	3.24 (1.2)	2.47 (1.2)	2.85 (1.4)	2.20 <sup>2</sup> (1.2)
Diabetes	41	2.83 (1.0)	2.79 (1.2)	3.21 (1.0)	2.57 (1.1)	3.09 (1.2)	2.65 <sup>1</sup> (1.3)
Asthma	41	2.40 (1.0)	2.51 (1.3)	3.00 (1.1)	2.30 (1.1)	2.70 (1.4)	1.88 <sup>2</sup> (1.0)
Pain	41	2.64 (1.0)	3.03 (1.2)	3.01 (1.1)	2.42 (1.1)	3.00 (1.3)	2.14 <sup>2</sup> (1.1)
Overall Mean (SD)	255	2.60 (1.0)	2.99 (1.3)	3.13 (1.1)	2.43 (1.1)	2.87 (1.3)	1.97 <sup>2</sup> (1.1)

NOTE: The only significant difference among conditions was on the Follow-up/Coordination subscale. Tukey Honest Significant Difference follow-up tests revealed that diabetes patient reported higher levels of follow-up than all other conditions (see superscripts in right-hand column indicating subgroups).

**TABLE 6.** Relationship of PACIC Scores to Other Measures

Scale	Hibbard Activation	Safran Assessment of Primary Care			
		Integration	Interpersonal Communication	Contextual Knowledge	Preventive Care
Overall PACIC	0.42/0.40	0.32/0.36	0.57/0.55	0.60/0.56	0.50/0.59
Patient Activation	0.29/0.29	0.22/0.26	0.35/0.31	0.40/0.37	0.32/0.37
Delivery System Design/ Decision Support	0.41/0.39	0.30/0.30	0.53/0.50	0.51/0.46	0.40/0.48
Goal Setting/Tailoring	0.43/0.41	0.31/0.33	0.49/0.46	0.49/0.45	0.48/0.51
Problem Solving/Contextual	0.38/0.36	0.32/0.36	0.54/0.53	0.59/0.53	0.45/0.55
Follow-up/ Coordination	0.32/0.30	0.16*/0.21	0.46/0.45	0.53/0.47	0.47/0.49

The first number in each cell is the unadjusted correlation; the second number is a partial correlation adjusting for gender, age, and number of comorbid conditions.  
\*Only correlation not  $P < 0.05$ .

The specific *a priori* predictions regarding PACIC subscales that we made were:

1. The PACIC Patient Activation scale should correlate moderately with Safran Communication and Interpersonal Care scale and with the Hibbard activation scale. The rationale for this hypothesis was that patient-centered communication and involvement should be related to the activation concept. This hypothesis was confirmed ( $r = 0.35$  and  $0.29$ ,  $P < 0.001$ , respectively) (Table 6), although the correlation with the Hibbard activation scale was not as high as we would have expected.
2. The PACIC Goal Setting scale should correlate moderately with Hibbard Activation scale. The rationale for this hypothesis was that collaborative goal setting is a key activity that facilitates patient activation.<sup>9,10,21</sup> This hypothesis was confirmed ( $r = 0.43$ ,  $P < 0.001$ ).
3. The PACIC Problem Solving/Contextual Counseling scale should correlate moderately with the Hibbard scale and with the Safran Contextual Knowledge scale. The rationale for this was that problem-solving is a key strategy to support patient activation and self-management;<sup>10,21</sup> and that counseling that took into account the patient's environment would need to use "contextual knowledge" of the patient. This hypothesis was confirmed ( $r = 0.38$  and  $0.59$ ,  $P < 0.001$ ).
4. The PACIC Follow-up/Coordination scale should correlate moderately with the Safran Integration scale. The rationale for this hypothesis was that coordination of care and follow-up on referrals should produce perceptions of more integrated care. This hypothesis was not confirmed ( $r = 0.16$ ,  $P = 0.09$ ).

## DISCUSSION

The PACIC provides a brief, patient-reported assessment of the extent to which chronically ill patients report

receiving care that is congruent with the CCM. When paired with the ACIC survey, these surveys can provide complementary consumer and provider assessments of important aspects of care for chronic illness patients. This work has summarized the preliminary, but promising, reliability and validity results on the PACIC. The PACIC produced similar means and standard deviations across 6 different chronic illnesses, with the exception of diabetes patients on the Follow-up Coordination scale. Other clinical and research groups are encouraged to use the instrument, which is in the public domain, to replicate our findings in other populations and settings. In particular, replications of our results in different healthcare systems, and use of the PACIC results in conjunction with and to inform quality improvement programs are recommended.

