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Patients' Experience of Specialty Care Coordination: Survey Development and Validation

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Purpose	Specialty care coordination relies on information flowing bidirectionally between all three participants in the “specialty care triad” — patients, primary care providers (PCPs), and specialists. Measures of coordination should strive to account for the perspectives of each. As we previously developed two surveys to measure coordination of specialty care as experienced by PCPs and specialists, this study aimed to develop and evaluate the psychometric properties of a related survey of specialty care coordination as experienced by the patient, thereby completing the suite of surveys among the triad.
Methods	We developed a draft survey based on literature review, patient interviews, adaptation of existing measures, and development of new items. Survey responses were collected via mail and online in two waves, August 2019–November 2019 and September 2020–May 2021, among patients (N=939) receiving medical specialty care and primary care in the Veterans Affairs health system. Exploratory and confirmatory factor analysis were used to assess scale structure. Multiple linear regression was used to examine the relationship of the final coordination scales to patients' overall experience of specialty care coordination.
Results	A 38-item measure representing 10 factors that assess the patient's experience of coordination in specialty care among the patient, PCP, and specialist was finalized. Scales demonstrated good internal consistency reliability and, together, explained 59% of the variance in overall coordination. Analyses revealed an unexpected construct describing organization of care between patient and specialist that accounted for patient goals and preferences; this 10-item scale was named Patient-Centered Care Coordination.
Conclusions	The final survey, Coordination of Specialty Care – Patient, or CSC-Patient for short, is a reliable instrument that can be used alone or with its companions (CSC-PCP, CSC-Specialist) to provide a detailed assessment of specialty care coordination and identify targets for coordination improvement. (<i>J Patient Cent Res Rev.</i> 2023;10:219-230.)
Keywords	patient experience; coordinated care; psychometrics; specialty care; survey methods

Specialty care referrals are plagued with the challenges of organizing care for a given patient between multiple clinicians, across settings, and over time. This care fragmentation incurs patient

dissatisfaction,¹ clinician burnout,² increased costs,² worse clinical status,³ and adverse events.⁴ Care coordination reduces these risks,^{5,6} but valid and reliable measures are needed to guide selection of targets and evaluate coordination improvement efforts.

In the case of specialty care, information flows bidirectionally along each side of the specialty care “triad” — between patient and primary care provider (PCP), between patient and specialist, and between PCP and specialist. Patient/PCP interactions include the referral decision and integration of specialist recommendations

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into the overall plan. Patient/specialist interactions require sharing information about the patient's condition, contextual factors, and treatment plan. PCP/specialist interactions require transfer of information about the patient's care before and after each encounter. At every step, triad members have overlapping, but not identical, needs. Hence, each has different criteria for what constitutes successful coordination.

A comprehensive assessment of specialty care coordination must account for the common and unique elements of coordination from each triad member's perspective. First, this approach allows an empiric assessment of which organizational structures and processes to coordinate specialty care are most efficacious for each triad member. Second, it allows evaluation of how successful coordination, as defined by each member, relates to outcomes.

Our research group previously developed Coordination of Specialty Care surveys to measure the experience of PCPs⁷ and specialists.^{8,9} Guided by the triad model, our objective in this study was to develop and assess the psychometric characteristics of a third survey focused on patient experiences: the Coordination of Specialty Care – Patient (CSC-Patient) survey. This work was guided by our conceptual model of the specialty triad and the need for a detailed assessment of patient/specialist coordination. This sets our efforts apart from other patient surveys that evaluate coordination but focus on the primary care context, including the Patient Perceptions of Integrated Care (PPIC) survey,¹⁰ Consumer Assessment of Healthcare Providers and Systems (CAHPS[®]),¹¹ and the U.S. Department of Veterans Affairs (VA) Survey of Healthcare Experiences of Patients (SHEP). SHEP draws items from CAHPS and is used by VA's Office of Reporting, Analytics, Performance, Improvement, and Deployment in three different versions to measure veterans' experience of VA outpatient primary care, VA outpatient specialty care, and VA-paid care received in the community.¹² Validation of the CSC-Patient survey could give health systems a patient-centered tool for measuring their performance in delivering well-coordinated specialty care.

METHODS

The VA Bedford Healthcare System Institutional Review Board approved this study.

Conceptual Framework

In a previous qualitative study with VA patients, PCPs, and specialists, we identified 5 overarching domains of specialty care coordination common to all triad members: 1) clear and timely communication; 2) clear

roles and responsibilities; 3) strong relationships with each other; 4) timely and well-organized data transfer; and 5) an organizational structure that supports the other 4 domains.¹³ Within these domains, the specific experiences (subdomains) that represented coordinated specialty care differed across triad members. The domains and the patient-specific subdomains, enriched by literature review, provided the constructs guiding survey development reported herein.

Identification and Refinement of Candidate Items

The CSC-Patient is a companion to the CSC-PCP⁷ and CSC-Specialist^{8,9} surveys. Our target was a survey to assess the patient experience of specialty care coordination in terms of patient/PCP interactions, patient/specialist interactions, and the effect of PCP/specialist interactions on patients that could also provide actionable targets for improvement. We aimed for applicability independent of disease and practice setting with only minimal changes to language. We first adapted items from existing validated surveys. We reviewed 101 existing surveys^{11,14-17} and identified 16^{10,18-32} that (a) measured patients' perspective for adult outpatient care, (b) were not disease-specific, (c) focused on patient experience rather than satisfaction, and (d) had empirical evidence of reliability and validity. Most measures focused on primary care rather than specialty care, with limited coverage of the patient/specialist interaction. This gap justified our creating a new survey.

We developed a list of candidate items from the 16 relevant surveys for each conceptual framework domain, maintaining scales when appropriate, and selected those most closely matching the patient experience of that domain. We adapted language as needed for consistency across items. Ultimately, we drew items from the CAHPS survey,¹¹ PPIC survey,¹⁰ national VA surveys of health care experience (including SHEP),^{31,33} and the Ambulatory Care Experiences Survey (ACES).²² We developed new items to address gaps and reviewed all items with a 9-member expert panel with expertise in care coordination, patient-centered care, survey methods, and clinical care. We refined items for clarity and relevance over 2 rounds of cognitive interviews with 9 VA patients in total.

