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Development and Preliminary Validation of the Patient Perceptions of Integrated Care Survey

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Abstract

Valid measures of the integration of patient care could provide rapid and accurate feedback on the successfulness of current efforts to improve health care delivery systems. This article describes the development and pilot testing of a new survey, based on a novel conceptual model, which measures the integration of patient care as experienced by patients. We administered the survey to 1,289 patients with multiple chronic conditions from one health system and received responses from 527 patients (43%). Psychometric analysis of responses supported a six-dimension model of integration with satisfactory internal consistency, discriminant validity, and goodness of fit. The Patient Perceptions of Integrated Care survey can be used to measure the integration of care received by chronically ill patients for two main purposes: as a research tool to compare interventions intended to improve the integration of care and as a quality improvement tool intended to guide the refinement of delivery system innovations.

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Introduction

Providing integrated patient care that is coordinated and patient centered is a priority for health care system improvement efforts (Singer et al., 2011). However, multiple factors have made these efforts especially challenging. Coordination is undermined by fragmentation of care among multiple providers: Each provider requires a "handoff" of patient information, which creates opportunity for failure of communication between providers, facilities, and patients (Cohen & Hilligoss, 2010). Also, despite the importance of providing care that meets patients' needs and preferences and recognizes the role of patients and family members as part of the care team, patients with multiple chronic conditions frequently do not receive patient-centered care (Haywood, Marshall, & Fitzpatrick, 2006).

National and local payers and providers have made substantial investments in efforts intended to improve the integration of patient care, such as accountable care organizations (McClellan, McKethan, Lewis, & Roski, 2010), patient-centered medical homes (Nutting et al., 2009), meaningful use of electronic health records (Center for Medicare and Medicaid Services, 2010) and episode- and performance-based payments (Rosenthal, 2008). Whether these initiatives will result in better integrated patient care—and better health outcomes and lower costs of care—is an important empirical question. If these desired outcomes do not materialize, stakeholders will need to know the nature of the failure: Did the initiative fail because integration is only weakly associated with health care costs and outcomes or because better care integration was never achieved? Even if policy actions failed to achieve better care integration as an overall construct, were there particular aspects of integration for which they succeeded?

Answers to these questions will require methods capable of providing accurate, detailed, rapid-cycle feedback on interventions' effects on the integration of care. Such feedback could enable new models of care to be refined earlier than traditional evaluation metrics (e.g., claims-based measures of redundant services) allow.

Despite this need for new measurement approaches to integration of care, valid and reliable measures are lacking. In response to this need, we developed and piloted a new survey instrument, the Patient Perceptions of Integrated Care (PPIC) survey, to measure the integration of patient care as experienced by patients. While surveying patients represents just one among many potential ways to assess the integration of care, we believe such surveys are a necessary component of the measurement set for this construct. This article presents the initial development work, response characteristics, and directions for further refinement and validation of the instrument.

New Contribution

While previous patient experience surveys address some aspects of integrated care, none do so comprehensively, and its measurement is considered an emerging

field (McDonald et al., 2010). In particular, there is a paucity of metrics of integrated patient care for specific high-risk populations, such as individuals with multiple chronic conditions. Building on the conceptual model described below, we developed a novel framework for measuring integrated care from the patient's perspective consisting of seven constructs: five aspects of coordination and two aspects of patient-centeredness (Singer et al., 2011). While prior patient experience surveys such as the clinician and group and patient-centered medical home versions of the Consumer Assessment of Health Care Providers and Systems (CAHPS) survey have domains for patient-centeredness and shared responsibility, they are not designed to measure multiple aspects of integrated patient care as defined by our conceptual model (Solomon, Hays, Zaslavsky, Ding, & Cleary, 2005). In particular, they assess integration as a single "coordination of care" domain, an approach that may limit the usefulness of survey results. In contrast, the PPIC survey offers a multidimensional assessment of integrated care that could provide more detailed guidance to managers seeking to improve the integration of care received by their patients.

Conceptual Model

The conceptual model underlying the PPIC survey (Table 1) was developed in consultation with a panel of experts on delivery system integration, patient experience, and survey development (names of expert panelists available from authors on request). Investigators met with various experts individually, on regular conference calls, and collectively through a day-long roundtable-format retreat held June 2009. The model rests on two critical insights (Singer et al., 2011). The first is that the integration of organizations and their activities is conceptually distinct from the integration of *care* actually delivered to patients (Ouwens, Wollersheim, Hermens, Hulscher, & Grol, 2005). Although these objects of integration are often linked, the relationships between integrated organizations, integrated patient care, and better health and financial outcomes are not guaranteed. While some evidence suggests "integrated delivery systems" may be associated with better quality and efficiency (Tollen, 2008), few studies have linked integrated care to patient outcomes, in part due to a dearth of measures.