The various scales of the PACIC, as well as the overall score, appear both internally consistent and to be moderately stable over the three-month test-retest interval. The PACIC includes 20 items, which should be sufficiently brief to use in many settings. Given the intercorrelations among the PACIC scales and the high internal consistency of the total score, respondents may not have recognized differences among the subscale constructs. Therefore, we are most confident recommending use of the entire PACIC and the total score to represent CCM congruent care. If this is too long for some settings, users might consider administering only the subscales most appropriate for given their program and questions, or dropping the patient activation items (#1–3), because this construct is addressed in other instruments and is the most highly correlated with other subscales.

We recommend that users administer at least the last 3 scales of the PACIC and, at a minimum, the Problem Solving/Contextual and Follow-up Coordination scales, because those brief scales assess specific activities that form the core of modern, patient-centered self-management support and that the

literature indicates are seldom delivered consistently.<sup>21,22,29</sup> Also as illustrated by our data, many of these strategies (eg, see collaborative goal setting and follow-up support especially in Table 5) are under-used.<sup>3</sup>

The PACIC and its scales demonstrated substantial construct validity by correlating moderately with predicted measures including patient activation<sup>12</sup> and selected primary care scales from the modified ACES.<sup>20</sup> In contrast, PACIC scores do not appear strongly related to specific diseases or patient demographic characteristics, with the possible exception of gender ( $r$  values for gender = 0.14–0.25). Confirmation of this latter finding is recommended, but it is reassuring that most of relationships remained virtually unchanged after controlling for gender, age, and number of comorbid illnesses. Future research is needed on the PACIC, and on gender differences in particular, to determine whether these effects are caused by differences in perception or reporting or to actual differences in care received.

This study has both strengths and limitations. Limitations include a sample from only one health care organization. Although this sample was relatively heterogeneous on a variety of characteristics and included patients having a large number of different chronic illnesses, it did not include a high percentage of non-whites. Probably the single greatest limitation is that we were not able to assess sensitivity to change as a result of intervention. Future research is needed to determine if interventions based on the CCM produce improvements in relevant PACIC scores, and to explore variations across medical practices and health care systems.

Strengths of the present study include a relatively large sample size and inclusion of patients having a number of different chronic illnesses and type of comorbidity. For survey research conducted in the present era of telemarketing, we also obtained a relatively high participation rate and telephone and paper and pencil administration appear to produce equivalent results. Additional research is recommended to further explore the convergent and divergent validity of the PACIC, such as its relationship to the ACIC, self-efficacy, self-management behaviors, more sophisticated measures of comorbidity, and health care team reports on implementation of the CCM.