The draft CSC-Patient survey had a core of 43 items about specialty care coordination as experienced by the patient directly (patient/PCP, patient/specialist) or indirectly (PCP/specialist). This included one preexisting scale: a CAHPS 4-item scale about provider communication. We used a 5-point response scale for all items from 1 (strongly disagree) to 5 (strongly agree). We included a single-item measure about overall coordination across the triad ("Overall, how would you rate how well your

PCP and specialist coordinated care for your health condition?), which was scored on a 5-point scale from 1 (poor) to 5 (excellent).

We added items that could help interpret any observed patterns in collected data: demographic information, self-reported physical and mental health as measured by the Veterans RAND 12-Item Health Survey (VR-12),³⁴ caregiver involvement, overall satisfaction with VA care, a list of methods used to coordinate care, and the Life Orientation Test of Optimism/Pessimism – Revised (LOT-R).³⁵ The final draft survey included 82 questions.

Survey Administration

Sample. We administered the survey to 5923 patients in VA health care across the United States. Eligible respondents (N=5441) were those ≥ 18 years old who, in the 6 months prior to sample selection, saw a clinician in 1 of 8 medical subspecialties as a new patient, defined as having had no visit within the prior 2 years, and also saw their PCP within 3 months prior to the index subspecialty care visit. Subspecialties included were cardiology, endocrinology, gastroenterology/hepatology, hematology/oncology, neurology, nephrology, pulmonary medicine, and rheumatology.

Data Collection. Pilot administration was from August 2019 to November 2019 among 600 patients using a mail-only, modified Dillman approach.³⁶ We sent up to 3 mailings, separated by 2–3 weeks. Patients were instructed to respond about the specific specialty experience that triggered study eligibility. Mailed surveys were created and responses scanned using Remark Optical Mark Recognition software (Gravac, Inc).³⁷ We provided an up-front incentive of a notepad, pad, and tote bag.

The COVID-19 State of Emergency was declared in March 2020 in our state, prior to our large launch. We modified our subsequent approach to minimize physical contact and infection risk. Invitations were mailed from September 2020 to May 2021 to 5323 patients. Participants had the option to respond online (using a URL or QR code for a survey hosted by Qualtrics³⁸) or call and request completion via mail or telephone. Participants were mailed a \$10 gift card for survey completion. An opt-out postcard and phone number were provided in both waves.

Statistical Analysis

We compared respondents to non-respondents on characteristics obtained from the VA Corporate Data Warehouse: age, gender, marital status, rural status, and Care Assessment Need (CAN) score. The CAN score is an analytic tool automatically generated from VA

data that predicts the likelihood of 90-day and 1-year hospitalization or death in an individual patient as compared to other VA patients.^{39,40}

We calculated item-level descriptive statistics including item missing rate, mean, standard deviation, skew, and kurtosis. The sample was randomly split into derivation and validation samples for psychometric analyses. Four items were omitted from further analyses due to a high percentage of respondents indicating “not applicable.” These items addressed scheduling of return visits, receiving printed health information, trying to contact the specialist, and involvement of caregivers.

We identified 3 subsets of items among the 39 remaining: those that could potentially be answered by all patients (k=23), a “Tests and Medications” subset that were relevant only to patients who had had new tests or medications ordered by the specialist (k=5), and a “PCP-related” subset that were relevant only to those who had a PCP visit after their index specialist visit (k=11). Respondents for whom no tests/medications were ordered or who had no follow-up PCP visit registered missing responses on all items relevant to those experiences. Scale construction analysis proceeded separately for each subset.

To identify a preliminary hypothesized scale structure, we applied exploratory factor analysis (EFA) to each subset of items separately in the derivation sample. Factor extraction used the principal factors method followed by promax rotation of factors with eigenvalues of ≥ 1 (ie, the Kaiser-Guttman criterion) to maximize alpha and statistical reliability.⁴¹ The initial number of factors retained for each subset of items was also informed by the location of the biggest gap between eigenvalues on the scree plot. Factor loadings of ≥ 0.40 were used as the criterion for item-to-scale assignments.⁴¹ When the initial factor-based scales were conceptually heterogeneous, we repeated the EFA but specified in advance a number of factors 1 higher than the number produced by the unconstrained EFA.

We tested the robustness of our hypothesized scale structure using confirmatory factor analyses (CFAs) for each subset of items in the validation sample. The full information maximum likelihood algorithm was applied to input variance/covariance matrices for each model into the CFA procedure to handle missing data. CFA provides several empirical estimates of how well the EFA-based scale structure fits the new sample data: absolute fit as estimated by the overall chi-squared and standardized root mean residual (SRMR), parsimony-corrected fit as estimated by the root mean square error of approximation (RMSEA), and incremental/comparative fit as estimated

by the comparative fit index (CFI) and Tucker-Lewis fit index (TLI). The adequacy of each proposed model of scale structure was evaluated based on the preponderance of evidence across these measures.

As a preliminary test of construct validity, we used linear regression to assess how well the new scales predicted a single-item overall measure of coordination: “Overall, how would you rate how well your PCP and specialist coordinated care for your health condition?” Responses to this item demonstrated a normal distribution with minimal skew, so it was modeled as a continuous variable for interpretability. Ten variables representing potential confounders or alternative drivers of perceived overall coordination were entered simultaneously into the prediction model prior to the block of specific coordination scales. These variables included: 1) demographics (n=5); 2) self-reported health status (n=3); 3) LOT-R score; and 4) a binary variable indicating whether the respondent had help in survey completion. If the scales predicted a statistically significant and substantial amount of the variance in overall coordination remaining after controlling for this wide range of factors that could also affect that rating, it would support the contention that the coordination scales were measures of particular facets of patient experience with coordination. The inclusion of the LOT-R as a predictor made this a particularly rigorous test as it represents the influence of a general tendency to perceive life events with a positive or negative valence and also represents the potential impact of common method bias on the outcome, inasmuch as both use Likert-type response scales and were administered as part of the same survey.⁴²

Only subjects with complete data on all 20 predictors were included. For these analyses, our focus was on the contribution of the scales in combination and the related R² statistic rather than the individual contributions of each scale. We hypothesized that the control variables would only account for a modest percentage of the variance in overall coordination and that adding the proposed coordination scales as a final block would significantly and substantially boost the percentage of variance in perceived overall coordination accounted for by the model. All analyses were conducted using SAS Enterprise Guide 8.3 software (SAS Institute Inc.).