We believe that the relationships between organizational antecedents including context, structure, and processes (e.g., integrated delivery systems, interoperable electronic medical records, and home visits following hospital admission), and the degree to which patients actually receive care that is integrated must be verified empirically. The same is true of the association between integrated patient care and health and financial outcomes.

The second insight underlying our conceptual model is that a definition of integration that takes patient care as its exclusive object implies recognition of the central role of the patient. We thus contend that achieving integrated care requires delivering care that is not only coordinated but also patient-centered (i.e., accounts for patients' needs, preferences, and the important role that patients and family members play as active participants in care).

Table 1. Conceptual Framework of Integrated Care From the Patient's Perspective

Construct	Description
1. Coordination within care team	Individual providers comprise a "care team" that delivers consistent and informed patient care and administrative services for individual patients, regardless of the care-team member providing them. The care team may include physicians, nurses, other clinicians, support staff, and administrative personnel who routinely work together to provide medical care for a specified group of patients.
2. Coordination across care teams	All care teams that interact with patients, including specialists, hospital personnel, and pharmacies, deliver consistent patient care and administrative services, regardless of the team providing them.
3. Coordination between care teams and community resources	Care teams consider and coordinate support for patients by other teams offered in the community (e.g., Meals on Wheels).
4. Continuity: familiarity with patient over time	Care-team members are familiar with the patient's past medical condition and treatments.
5. Continuity: proactive and responsive action between visits	Care-team members reach out and respond to patients before, following and between visits; patients can access care and information 24/7.
6. Patient-centeredness	Care-team members design care to meet the patient's needs and preferences, as well as those of family members and other informal caregivers.
7. Shared responsibility	Both the patient and his or her family and care-team members are responsible for the provision of care and maintenance of good health; processes enhance patients' engagement in self-management.

Method

Instrument Development

We developed the PPIC survey based on our conceptual framework. We identified potential items through review of nine existing patient experience surveys with related constructs (e.g., "integration," coordination, patient-centeredness; Singer et al., 2011). We engaged in iterative discussion and refinement with expert-panel members to identify components of our theoretical framework that were not covered satisfactorily by existing surveys, adapt existing items that represented our dimensions, and create new items to fill conceptual gaps.

We generated 108 potential items representing the seven dimensions in our framework. To limit redundancy and respondent burden, we reduced the number of items and then refined the survey through expert review and cognitive testing with patients to ensure item clarity and consistent interpretation. The cognitive testing resulted in

largely superficial modifications (e.g., adding bold print for emphasis), clarifications (e.g., restating the time frame within the question in addition to the instructions), and simplifications (e.g., changing "doctors, nurses, or other staff" to "other health providers"). The final pilot version of the survey included the 29 items considered most relevant to integrated care and 14 items eliciting demographic characteristics or triggering applicable skip patterns (survey instrument available from authors on request). Following the convention of the CAHPS surveys, PPIC items used *yes*/*no* or 4-point *always*/*usually*/*sometimes*/*never* response scales. Items unique to the PPIC survey include those that assess the degree of care coordination within a primary care practice (a domain of increasing importance in settings involving patient-centered medical home models, which frequently rely on greater teamwork within practices; Margolius & Bodenheimer, 2010) and the degree to which specialists and hospitals share sufficient patient information to provide necessary, nonduplicative care (a domain particularly important to accountable care organizations).

Piloting

We pilot tested the PPIC survey within a safety-net health system in Massachusetts that included 13 primary care clinics. We targeted patients with multiple chronic conditions because theoretically they were the most likely to benefit from improved integration. Additionally, these patients were unlikely to experience "trivial" integration of care (i.e., "integration" occurring when a basically healthy patient sees only one provider).

To determine our sample, the health system used its data warehouse to identify patients with two or more chronic conditions who had received care in the past 6 months. Patients were not excluded based on specific health conditions or age. The health system then extracted electronic medical record information to determine the provider and clinic that each patient visited most frequently during this period as well as each patient's language preference, age, gender, and race. We randomly selected up to 100 such patients in each clinic. One clinic had only 89 associated chronically ill patients. Thus, our total sample included 1,289 patients, representing from 10% to 100% (mean 19%) of clinics' patients with multiple chronic conditions.