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## REFERENCES

1. Institute of Medicine, Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press; 2001.
2. Lenfant C. Clinical research to clinical practice—lost in translation? *N Engl J Med*. 2003;349:868–874.
3. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348:2635–2645.
4. Bodenheimer TS, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA*. 2002;288:1775–1779.
5. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q*. 1996;74:511–544.
6. Von Korff M, Gruman J, Schaefer J, et al. Collaborative management of chronic illness. *Ann Intern Med*. 1997;19:1097–1102.
7. Wagner EH, Davis C, Schaefer J, et al. A survey of leading chronic disease management programs: are they consistent with the literature? *Manag Care Q*. 1999;7:56–66.
8. Wagner EH. Chronic disease management: what will it take to improve care for chronic illness. *Effec Clin Pract*. 1998;1:1–4.
9. Wagner EH, Glasgow RE, Davis C, et al. Quality improvement in chronic illness care: a collaborative approach. *Jt Comm J Qual Improv*. 2001;27:63–80.
10. Glasgow RE, Funnell MM, Bonomi AE, et al. Self-management aspects of the improving chronic illness care Breakthrough Series: implementation with diabetes and heart failure teams. *Ann Behav Med*. 2002;24:80–87.
11. Bonomi AE, Glasgow RE, Wagner EH, et al. Assessment of chronic illness care (ACIC): a practical tool for quality improvement. *Health Serv Res*. 2001;37:791–820.
12. Hibbard JH, Stockard J, Mahoney ER, et al. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers. *Health Serv Res*. 2004;39:1005–1026.
13. Williams GC, Freedman ZR, Deci EL. Supporting autonomy to motivate patients with diabetes for glucose control. *Diabetes Care*. 1998;21:1644–1651.
14. Anderson RM, Funnell MM, Fitzgerald JT, et al. The Diabetes Empowerment Scale. *Diabetes Care*. 2000;23:739–743.
15. Institute of Medicine. *Primary Care: America's Health in a New Era*. Washington, DC: National Academy of Sciences; 1996.
16. Borowsky SJ, Nelson DB, Fortney JC, et al. VA community-based outpatient clinics: Performance measures based on patient perceptions of care. *Med Care*. 2002;40:578–586.
17. Flocke SA. Measuring attributes of primary care: development of a new instrument. *J Fam Pract*. 1997;45:64–74.
18. Safran DG, Kosinski M, Tarlove AR, et al. The Primary Care Assessment Survey: tests of data quality and measurement performance. *Med Care*. 1998;36:728–739.
19. Shi L, Starfield B, Xu J. Validating the adult primary care assessment tool. *J Fam Pract*. 2001;50:161W–175W.
20. Safran DG, Karp M, Coltin K, et al. Measuring patients' experiences with individual physicians. *J Gen Int Med*. 2005, in press.
21. Glasgow RE, Davis CL, Funnell MM, et al. Implementing practical interventions to support chronic illness self-management in health care settings: Lessons learned and recommendations. *Jt Comm J Qual Improv*. 2003;29:563–574.
22. Lorig KR, Holman HR. Self-management education: history, definition, outcomes, and mechanisms. *Ann Behav Med*. 2003;26:1–7.
23. Murray A, Safran DG. The Primary Care Assessment Survey: a tool for measuring, monitoring, and improving primary care. In: Maruish ME, ed. *Handbook of Psychological Assessment in Primary Care Settings*. Mahwah, NJ: Lawrence Erlbaum Associates; 2000:623–651.
24. Safran D, Taira D, Rogers W, et al. Linking primary care performance to outcomes of care. *J Fam Pract*. 1998;47:213–220.
25. Safran DG, Murray AM, Chang H, et al. Linking doctor-patient relationship quality to outcomes. *J Gen Intern Med*. 2000;15:116.
26. Safran DG, Montgomery JE, Chang H, et al. Switching doctors: determinants of voluntary disenrollment from a physician's practice. *J Fam Pract*. 2001;50:2:136.
27. Forness C, Larker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res*. 1981;18:39–50.
28. Bentler BP, Bonett DG. Significance tests and goodness-of-fit in the analysis of covariance structure. *Psychol Bull*. 1988;88:588–606.
29. Glasgow RE, Eakin EG, Fisher EB, et al. Physician advice and support for physical activity: results from a national survey. *Am J Prev Med*. 2001;21:189–196.



## APPENDIX

## PACIC Scale

## T1

## Your Chronic Illness Care

Staying healthy can be difficult when you have a chronic illness. We would like to learn about the type of help with your condition you get from your health care team. This might include your regular doctor, his or her nurse, or physician's assistant who treats your illness. Your answers will be kept confidential and will not be shared with anyone else.

## When I received care for my chronic illness over the past 6 months, I was:

	Almost Never	Generally Not	Sometimes	Most of the Time	Almost Always
1. Asked for my ideas when we made a treatment plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Given choices about treatment to think about.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Asked to talk about any problems with my medicines or their effects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Given a written list of things I should do to improve my health.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Satisfied that my care was well organized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Shown how what I did to take care of my illness influenced my condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Asked to talk about my goals in caring for my illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Helped to set specific goals to improve my eating or exercise.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Given a copy of my treatment plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Encouraged to go to a specific group or class to help me cope with my chronic illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Asked questions, either directly or on a survey, about my health habits.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## T2

## Over the past 6 months, when I received care for my chronic illness, I was:

	Almost Never	Generally Not	Sometimes	Most of the Time	Almost Always
12. Sure that my doctor or nurse thought about my values and my traditions when they recommended treatments to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Helped to make a treatment plan that I could do in my daily life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Helped to plan ahead so I could take care of my illness even in hard times.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Asked how my chronic illness affects my life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Contacted after a visit to see how things were going.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Encouraged to attend programs in the community that could help me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Referred to a dietitian, health educator, or counselor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Told how my visits with other types of doctors, like the eye doctor or surgeon, helped my treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Asked how my visits with other doctors were going.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Scoring of PACIC Scales:

Patient Activation	Average of Items 1-3
Delivery System Design/Practice Design	Average of Items 4-6
Goal setting/Tailoring	Average of Items 7-11
Problem-Solving/Contextual	Average of Items 12-15
Follow-up/Coordination	Average of Items 16-20

FIGURE 1. PACIC Scale, with permission from Improving Chronic Illness Care, a national program of The Robert Wood Johnson Foundation. The instrument is also available at: <http://improvingchroniccare.org/tools/pacic.htm>.