RESULTS

The response rate was 37.4% for the mail-only pre-pandemic-administrated survey and 13.5% for the multimode peripandemic administration, for an overall response rate of 15.6%. Combined sample characteristics are shown in Table 1. Respondents were comparable in age and gender to nonrespondents. Respondents included a higher proportion of married (53.5% vs

Table 1. Characteristics of Respondents* to the Coordination of Specialty Care – Patient (CSC-Patient) Survey

Characteristic	n	%
Age (N=909)		
Less than 30 years	11	1.2%
30–39 years	33	3.5%
40–49 years	45	4.8%
50–59 years	148	15.8%
60 years or older	672	71.5%
Missing	30	3.2%
Gender (N=909)		
Female	144	15.3%
Male	765	81.5%
Missing	30	3.2%
Race (N=854)		
White	657	70.0%
Black or African American	130	13.8%
Multiracial	21	2.2%
Other (please specify)	46	4.9%
Missing	85	9.1%
Hispanic or Latino descent (N=859)		
Yes	105	11.2%
No	754	80.3%
Missing	80	8.5%
Main language spoken at home (N=878)		
English	839	89.4%
Spanish	30	3.2%
Multiple/Other	9	1.0%
Missing	61	6.5%
Highest level of education completed (N=875)		
8th grade or less	6	0.6%
Some high school	20	2.1%
High school graduate or GED	198	21.1%
Some college or 2-year degree	363	38.7%
4-year college graduate	146	15.6%
More than 4-year college degree	142	15.1%
Missing	64	6.8%
Had family, friends or other caregivers involved in care (N=861)		
Yes	444	47.3%
No	417	44.4%
Missing	78	8.3%
Survey mode (N=939)		
Paper	224	23.9%
Link	559	59.5%
QR code	145	15.4%
Telephone	11	1.2%
Specialty (N=939)		
Cardiology	176	18.7%
Endocrinology	73	7.8%
Gastroenterology	115	12.3%
Hematology	94	10.0%
Neurology	206	21.9%
Pulmonary/Chest	104	11.1%
Renal/Nephrology	57	6.1%
Rheumatology/Arthritis	114	12.4%

*While 939 respondents started the survey by denoting a specialty, only 909 progressed to report ≥1 descriptive characteristic; the total N for each characteristic varies due to missing data.

44.4%; $P < 0.0001$), a slightly higher proportion of rural individuals (27.1% vs 26.0%; $P = 0.01$), and had a higher risk of 1-year mortality (Table 2). No significant differences were found between the derivation ($n = 470$) and validation ($n = 469$) samples.

Descriptive statistics for the 39 candidate scale items are shown in Table 3. Four items were reverse coded (Q8, Q46, Q47, Q48) so that, consistent with the other items, higher scores reflected more positive experiences. Top box percentages ranged between 48.9% (for Q46 [reverse coded]: My PCP or specialist knew about important changes in treatment for my referral condition that the other provider had made) and 92.2% (for Q7: I clearly understood the reasons for seeing the specialist).

The initial EFA of the 23-item “Applicable to All” subset suggested a 5-factor model with two 2-item factors and one orphan item (Q8). The EFA excluding Q8 gave the same factor structure suggested by the initial analysis and the scree plot also suggested 5 factors. The 5 factors were homogenous in content and readily interpretable. Factor 1, patient-centered care coordination ($k = 10$), had loadings that ranged from 0.46 to 0.82. The two highest-loading items were “I understood what I needed to do to take care of my condition after my specialist visit(s);” and “The specialist included me in making decisions about my specialty care as much as I wanted.” Factor 2, specialist communication ($k = 5$) had loadings ranging from 0.48 to 0.84. The two highest-loading items were “The specialist showed respect for what I had to say;” and “The specialist listened carefully to me.” The remaining factors were Factor 3, access to specialist care ($k = 3$); Factor 4, specialist knowledge of patient history ($k = 2$); and Factor 5: referral shared decision-making ($k = 2$). Specialist communication (Factor 2) included all items from the 4-item CAHPS provider communication scale plus an item about confidence and trust in the specialist. We dropped the orphan item, Q8, from further analyses, such that the Applicable to All subset included 22 items across the 5 factors.

The initial EFA on the 5-item Tests and Medications subset suggested a single factor, but the scree plot suggested retaining 2 factors. Furthermore, the 5 items seemed to address two different concepts — patient education during the visit and receipt of results after the visit. We repeated the EFA specifying 2 factors a priori. The result did not include an interpretable second factor, so we provisionally scored these 5 items as a single scale. Nonetheless, because the 2 content-based dimensions represented patient experiences that would occur at different points in time (during and after the specialist visit), and consequently be subject to different influences and have different targets for intervention, we also carried both solutions forward into the CFA. Namely, Factor 1 was defined as “tests and medications: patient education” ($k = 3$) and Factor 2 as “tests and medications: get results” ($k = 2$).

The initial EFA in the 11-item “PCP-related” subset resulted in 3 interpretable factors; a 3-factor solution was also supported by the scree plot. For Factor 1, “overall trust and specialty care engagement of PCP” ($k = 5$), loadings ranged from 0.66 to 0.77. The two highest-loading items were “I have confidence and trust in my PCP;” and “My PCP showed respect for what I had to say about the health condition for which I was referred.” The other factors were Factor 2, “coordination of care-specialist and PCP” ($k = 3$) and Factor 3, “team planning for patient self-care” ($k = 3$).

CFAs with the 38 items were initially conducted using complete cases in the validation sample for each of the 3 subgroups (ie, Applicable to All, Tests and Medications, and PCP-related). However, sample sizes for the latter 2 subgroups were small, limiting power, so the CFAs for these 2 subgroups were repeated using complete cases from the combined (derivation + validation) sample (Table 4). As commonly occurs,⁴³ chi-squared tests were statistically significant, rejecting the strict null hypothesis of exact fit. Nonetheless, other key fit statistics provided strong empiric evidence for the 5-factor Applicable to All model, the 1- and 2-factor “Tests and Medications”

Table 2. Comparison of Nonrespondents and Respondents to the CSC-Patient

Patient characteristic	Nonrespondents (n=4532)	Respondents (n=909)	P
Female, n (%)	667 (14.7%)	144 (15.8%)	0.358
Age in years, mean (SD)	64.3 (13.9)	65.5 (12.3)	0.465
Married, n (%)	2002 (44.4%)	482 (53.5%)	<0.0001
Rural, n (%)	1135 (26.0%)	242 (27.1%)	0.011
CAN score of ≥ 95 , n (%)	692 (15.9%)	80 (8.8%)	<0.0001

CAN, Care Assessment Need scale; CSC-Patient, Coordination of Specialty Care – Patient survey; SD, standard deviation.