We administered the survey by mail between February and May 2010 in three waves. We offered the survey in English, Spanish, and Portuguese and provided telephone-based interpreter services for those wishing assistance. Parents or caregivers completed the survey for children or patients unable to complete it themselves. The survey instructed individuals completing the survey on someone's behalf to answer according to their understanding of the patient's experiences with medical providers. All sampled patients were entered into a lottery to win one of five $50 gift certificates to a local supermarket.

Statistical Analysis

Our initial evaluation of PPIC responses focused on assessing survey properties, determining the survey's latent scale structure, and assessing the internal consistency,

discriminant validity, and goodness of fit of these scales. Because of our small sample size, we conducted all analyses in the full sample, rather than in derivation and validation halves. Thus all analyses must be considered exploratory.

First, we examined survey properties by measuring item and unit nonresponse, percentage top box (the percentage of respondents reporting the most positive response; a common approach to reporting patient experience measures (CAHPS Database, 2010)), mean, and variance. In assessing unit nonresponse, we compared response rates by known administrative characteristics of the sampled patients (age, gender, and race). We used a Fisher's exact test to evaluate differences between the full sample of patients and the subgroup that responded. We also estimated a logistic regression model of unit nonresponse with fixed effects for these covariates. Next, to determine the survey's latent scale structure, we followed a strategy similar to that used for analyzing the three-state CAHPS Hospital pilot survey by calculating the covariance matrix of variables in a pairwise fashion (O'Malley et al., 2005). Our inference method rests on the "missing-completely-at-random" assumption, which assumes that data missing because of item nonresponse as well as skip patterns are randomly distributed among respondents (Little & Rubin, 2002). While missing-completely-at-random is the default assumption for this methodological approach, uniform nonresponse is a relatively strong assumption that may not have been met, potentially introducing some bias in our results. With this covariance matrix we conducted individual-level exploratory factor analysis with patients as the unit of analysis. We followed an eigenvalues-greater-than-one decision rule and considered interpretability of the factor pattern matrix to determine the appropriate number of factors to extract. We then applied a Promax (oblique) rotation to identify a simple structure that included coherent and relatively independent item groupings (Pett, Lackey, & Sullivan, 2003).

We examined the internal consistency of each factor by calculating Cronbach's alphas and discriminant validity by comparing the strength of each factor's internal consistency with its correlations with remaining scales. To explore the goodness of fit of the selected model, we calculated indices by applying criteria from Brown (2006), using the SAS procedure for confirmatory factor analysis.

A one-way analysis of variance for each survey item and dimension generated intraclass correlations assessing within-group versus between-group variance, allowing us to understand the extent to which patient assessments of integrated care in 13 clinics could be regarded as clinic-level characteristics.

We performed psychometric analysis using SAS® version-9 (SAS Institute, Cary, NC) and other analyses with Stata®-10. Institutional review boards at participating institutions approved this study.

Results

Sample Characteristics

We received 527 responses for an overall response rate of 43%, after excluding 58 surveys returned as undeliverable, a rate similar to other widely used patient

surveys (Anastario et al., 2010; Rodriguez & Crane, 2011). Response rates varied by language preference—from 45% for English to 24% for Portuguese. The lower response rate among respondents to the Portuguese survey is because of its late inclusion in the study (in response to requests from providers), resulting in only two waves of fielding in Portuguese.

Respondents were predominantly English speaking (Table 2). More than one third of respondents were 55 years old or more and 65% were female. Forty percent of respondents were non-White, and more than one fifth described themselves as Hispanic. More than 20% of respondents also reported having at least a 4-year college degree, and almost one third of respondents described themselves as being in fair or poor health.

The relatively small sample size for respondents 75 years or older limits our power to test nonresponse rates in this category. Younger subgroups had significantly lower-than-average response rates relative to the total sample population (28% for the subgroup aged 18-24 years and 33% for those aged 25-34 years), and the older subgroup (aged 65-74years) had significantly higher-than-average response rates (57%). In multiple logistic regression, adjusted response rates also increased with age ($p < .001$).

Survey Properties

Missing data followed predictable patterns related to skip questions (Table 3). Among respondents, two thirds reported seeing a doctor other than their primary doctor in the past 6 months, almost half had received a prescription from another doctor or had seen a doctor from another clinic, and more than half had an appointment with a specialist. Only 12% had a hospital admission in the 6 months prior to being surveyed. Due to the resulting small number of responses regarding hospitalization, we do not report results regarding integration of hospital care. For items relevant to given respondents, nonresponse was less than 5% (with the exception of Question 33, with 7%).