Table 3. Candidate Scale Item (k=39) Means and Top Box Percentages for the CSC-Patient

Item/Question	n	Mode (%)	Mean*	SD	Top Box % [†]	Source [§]
Items applicable to all (k=23)						
Q3 I had enough say in the decision to see the specialist.	850	4 (44.2%)	3.98	1.05	78.6%	new
Q4 I had enough say in selecting the date and time of my appointment with the specialist.	848	4 (40.9%)	3.83	1.12	71.6%	new
Q5 I had my appointment with the specialist as soon as I needed.	851	4 (43.1%)	3.65	1.15	66.5%	CAHPS
Q7 I clearly understood the reasons for seeing the specialist.	850	5 (49.9%)	4.36	0.84	92.2%	new
Q8 When I saw the specialist, things came up that I wish one of my providers had told me about or prepared me for beforehand.	837	4 (32.9%)	3.34	1.07	47.0%	new
Q13 My appointment began within a reasonable amount of time after the scheduled start time.	884	4 (52.8%)	4.08	0.96	86.4%	new
Q14 The specialist seemed to know the important information about my medical history.	874	4 (44.7%)	3.99	1.00	78.5%	PPIC
Q15 The specialist seemed to know the results of lab tests, x-rays or other tests previously ordered by my PCP that were related to my specialty care. (N/A option)	796	4 (45.4%)	4.05	0.97	80.7%	PPIC
Q16 The specialist listened carefully to me.	875	4 (44.8%)	4.19	0.91	86.3%	CAHPS
Q17 The specialist explained things in a way that was easy for me to understand.	875	4 (45.5%)	4.19	0.89	85.9%	CAHPS
Q18 The specialist gave me enough information about the health condition for which I was referred.	874	4 (43.9%)	4.04	0.98	79.5%	NVSCS
Q19 I understood the specialist's recommendations for my care.	843	4 (47.1%)	4.15	0.88	84.5%	new
Q20 The specialist explained what to do if my problems or symptoms continued, got worse, or came back. (N/A option)	844	4 (40.8%)	3.98	1.04	76.5%	NVSCS
Q21 The specialist had reasonable expectations about what I could do to take care of my condition after the appointment.	869	4 (46.6%)	3.89	0.95	73.3%	new
Q22 The specialist included me in making decisions about my specialty care as much as I wanted.	873	4 (44.7%)	3.85	1.02	72.1%	NVSCS
Q23 The specialist and I had the same goals for my care.	873	4 (42.0%)	4.01	0.97	76.6%	new
Q24 The specialist showed respect for what I had to say.	868	4 (45.1%)	4.25	0.86	88.6%	CAHPS
Q25 The specialist did a good job of explaining what would happen next in my care.	875	4 (41.8%)	3.93	1.02	73.9%	NVSCS
Q34 The specialist spent enough time with me.	620	4 (46.0%)	4.21	0.87	87.1%	CAHPS
Q35 I have confidence and trust in the specialist.	872	5 (41.9%)	4.11	1.00	79.6%	NVSCS
Q37 It was clear to me who to contact if I had follow-up questions related to the health condition for which I was referred.	867	4 (44.1%)	3.82	1.10	72.5%	NVSCS
Q38 I understood what I needed to do to take care of my condition after my specialist appointment.	870	4 (45.4%)	3.93	0.99	75.4%	new
Q39 The specialist or their staff followed up with me between visits as much as I needed.	866	4 (32.0%)	3.44	1.15	52.0%	PPIC
Items about tests and medications (k=5)						
Q27 The specialist explained the purpose of these tests in a way I could understand. (could be skipped following a screener)	575	4 (49.7%)	4.21	0.83	88.5%	NVSCS
Q28 I learned about the results of tests ordered by the specialist within a reasonable amount of time. (could be skipped following a screener; also includes N/A option)	561	4 (44.0%)	4.02	1.03	80.6%	new
Q29 The results of tests ordered by the specialists were explained to me in a way I could understand. (could be skipped following a screener; also includes N/A option)	530	4 (45.7%)	4.11	0.95	83.6%	NVSCS
Q31 The specialist explained the purpose of these new medications or other treatments in a way I could understand. (could be skipped following a screener)	436	4 (48.6%)	4.19	0.88	87.8%	NVSCS
Q32 The specialist told me about side effects and risks of these new medications or other treatments in a way I could understand. (could be skipped following a screener)	433	4 (41.6%)	3.87	1.07	72.5%	NVSCS

Continued >

Table 3 (cont). Candidate Scale Item (k=39) Means and Top Box Percentages for the CSC-Patient

Item/Question	n	Mode (%)	Mean*	SD	Top Box % [†]	Source [§]
PCP-related items (k=11)						
Q41 My PCP discussed the specialist's recommendations and planned next steps with me as much as I needed. (could be skipped following a screener)	335	4 (41.2%)	4.07	0.96	78.8%	new
Q42 My PCP seemed informed and up to date about the care I received from my specialist. (could be skipped following a screener)	336	4 (42.3%)	4.18	0.93	84.2%	ACES
Q43 My PCP showed respect for what I had to say about the health condition for which I was referred. (could be skipped following a screener)	425	5 (42.4%)	4.15	0.96	82.4%	CAHPS
Q44 I have confidence and trust in my PCP.	867	5 (40.5%)	4.02	1.08	75.4%	NVSCS
Q45 In the past 6 months, when I contacted my PCP's office with a medical question, I got an answer as soon as I needed. (N/A option)	747	4 (34.9%)	3.77	1.25	69.3%	new
Q46 There were times when either my PCP or the specialist did not know about important changes in treatment for my health condition that the other provider had made. (N/A option) ^{††}	687	4 (29.3%)	3.39	1.16	48.9%	NVSCS
Q47 There were times when either my PCP or the specialist did not know about test results related to my health condition that the other provider had recommended. (N/A option) ^{††}	764	4 (31.7%)	3.54	1.13	54.7%	NVSCS
Q48 At times I was confused because my VA providers (PCP and the specialist) told me different things about my health or treatment. ^{††}	849	4 (35.2%)	3.72	1.09	62.7%	NVSCS
Q49 My PCP and the specialist seemed to work with each other as much as necessary to provide the care that I needed.	855	4 (33.8%)	3.56	1.14	56.5%	new
Q50 One of my providers (PCP, specialist, or someone on their staff) asked me about any challenges I might have in caring for my referral condition. (N/A option)	708	4 (35.7%)	3.37	1.19	53.0%	PPIC
Q51 One of my providers (PCP, specialist, or someone on their staff) helped me come up with a plan to deal with any challenges I might have in caring for my referral condition. (N/A option)	660	4 (32.1%)	3.35	1.19	50.3%	PPIC

*All items with theoretical minimum and maximum of 1 and 5, respectively.

[†]Top box percentage = agree + strongly agree (ie, 4's and 5's).

[§]ACES = Ambulatory Care Experiences Survey; CAHPS = Consumer Assessment of Healthcare Providers and System; CSC-Patient = Coordination of Specialty Care – Patient survey; new = newly developed item; NVSCS = national VA patient satisfaction with care surveys; PPIC = Patient Perceptions of Integrated Care survey.

^{††}Items Q46, Q47, and Q48 reverse-coded for analysis such that higher scores represent more positive experience.

N/A, not applicable; PCP, primary care provider; VA, Veterans Affairs health system.

Table 4. Confirmatory Factor Analyses for Final Scales of the CSC-Patient

Question subgroup, no. of factors (no. of items)	Sample used	Sample size	X ² , degrees of freedom	Pr>ChiSq	SRMR*	RMSEA (90% CI) [†]	CFI [§]	TLI [§]
Applicable to All, 5 factors (k=22)	Validation	236	668.90, 199	<0.0001	0.03	0.07 (0.07, 0.08)	0.95	0.94
Tests and Medications, 2 factors (k=5)	Combined	300	27.19, 5	<0.0001	0.02	0.05 (0.02, 0.09)	0.99	0.99
PCP-related, 3 factors (k=11)	Combined	221	143.35, 41	<0.0001	0.05	0.08 (0.07, 0.09)	0.95	0.94

*SRMR has a possible range of 0.0–1.0; a value of <0.08 indicates good fit.

[†]RMSEA values of ≤0.08 indicate reasonable fit and <0.06 indicate good fit.

[§]For both the CFI and TLI, ≥0.95 indicates good fit and 0.90–0.95 indicates reasonable fit.

CFI, comparative fit index; CSC-Patient, Coordination of Specialty Care – Patient survey; PCP, primary care provider; Pr>ChiSq, probability; RMSEA, root mean square error of approximation; SRMR, standardized root mean residual; TLI, Tucker-Lewis fit index.

model(s), and the 3-factor “PCP-related” model as ways to conceptualize the latent constructs driving responses to these items. The RMSEA (90% CI) for Applicable to All was 0.07 (0.07, 0.08) indicating reasonable fit and the SRMR, CFI, and TLI also supported model fit. On a conceptual basis we selected the 2-factor solution for Tests and Medications, which is presented in Table 4.

Scale descriptive statistics are in Table 5. Scale scores are the mean of the item scores when at least half of the items in the scale were not missing. The lowest mean scale score was for “team planning for patient self-care;” this scale includes 3 items about the PCP and specialist working together to meet patient needs and only 17.1% of responses were at the ceiling. The highest mean scale score was for “referral shared decision-making,” which had 46.6% of respondents at the ceiling.

Internal consistency reliabilities (coefficient alphas) are reported in the diagonals of Table 6, along with interscale correlations. Given that the factor loadings suggest it unlikely that the scale items have the same

relationship to the underlying factor (the assumption of tau-equivalency), these coefficient alphas should be considered the lower bound of reliability for these scales. In every case, coefficient alpha was higher than the interscale correlations, supporting that the scales represent distinct concepts. There also was evidence of related concepts — “patient-centered care coordination” and “specialist communication” were correlated at 0.87, representing 76% shared variance. Correlations of ≥ 0.70 were observed for “patient-centered care coordination” (with 4 other scales) and “specialist communication” (with 4 other scales), and between the two scales related to Tests and Medications.

Correlations of each scale with the outcome measure for the preliminary test of construct validity (ie, mean score for the item “Overall, how would you rate how well your PCP and specialist coordinated care for your health condition?”) ranged between 0.36 (“referral shared decision-making”) and 0.74 (“team planning for patient self-care”) (Table 5, last row).

Table 5. Descriptive Statistics for Final Scales of the CSC-Patient

Subgroup and items	No. of items per scale	Item no.	n*	Mean (SD)	Percent at ceiling [†]	Observed min. and max. values [§]
Applicable to All (k=22)						
Patient-centered care coordination	10	Q18, Q19, Q20, Q21, Q22, Q23, Q25, Q37, Q38, Q39	879	3.90 (0.86)	28.8%	1 and 5
Specialist communication	5	Q16, Q17, Q24, Q34, Q35	876	4.18 (0.83)	41.4%	1 and 5
Access to specialist care	3	Q4, Q5, Q13	852	3.86 (0.89)	24.3%	1 and 5
Specialist knowledge of patient history	2	Q14, Q15	885	4.01 (0.94)	38.0%	1 and 5
Referral shared decision-making	2	Q3, Q7	847	4.17 (0.83)	46.6%	1 and 5
Tests and Medications (k=5)						
Tests and medications: patient education	3	Q27, Q31, Q32	690	4.09 (0.85)	33.2%	1 and 5
Tests and medications: get results	2	Q28, Q29	561	4.04 (0.97)	40.3%	1 and 5
PCP-related (k=11)						
Overall trust and specialty care engagement of PCP	5	Q41, Q42, Q43, Q44, Q45	400	4.14 (0.89)	41.5%	1 and 5
Coordination of care: specialist and PCP	3	Q46, Q47, Q48	783	3.55 (0.98)	20.1%	1 and 5
Team planning for patient self-care	3	Q49, Q50, Q51	736	3.43 (1.03)	17.1%	1 and 5

*Number of those who had nonmissing data on at least half the items in each scale.