Most responses were positive or strongly positive, suggesting that on average patients perceived their care as integrated. For items using an *always*/*often*/*sometimes*/*never* scale, the percentage of responses in the top box ranged from 45% (Question 11: "How often did your doctor ask you for your ideas about managing your health?") to 70% (Question 17: "When you get a blood test, X-ray, or other test at your doctor's office, how often do you find out what the test showed?"). Mean scores for items using this four-point response scale ranged from 3.0 to 3.6 with standard deviation of at least 0.7.

For items using a *yes*/*no* response scale, the rate of top-box response ranged from 38% (Question 12: "In the past 6 months, did your doctor or staff in your doctor's office ever ask if you need help at home in managing your health conditions?") to 93% (Question 27: Do you think your doctor knows that you have received care from this specialist?"). Three items using this response scale had rates of top-box responses exceeding 90%, suggesting that these items may not achieve satisfactory variance as written. An additional seven items had more than 80% positive response. Notably, high means characterized all items related to specialists.

Table 2. Sample and Respondent Characteristics

	Respondents		Total Sample		Excluded	
	N	Percentage	*N*	Percentage	*N*	Percentage
Total	527	100	1,289	100	58	100
Languages[a]						
English	447	85	1,020	79	31	53
Spanish	47	9	115	9	9	16
Portuguese	33	6	154	12	18	31
Integration requirements[b]						
Multiple clinicians (Question 4)	347	66				
Other clinician prescriptions (Question 8)	257	49				
Other clinic provider (Question 21)	246	47				
Specialist (Question 25)	284	54				
Hospital admission (Question 34)	64	12				
						Percent Response Within This Category
Age (years)[a]						
18-24	74	14	263	20		28
25-34	70	13	209	16		33
35-44	75	14	196	15		38
45-54	123	23	277	22		44
55-64	97	18	183	14		53
65-74	60	11	105	8		57
≥75	28	5	53	4		53
Gender[a]						
Male	180	34	474	37		38
Female	347	66	812	63		43
Race[a]						
White	314	60	719	56		44
Black	77	15	207	16		37
Asian	19	4	45	3		42
Others	97	18	265	21		37
Unknown	19	0	48	4		40
Decline	1	0	2	0		50
Ethnicity[b]						
Hispanic	103	22				
Not Hispanic	374	78				

(continued)

Table 2. (continued)

	Respondents		Total Sample		Excluded	
	N	Percentage	*N*	Percentage	*N*	Percentage
Education[b]						
Eighth grade or less	64	13				
Some high school	60	12				
High school graduate/GED	148	29				
Some college/2-year degree	120	24				
4-year college graduate	61	12				
More than 4-year college degree	54	11				
Health self-rating[b]						
Excellent	64	13				
Very good	133	26				
Good	158	31				
Fair	130	25				
Poor	29	6				

Note: N/A = not applicable.
a. Information provided by the health system.
b. Information provided by respondents. Respondent demographics refer to the individual completing the survey, not necessarily the patient. Twenty-five respondents (5%) were caregivers.

Exploratory Factor Analysis

Given the low rate of hospital admission among respondents, we conducted two exploratory factor analyses, one including and one excluding items querying aspects of hospital care. Results were consistent between the two approaches but more easily interpretable without the hospital items, so we excluded these from the main pilot analyses.

Applied to the set of 25 items, excluding those related to hospitals, Kaiser's eigenvalues-greater-than-one criterion suggested retention of seven factors (Table 4). Using a .40 threshold for factor loadings after rotation, all but four items grouped onto at least one factor. Nine items had loadings of at least .30 on multiple factors. Where cross-loadings existed, the primary loadings were, in general, substantially higher. We assigned these items to the factors with the highest loading. We eliminated Question 32, which asks respondents whether they were confused about managing their condition after their last specialist visit, because its loadings on the third and seventh factors were nearly equal (.50 and .48, respectively).