[†]Ceiling = scale score of ≥ 4.5 .

[§]Theoretical minimum (min.) and maximum (max.) values of 1 and 5, respectively.

CSC-Patient, Coordination of Specialty Care – Patient survey; PCP, primary care provider; SD, standard deviation.

Table 6. Descriptive Statistics for Final Scales of the CSC-Patient

	Patient-centered care coor.	Specialist comm.	Access to specialist care	Specialist knowledge of patient history	Referral shared decision-making	T&M: patient education	T&M: get results	PCP: overall trust & specialty care engagement	Coor. of care: specialist & PCP	Team planning for patient self-care
Patient-centered care coor.	(0.96)									
Specialist comm.	0.87	(0.94)								
Access to specialist care	0.64	0.61	(0.77)							
Specialist knowledge of patient history	0.72	0.71	0.54	(0.84)						
Referral shared decision-making	0.57	0.56	0.62	0.48	(0.69)					
T&M: patient education	0.80	0.73	0.56	0.62	0.48	(0.83)				
T&M: get results	0.79	0.71	0.57	0.62	0.50	0.73	(0.87)			
PCP: overall trust & specialty care engagement	0.57	0.54	0.49	0.41	0.43	0.55	0.60	(0.90)		
Coor. of care: specialist & PCP	0.48	0.43	0.36	0.44	0.30	0.36	0.44	0.54	(0.85)	
Team planning for patient self-care	0.63	0.53	0.49	0.50	0.40	0.48	0.54	0.68	0.54	(0.86)
Single item about overall coor.	0.62	0.55	0.49	0.49	0.36	0.46	0.55	0.65	0.61	0.74

*Internal consistency reliability in parentheses in the diagonal.

comm., communication; coor., coordination; CSC-Patient, Coordination of Specialty Care – Patient survey; PCP, primary care provider; T&M, Tests and Medications.

For the test of construct validity, we used only data from the 201 subjects with complete data on all variables, which comfortably exceeds the minimum number of cases (n=120) required for a robust result given the number of predictors (n=20) in this case.⁴⁴ The control variable block accounted for 5.7% of the variance in overall coordination (Online Supplemental Table S1). The coordination scales added as a block accounted for an additional 58.6%, bringing the model adjusted R² to 64.3%. The overall prediction model was highly significant [F(20,180)=19.03; P<0.0001], supporting construct validity of the scales.

DISCUSSION

As developed, the CSC-Patient survey is a reliable, 38-item survey comprising 10 scales that comprehensively measure coordination among the specialty care triad, as experienced by the patient. It is the first such survey. Its scales provide a broad assessment of coordination, while individual items provide specificity and actionable data about where problems lie. Researchers and health system

leaders can combine the survey with other data sources to identify the antecedents and outcomes of patients' experience of coordination in specialty care.

The survey was developed following extensive literature review, qualitative work, and stakeholder feedback, which provide face validity and content validity. Our analyses resulted in 10 scales that describe patients' needs for successful specialty care coordination as influenced by interactions across the triad (ie, patient/specialist, patient/PCP, and PCP/specialist interactions) and organizational factors. The soundness of these scales is supported by their high internal consistency reliability and multiple measures of goodness-of-fit in a large patient sample. Multivariable linear regression showed that the scales accounted for nearly 60% of the variance in patients' ratings of overall specialty care coordination, supporting construct validity.

Future work should examine the psychometric properties of the CSC-Patient among patients receiving specialty

care in other health care settings (eg, surgical, mental health), sensitivity to change over time and pre/postintervention, and how the scales individually and together predict outcomes such as patient satisfaction and clinical quality.

An unexpected finding was the emergence of a construct that we have not observed in other coordination surveys. We named this related scale Patient-Centered Care Coordination (PCCC). The PCCC scale comprises 10 items that together address whether care was organized between patient and specialist during the visit such that, by visit's end, (a) the patient understood their condition, the next steps, and their role in those steps (coordinated care), and (b) the care plan was realistic from the patient's perspective and met their priorities and goals for care (patient-centered care). The PCCC scale describes what patients need from the specialist by the time they leave the specialist visit. It addresses aspects of the patient/specialist interaction distinct from specialist communication skills and specialists' knowledge of the patient's history. PCCC is of central importance to achieving high-quality care, since organization of care without an orientation toward patient priorities and goals can never fully meet patient needs. The PCCC scale is a promising candidate measure of quality of the patient/specialist interaction. It is a new contribution that can be used to examine how PCCC of specialty care, as experienced by patients, is associated with patient and institutional outcomes, and what organizational, clinician, and patient factors influence it.

The CSC-Patient was created as a companion to the CSC-Specialist^{8,9} and the CSC-PCP.⁷ The trio of surveys, undergirded by a common conceptual framework, can be used singly⁴⁵⁻⁴⁷ or together to measure complementary experiences of the specialty care triad. The specificity of the CSC-Patient for specialty care and its membership in the trio set it apart from other measures that address overlapping domains. The ACES²¹ measures patient experiences of physician/patient interactions and organizational features of care and is not focused on coordination as a subset of experience. The CAHPS¹¹ family of surveys are among the best-known measures of patient experience of care, and the VA uses CAHPS items in its current patient experience survey, SHEP. CAHPS¹¹ and SHEP¹² are widely used measures that include a broad assessment of experience but, like the ACES²² and national VA satisfaction with care surveys (NVSCS),^{31,33} do not assess in detail the interactions of the patient with both the PCP and the specialist. The PPIC survey,¹⁰ in contrast to the others described, is focused on care coordination. However, the PPIC survey addresses the primary care experience with minimal assessment of

the patient/specialist interaction. Thus, the Coordination of Specialty Care trio of surveys is uniquely positioned among existing measures for evaluation of specialty care coordination.