Information related to the reliability of the scales can be found in Table 5, which presents the scale internal consistency estimates on the diagonal. Six of the seven empirically derived factors met or nearly met conventional standards (Cronbach's $\alpha > .70$),

Table 3. Item Response, Mean, and Standard Deviation

Item Number/Item Text[a]	*N*	Response Scale[b]	Percentage Top Box	Mean	*SD*
Question 3. Did you ever receive a call prior to your appointments telling you what to expect or how to prepare?	511	Y/N	65	0.65	0.48
Question 5. Did you and your doctor talk about the care you received from these other doctors?	344	Y/N	76	0.76	0.43
Question 6. How often do you think your doctor knows when you receive care from these other doctors?	344	A/U/S/N	58	3.34	0.89
Question 7. In the past 6 months, did your doctor ever give you instructions for managing a health problem that disagreed with what another doctor told you to do? (R)	342	Y/N	83	0.83	0.38
Question 9. In the past 6 months, how often did your doctor or staff in your doctor's office ask you about medicines you were prescribed by other doctors?	259	A/U/S/N	51	3.02	1.16
Question 10. Thinking back about the care you received in the past 6 months, how often do you think your doctor understood the things that really matter to you about your health care?	509	A/U/S/N	67	3.56	0.71
Question 11. How often did your doctor ask you for your ideas about managing your health?	513	A/U/S/N	45	3.09	0.98
Question 12. In the past 6 months, did your doctor or staff in your doctor's office ever ask if you need help at home in managing your health conditions?	512	Y/N	38	0.38	0.49
Question 13. Did your doctor or staff in your doctor's office talk to you about resources available in your neighborhood to support you in managing your health conditions?	509	Y/N	44	0.44	0.50
Question 14. In the past 6 months, did you ever leave your doctor's office confused about what to do next to manage your health conditions? (R)	514	Y/N	88	0.88	0.32
Question 15. If you had a question about managing your health conditions today, would you know how to get answers you trust?	509	Y/N	90	0.90	0.30
Question 16. In the past 6 months, has your doctor or staff in your doctor's office contacted you to ask about your condition?	510	Y/N	41	0.41	0.49

(continued)

Table 3. (continued)

Item Number/Item Text[a]	*N*	Response Scale[b]	Percentage Top Box	Mean	*SD*
Question 17. When you get a blood test, X-ray, or other test at your doctor's office, how often do you find out what the test showed?	515	A/U/S/N	70	3.54	0.79
Question 18. When you received the test results, how often did you get them within 2 weeks after the test?	512	A/U/S/N	51	3.25	0.91
Question 19. When you received the test results, how often were they easy to understand?	513	A/U/S/N	64	3.49	0.79
Question 22. How often do you think these other health care providers knew about all of the medical services you received from your doctor?	243	A/U/S/N	49	3.25	0.87
Question 23. How often do you think these other health care providers really understood all of your important medical information?	243	A/U/S/N	53	3.31	0.85
Question 24. How often did you and your doctor talk about care you received from these other health care providers?	249	A/U/S/N	47	3.00	1.09
Question 27. Do you think your doctor knows that you have received care from this specialist?	283	Y/N	93	0.93	0.26
Question 28. Thinking about your most recent appointment with this specialist, were you seen as soon as you needed to be seen?	286	Y/N	91	0.91	0.29
Question 29. Was the cost of seeing this specialist difficult for you to afford? (R)	278	Y/N	83	0.83	0.38
Question 30. At your last visit, do you think this specialist knew all of the medications you were taking?	283	Y/N	92	0.92	0.27
Question 31. At your last visit, do you think this specialist really understood all of your important medical information?	282	Y/N	89	0.89	0.31
Question 32. After your last visit, did you leave the specialist confused about what to do next to manage your health conditions? (R)	287	Y/N	86	0.86	0.35
Question 33. In general, do you think the doctors that you see communicate with each other about your care?	274	Y/N	81	0.81	0.39

a. Omitted item numbers represent skip questions. "R" indicates that an item has been reverse scored.
b. Response scales were either *yes*/*no* ("Y/N") or always/usually/sometimes/never ("A/U/S/N").

Table 4. Patient-Level Exploratory Factor Analysis

Item Number/Item text	Factor 1: Information Flow to Your Doctor	Factor 2: Postvisit Information Flow to the Patient	Factor 3: Information Flow to Your Specialist	Factor 4: Coordination With Home and Community Resources	Factor 5: Information Flow to Other Providers in Your Doctor's Office	Factor 6: Patient-Centeredness	Factor 7: Orphan Items
Question 5. Did you and your doctor talk about the care you received from these other doctors?	.67						
Question 6. How often do you think your doctor knows when you receive care from these other doctors?	.58						
Question 27. Do you think your doctor knows that you have received care from this specialist	.58						
Question 9. In the past 6 months, how often did your doctor or staff in your doctor's office ask you about medicines you were prescribed by other doctors?	.49						
Question 24. How often did you and your doctor talk about care you received from these other health care providers?	.47	.38					
Question 33. In general, do you think the doctors that you see communicate with each other about your care?	.43		.31				
Question 17. When you get a blood test, X-ray, or other test at your doctor's office, how often do you find out what the test showed?		.71					