Limitations

Our study has limitations. First, the overall response rate was 15%, driven by the lower response rate during the larger, peripandemic phase of survey administration. This raises concern for nonresponse bias. Respondents were similar to nonrespondents in age and gender. More respondents had a high CAN score, which may have led to greater interest in the survey topic. There was a higher proportion of married individuals among respondents, which could be due to these individuals having more support or encouragement to complete the survey. Nonresponse bias might have manifested as a restricted range of responses and a positive (or negative) skew across all items, making the identification of separate factors difficult. However, we identified separable scales, and all scale scores ranged from 1 to 5.

A second limitation is that the study population tended to be older, male, and White. Future research should include testing among populations with greater age, gender, and racial/ethnic diversity, including testing of any translated versions. A third limitation is that 3 of the scales include only 2 items. Reassuringly, CFA results provide powerful support for our evaluation of the number of distinct latent dimensions underlying the responses for each of the 3 subgroups. In future work, we will add 1 or 2 items to these scales to enhance their utility.

Lastly, we observed a high correlation between the PCCC scale and the item "specialist communication," and between each of these with 3 other scales. However, that the scales represented distinct concepts was supported by internal consistency reliability of individual scales being higher than these interscale correlations. Additionally, the CFA goodness-of-fit statistics were good for a model in which these were represented as separate factors.

A user guide for the CSC-Patient, which includes scoring instructions, is available with this article as Online Appendix A.

CONCLUSIONS

The Coordination of Specialty Care – Patient survey was developed as a companion to the CSC-Specialist^{8,9} and CSC-PCP surveys.⁷ These surveys were developed with a common conceptual framework — the "specialty care triad" — and are intended for use singly,⁴⁵⁻⁴⁷ in pairs, or as a trio to evaluate specialty care coordination among the three parties best positioned to know whether efforts to

coordinate care are successful. Examining coordination from more than one perspective can answer questions such as “When efforts are made that impact clinicians’ coordination with each other (eg, a new electronic health record), what is the effect on patients’ experience of coordination?” The surveys can be used in cross-sectional research studies and quality improvement among cohorts of patients and clinicians or longitudinally to measure experience within individual triads. The CSC-Patient can be used alone or with the CSC-Specialist and CSC-PCP to measure and guide improvements in the quality of specialty care coordination in any health system and over time.

Patient-Friendly Recap

- Involving a specialist, such as a cardiologist or gastroenterologist, in a patient’s care requires some degree of coordination among patient and primary and specialty providers.
- To account for the patient’s perspective when measuring the quality of such coordinated care, authors developed and evaluated a novel survey — administered via mail and online — designed to assess the experiences of patients (N=939) who received specialty care in the VA health system.
- The resulting 38-item “Coordination of Specialty Care – Patient” survey was deemed valid for use in measuring and guiding improvements in specialty care coordination.

Author Contributions

Study design: Vimalananda, Meterko, Fincke. Data acquisition or analysis: all authors. Manuscript drafting: all authors. Critical revision: all authors.

Conflicts of Interest

None.

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References

1. Wang MC, Mosen D, Shuster E, Bellows J. Association of patient-reported care coordination with patient satisfaction. *J Ambul Care Manage.* 2015;38:69-76. [Crossref](#)
2. Kern LM, Safford MM, Slavin MJ, et al. Patients’ and providers’ views on causes and consequences of healthcare fragmentation in the ambulatory setting: a qualitative study. *J Gen Intern Med.* 2019;34:899-907. [Crossref](#)

3. Helmer D, Sambamoorthi U, Shen Y, et al. Opting out of an integrated healthcare system: dual-system use is associated with poorer glycemic control in veterans with diabetes. *Prim Care Diabetes.* 2008;2:73-80. [Crossref](#)
4. Kern LM, Reshetnyak E, Colantonio LD, et al. Association between patients’ self-reported gaps in care coordination and preventable adverse outcomes: a cross-sectional survey. *J Gen Intern Med.* 2020;35:3517-24. [Crossref](#)
5. Elliott MN, Adams JL, Klein DJ, et al. Patient-reported care coordination is associated with better performance on clinical care measures. *J Gen Intern Med.* 2021;36:3665-71. [Crossref](#)
6. Chen CC, Cheng SH. Care continuity and care coordination: a preliminary examination of their effects on hospitalization. *Med Care Res Rev.* 2021;78:475-89. [Crossref](#)
7. Vimalananda VG, Meterko M, Qian S, Wormwood JB, Solch A, Fincke BG. Development and psychometric analysis of a survey to measure specialty care coordination as experienced by primary care providers. *Health Serv Res.* 2020;55:660-70. [Crossref](#)
8. Vimalananda VG, Fincke BG, Qian S, Waring ME, Seibert RG, Meterko M. Development and psychometric assessment of a novel survey to measure care coordination from the specialist’s perspective. *Health Serv Res.* 2019;54:689-99. [Crossref](#)
9. Vimalananda VG, Meterko M, Solch A, et al. Coordination of care as experienced by the specialist: validation of the CSC-Specialist Survey in the private sector and the effect of a shared electronic health record. *Med Care.* 2020;58:1051-8. [Crossref](#)
10. Singer SJ, Friedberg MW, Kiang MV, Dunn T, Kuhn DM. Development and preliminary validation of the Patient Perceptions of Integrated Care survey. *Med Care Res Rev.* 2013;70:143-64. [Crossref](#)
11. Agency for Healthcare Research and Quality. CAHPS patient experience surveys and guidance. Page last reviewed August 2023; accessed July 15, 2013. <https://www.ahrq.gov/cahps/surveys-guidance/index.html>
12. Stratford D; VA News. VA’s Survey of Healthcare Experience of Patients. Posted January 30, 2021; accessed May 3, 2023. <https://news.va.gov/83755/vas-survey-healthcare-experience-patients/>
13. Vimalananda VG, Dvorin K, Fincke BG, Tardiff N, Bokhour BG. Patient, primary care provider, and specialist perspectives on specialty care coordination in an integrated health care system. *J Ambul Care Manage.* 2018;41:15-24. [Crossref](#)
14. McDonald KM, Schultz E, Albin L, et al. Care Coordination Measures Atlas Update (Agency for Healthcare Research and Quality Publication No. 14-0037-EF). Content last reviewed June 2014; accessed December 6, 2023. <https://www.ahrq.gov/ncepcr/care/coordination/atlas.html>
15. National Quality Forum. Effective communication and care coordination. Accessed May 22, 2015. http://www.qualityforum.org/Topics/Effective_Communication_and_Care_Coordination.aspx
16. National Committee on Quality Assurance. Patient-Centered Medical Home (PCMH). Accessed July 12, 2013. <https://www.ncqa.org/programs/health-care-providers-practices/patient-centered-medical-home-pcmh/>
17. Schultz EM, Pineda N, Lonhart J, Davies SM, McDonald KM. A systematic review of the care coordination measurement landscape. *BMC Health Serv Res.* 2013;13(1):119. [Crossref](#)