(continued)

Table 4. (continued)

Item Number/Item text	Factor 1: Information Flow to Your Doctor	Factor 2: Postvisit Information Flow to the Patient	Factor 3: Information Flow to Your Specialist	Factor 4: Coordination With Home and Community Resources	Factor 5: Information Flow to Other Providers in Your Doctor's Office	Factor 6: Patient-Centeredness	Factor 7: Orphan Items
Question 18. When you received the test results, how often did you get them within 2 weeks after the test?		.70					
Question 19. When you received the test results, how often were they easy to understand?		.62					.30
Question 31. At your last visit, do you think this specialist really understood all of your important medical information?			.71				
Question 30. At your last visit, do you think this specialist knew all of the medications you were taking?			.58				
Question 32. After your last visit, did you leave the specialist confused about what to do next to manage your health conditions?			.50				.48
Question 28. Thinking about your most recent appointment with this specialist, were you seen as soon as you needed to be seen?			.49				

(continued)

Table 4. (continued)

Item Number/Item text	Factor 1: Information Flow to Your Doctor	Factor 2: Postvisit Information Flow to the Patient	Factor 3: Information Flow to Your Specialist	Factor 4: Coordination With Home and Community Resources	Factor 5: Information Flow to Other Providers in Your Doctor's Office	Factor 6: Patient-Centeredness	Factor 7: Orphan Items
Question 13. Did your doctor or staff in your doctor's office talk to you about resources available in your neighborhood to support you in managing your health conditions?				.69			
Question 12. In the past 6 months, did your doctor or staff in your doctor's office ever ask if you need help at home in managing your health conditions?				.68			
Question 16. In the past 6 months, has your doctor or staff in your doctor's office contacted you to ask about your condition?				.46			
Question 3. Did you ever receive a call prior to your appointments telling you what to expect or how to prepare?	.32			.37			
Question 23. How often do you think these other health care providers really understood all of your important medical information?		.30			.80		
Question 22. How often do you think these other health care providers knew about all of the medical services you received from your doctor?	.30	.41			.54		

(continued)

Table 4. (continued)

Item Number/Item text	Factor 1: Information Flow to Your Doctor	Factor 2: Postvisit Information Flow to the Patient	Factor 3: Information Flow to Your Specialist	Factor 4: Coordination With Home and Community Resources	Factor 5: Information Flow to Other Providers in Your Doctor's Office	Factor 6: Patient-Centeredness	Factor 7: Orphan Items
Question 11. How often did your doctor ask you for your ideas about managing your health?	.31			.30		.62	
Question 10. Thinking back about the care you received in the past 6 months, how often do you think your doctor understood the things that really matter to you about your health care?	.43					.57	
Question 14. In the past 6 months, did you ever leave your doctor's office confused about what to do next to manage your health conditions?							.46
Question 7. In the past 6 months, did your doctor ever give you instructions for managing a health problem that disagreed with what another doctor told you to do?							.34
Question 29. Was the cost of seeing this specialist difficult for you to afford?							.32
Question 15. If you had a question about managing your health conditions today, would you know how to get answers you trust?							.28

Note: Factor loadings less than .28 are suppressed.

Table 5. Internal Consistency Estimates, Interscale Correlations, and Intraclass Correlations

Factor Number and Name	Factor 1: Information Flow to Your Doctor	Factor 2: Postvisit Information Flow to the Patient	Factor 3: Information Flow to Your Specialist	Factor 4: Coordination With Home and Community Resources	Factor 5: Information Flow to Other Providers in Your Doctor's Office	Factor 6: Patient-Centeredness	Factor 7: Orphan Items
Factor 1: Information Flow to Your Doctor	(.80)						
Factor 2: Postvisit Information Flow to the Patient	.72	(.77)					
Factor 3: Information Flow to Your Specialist	.35	.31	(.62)				
Factor 4: Coordination With Home and Community Resources	.67	.40	.14	(.69)			
Factor 5: Information Flow to Other Providers in Your Doctor's Office	.64	.69	.54	.31	(.80)		
Factor 6: Patient-Centeredness	.84	.62	.37	.57	.53	(.72)	
Factor 7: Orphan Items							(.43)
Intraclass correlation: ICC-1	.01	.01	.02	.03	.01	.00	
Intraclass correlation: ICC-2	.34	.20	.31	.57	.09	.15	

Note: Internal consistency estimates are presented on the diagonal. Interscale correlations are below the diagonal.

ranging from .62 to .80; reliability for the seventh factor was .43. The four items that loaded with the seventh factor, two of which might have formed the basis of a shared responsibility domain (Question 14, Question 15), generally reflected patients' confusion in their interactions with the health care system. Given low loading of items to this factor, low reliability, and inconsistency with our theoretical model, we omitted this factor from further analysis. The selected six-factor model had adequate fit on standard indices (Brown, 2006): goodness-of-fit index (GFI) of .90, adjusted GFI of .87, root mean square residual (RMR) of .02, and RMSEA estimate of .07 (90% confidence interval = 0.06-0.08).

The pattern of factor correlations observed was generally consistent with our expectations for valid measures of related, yet distinct, aspects of integrated care. Correlations among the six factors ranged from .14 to .84 (absolute value) with a mean of .51. Alpha coefficients (diagonal entries) were considerably higher than the inter-scale correlations (off-diagonal entries), with 2 exceptions out of 30 comparisons, supporting the conclusion that the scales are not interchangeable, but instead are measures of distinguishable aspects of integrated care.

Also in Table 5, intraclass correlation coefficients (ICC-1) for factor scores based on an average of 48 patients per clinic ranging from .032 to .004 were not statistically significant. Corresponding reliabilities of clinic-level means (ICC-2) ranging from .57 to .09, similarly did not suggest sufficient within-group versus between-group agreement at the clinic level to warrant clinic-level analysis in our study sample.

Taken together, exploratory results implied the following factor interpretations, with five factors assessing aspects of care coordination and the sixth assessing patient-centeredness. The coordination-oriented factors included *Information Flow to Your Doctor* (*Factor 1*), which consisted of six items reflecting matters of coordination and communication between patients, their primary doctors, and doctors outside the clinic. A second factor, *Information Flow to Your Specialist* (*Factor 3*), included three items focused on similar issues among patients and their specialists. Similarly, two items comprising the factor *Information Flow to Other Providers in Your Doctor's Office* (*Factor 5*) assessed coordination and communication among care team members within the clinic. *Factor 4* was labeled *Coordination With Home and Community Resources*; it included four items addressing a primary doctor's effort to coordinate resources in his or her patients' home and community. We called the last coordination factor *Postvisit Information Flow to the Patient* (*Factor 2*), as its three items focused on continuity with a patient following an office visit. Finally, *Factor 6* was *Patient-Centeredness*, including two items about the responsiveness of the medical system to the patient's ideas and concerns. The concepts of continuous familiarity with patient over time and shared responsibility—two of the dimensions in the original conceptual model—were not clearly articulated through psychometric assessment, and proactive and responsive action between visits was only partially articulated with a focus on responsive action following visits in Factor 2.

Discussion

Our analysis of responses to a pilot survey developed to measure aspects of integrated care suggests a six-dimension measurement framework that is largely consistent with our theoretical model and that can be used by health-system reformers to gauge the ongoing progress of their initiatives. Overall, empirical support for this model is strong for a pilot survey, with item factor loadings, internal consistency, discriminant validity, and goodness of fit for the six-factor model meeting standard statistical criteria (Brown, 2006). These six dimensions of integration represent an advance over prior surveys with single integration domains because they allow more detailed identification of components of integrated care that are successfully or unsuccessfully addressed by given interventions. Additionally, more precise characterization of successes and opportunities may make survey results more actionable, allowing data-driven, rapid-cycle adjustment of improvement initiatives. However, results from this initial exploration of the PPIC survey are preliminary and should be retested after implementing survey modifications suggested by the present analysis.

Response patterns provide expected, albeit sobering, results: While most patients view their care as well integrated, a significant portion of patients recount problems with integration, particularly regarding providers communicating with patients and coordinating with resources to care for them in the home environment. High means for several items, particularly in the area of information flow to specialists, suggest that revisions to these items are needed to enhance variance.