18. Stewart AL, Nápoles-Springer AM, Gregorich SE, Santoyo-Olsson J. Interpersonal processes of care survey: patient-reported measures for diverse groups. *Health Serv Res.* 2007;42(3 Pt 1):1235-56. [Crossref](#)
19. Shi L, Starfield B, Xu J. Validating the adult primary care assessment tool. *J Fam Pract.* 2001;50(2):161-75.
20. Scholle SH, Weisman CS, Anderson RT, Camacho F. The development and validation of the primary care satisfaction survey for women. *Womens Health Issues.* 2004;14(2):35-50. [Crossref](#)
21. Safran DG, Kosinski M, Tarlov AR, et al. The Primary Care Assessment Survey: tests of data quality and measurement performance. *Med Care.* 1998;36:728-39. [Crossref](#)
22. Safran DG, Karp M, Coltin K, et al. Measuring patients' experiences with individual primary care physicians. Results of a statewide demonstration project. *J Gen Intern Med.* 2006;21:13-21. [Crossref](#)
23. Radwin L, Alster K, Rubin KM. Development and testing of the Oncology Patients' Perceptions of the Quality of Nursing Care Scale. *Oncol Nurs Forum.* 2003;30:283-90. [Crossref](#)
24. Parchman ML, Noël PH, Lee S. Primary care attributes, health care system hassles, and chronic illness. *Med Care.* 2005;43:1123-9. [Crossref](#)
25. O'Malley AS, Cunningham PJ. Patient experiences with coordination of care: the benefit of continuity and primary care physician as referral source. *J Gen Intern Med.* 2009;24:170-7. [Crossref](#)
26. McGuinness C, Sibthorpe B. Development and initial validation of a measure of coordination of health care. *Int J Qual Health Care.* 2003;15:309-18. [Crossref](#)
27. Haggerty JL, Roberge D, Freeman GK, Beaulieu C, Bréton M. Validation of a generic measure of continuity of care: when patients encounter several clinicians. *Ann Fam Med.* 2012;10:443-51. [Crossref](#)
28. Gulliford M, Cowie L, Morgan M. Relational and management continuity survey in patients with multiple long-term conditions. *J Health Serv Res Policy.* 2011;16:67-74. [Crossref](#)
29. Glasgow RE, Wagner EH, Schaefer J, Mahoney LD, Reid RJ, Greene SM. Development and validation of the Patient Assessment of Chronic Illness Care (PACIC). *Med Care.* 2005;43:436-44. [Crossref](#)
30. Chao J. Continuity of care: incorporating patient perceptions. *Fam Med.* 1988;20:333-7.
31. Borowsky SJ, Nelson DB, Fortney JC, Hedeem AN, Bradley JL, Chapko MK. VA community-based outpatient clinics: performance measures based on patient perceptions of care. *Med Care.* 2002;40:578-86. [Crossref](#)
32. Agency for Healthcare Research and Quality. CAHPS® surveys and tools to advance patient care. Accessed November 20, 2020. <http://www.ahrq.gov/cahps/>
33. Cleary PD, Edgman-Levitan S, Roberts M, et al. Patients evaluate their hospital care: a national survey. *Health Aff (Millwood).* 1991;10:254-67. [Crossref](#)
34. Kazis LE, Miller DR, Clark JA, et al. Improving the response choices on the veterans SF-36 health survey role functioning scales: results from the Veterans Health Study. *J Ambul Care Manage.* 2004;27:263-80. [Crossref](#)
35. Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J Pers Soc Psychol.* 1994;67:1063-78. [Crossref](#)
36. Dillman DA, Smyth JD, Christian LM. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method, Fourth Edition.* Wiley; 2014.
37. Gravic, Inc. Remark Classic OMR 6. Accessed December 6, 2023. <https://remarksoftware.com/wp-content/uploads/2018/12/Remark-Classic-OMR-Users-Guide6.0.pdf>
38. Qualtrics. Qualtrics XM home page. Accessed December 6, 2023. <https://www.qualtrics.com/>
39. Wang L, Porter B, Maynard C, et al. Predicting risk of hospitalization or death among patients receiving primary care in the Veterans Health Administration. *Med Care.* 2013;51:368-73. [Crossref](#)
40. Fihn SD, Francis J, Clancy C, et al. Insights from advanced analytics at the Veterans Health Administration. *Health Aff (Millwood).* 2014;33:1203-11. [Crossref](#)
41. Tabachnick BG, Fidell LS. *Using Multivariate Statistics, Fifth Edition.* Allyn & Bacon, Inc./Pearson Education; 2007.
42. Spector PE. Method variance as an artifact in self-reported affect and perceptions at work: Myth or significant problem? *J Appl Psychol.* 1987;72:438-43. [Crossref](#)
43. Brown TA. *Confirmatory Factor Analysis for Applied Research.* Guilford Press; 2006.
44. Tabachnick BG, Fidell LS. *Using Multivariate Statistics, Sixth Edition.* Pearson Education, Inc.; 2013.
45. Vimalananda VG, Meterko M, Waring ME, et al. Tools to improve referrals from primary care to specialty care. *Am J Manag Care.* 2019;25:e237-e242.
46. Anderson E, Solch AK, Fincke BG, Meterko M, Wormwood JB, Vimalananda VG. Concerns of primary care clinicians practicing in an integrated health system: a qualitative study. *J Gen Intern Med.* 2020;35:3218-226. [Crossref](#)
47. Vimalananda VG, Wormwood JB, Qian S, Meterko M, Sitter KE, Fincke BG. The effect of clinicians' personal acquaintance on specialty care coordination as the sharing of an EHR increases. *J Ambul Care Manage.* 2021;44:227-36. [Crossref](#)

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