While there was considerable overlap between the empirically derived, six-factor model and our theoretical factors, differences highlight opportunities for refining both our theoretical model and the PPIC survey instrument. Specifically, results suggest that patients perceive dimensions of integration that are more provider specific (i.e., related to particular doctors and sites of care) and unidirectional (i.e., assessing information flow *to* a given doctor) than those represented in our conceptual framework (e.g., coordination within teams, coordination across teams). In the theoretical model of integration, therefore, it may be appropriate to separate dimensions of coordination according to the direction of information flow, since this flow may not be symmetric between providers. For example, the theoretical model component "coordination within the care team" might need to consider separately information flow to primary doctors and to other care team members. Similarly, "coordination across care teams" may require separate consideration of information flow to and from specialists. For parallel reasons, issues originally described collectively as "continuity, proactive and responsive action between visits" might be divided into dimensions addressing, previsit coordination, postvisit coordination, and responsiveness outside visits.

The pilot administration of the PPIC survey revealed additional opportunities for improving the instrument and its administration. First, items with low variation (high means and low standard deviations) and scaling failures (high correlation with scales other than their assigned scale) will be reworded or replaced to achieve more variance and reduce cross-loading. For example, rewording items to apply a four-point rather

than a dichotomous choice might substantially increase variation. In addition, items will be added or reworded to bolster reliability of weaker constructs and those that were not fully articulated in our exploratory analysis. For example, "continuous familiarity with patient over time" might be better distinguished from other dimensions with an item that asks, "In general, when you see your primary provider, how often do you have to repeat information you have already given to someone in your provider's office?" Similarly, shared responsibility could be represented with questions like "In the past 6 months, how often have you and anyone from your provider's office talked about what to do if you have a bad reaction to your medicine?"

The survey response rate, though relatively strong for a pilot, leaves open the possibility for selection bias and thus more uniform responses than we might have received from a more representative sample. As with all patient surveys, additional ways to encourage survey response, including incentives and advertisement by the clinics, should be considered when administering the PPIC. In particular, our subgroup analysis, which found differences in adjusted response rates by age, suggests that monitoring and targeted prenotification for underrepresented groups may be warranted (Klein et al., 2011). Substantially lower response to items relating to respondents' latest hospital admission suggests that future sampling protocols should oversample patients with recent hospitalizations. In addition, ICC analysis based on pilot results from a single delivery system suggests that a larger sample size per clinic or greater between-clinic response diversity may be necessary for detecting significant between-group differences.

More empirical work will be required to assess the instrument by confirming scale reliability in a second sample and by comparing patients' perceptions with additional measures of care integration. Such comparisons would lend criterion validity to our instrument by measuring the sensitivity and specificity of patients' reports of integration. In the absence of clear evidence to the contrary, patients may assume that their care is highly integrated even when it is not—but the degree to which patients give providers this benefit of the doubt is unknown. Additional research is also necessary to relate patient experience of integrated care to high-priority financial and clinical outcomes.

Implications for Research and Practice

Items and dimensions covered in the PPIC survey suggest strong potential for creating a reliable and valid method for assessing integrated care through patient surveys. For research purposes, this measurement tool would enable the examination of hypothesized relationships: whether integration as experienced by patients relates to their financial and health outcomes and what organizational contexts, structures, and processes enhance the ability of organizations to provide such care. Also interesting would be the discovery of interaction effects, since the degree to which more integrated care affects patient outcomes may depend on underlying characteristics of patients (e.g., medical complexity) and health systems (e.g., number of distinct providers seen by a patient).

Future survey instruments incorporating scales from the PPIC survey could give health delivery reformers and policy makers an unprecedented ability to evaluate initiatives designed to reward and improve integrated patient care, such as bundled payments—before the ultimate manifestation of effects on costs and health outcomes. Initiatives such as incentives to adopt electronic health records (and some forms of pay-for-performance) were undertaken to improve the integration of patient care; while these reforms enjoy broad support, some may be more effective than others, and the PPIC survey may provide an ability to bring the patient's perspective to bear in identifying the most promising among them. Although the types of data collected through the PPIC survey hold potential to complement existing public reporting, the practical use of the PPIC survey in this way is currently limited by its length and specialization. Rather, targeted use of the survey for internal quality improvement and research purposes is its most likely use.

Conclusion

By measuring an important conceptual antecedent to better, more efficient care, the PPIC survey can provide novel information for health services research and health care improvement. The PPIC and related measures of the integration of patient care may enable new types of patient-centered outcomes research, timelier comparative effectiveness studies, and more rapid and reliable feedback about the effectiveness of delivery system innovations. In turn, identifying the most promising approaches to providing more integrated care would facilitate their broader dissemination.

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Authors' Note

The views expressed in this article are those of the authors and not necessarily those of the individuals or organizations that contributed to its development.

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