

# Assessing the Quality of Preparation for Posthospital Care from the Patient's Perspective

## *The Care Transitions Measure*

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**Background:** Evidence that both quality and patient safety are jeopardized for patients undergoing transitions across care settings continues to expand. Performance measurement is one potential strategy towards improving the quality of transitional care. A valid and reliable self-report measure of the quality of care transitions is needed that is both consistent with the concept of patient-centeredness and useful for the purpose of performance measurement and quality improvement.

**Objective:** We sought to develop and test a self-report measure of the quality of care transitions that captures the patient's perspective and has demonstrated utility for quality improvement.

**Subjects:** Patients aged 18 years and older discharged from one of the 3 hospitals of a vertically integrated health system were included.

**Research Design:** Cross-sectional assessment of factor structure, dimensionality, and construct validity.

**Results:** The Care Transitions Measure (CTM), a 15-item unidimensional measure of the quality of preparation for care transitions, was found to have high internal consistency, reliability, and reflect 4 focus group-derived content domains. The measure was shown to discriminate between patients discharged from the hospital who did and did not have a subsequent emergency department visit or rehospitalization for their index condition. CTM scores were significantly different between health care facilities known to vary in level of system integration.

**Conclusions:** The CTM not only provides meaningful, patient-centered insight into the quality of care transitions, but because of the association between CTM scores and undesirable utilization outcomes, it also provides information that may be useful to clini-

cians, hospital administrators, quality improvement entities, and third party payers.

**Key Words:** care transition, coordinated care, patient-centered care, quality measurement, quality of care

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Transitional care has been defined as a set of actions designed to ensure the coordination and continuity of care as patients transfer between different locations or different levels of care within the same location.<sup>1</sup> Executing effective care transitions can be challenging.<sup>2,3</sup> Most transitions across care settings are unplanned, often attributable to acute illness or exacerbations of chronic illness. This is particularly true for those patients who are hospitalized. Patients undergoing transitions are in an extremely vulnerable state—they may suffer from functional loss, pain, anxiety, or delirium.<sup>2,4</sup> Patients and caregivers frequently are unprepared for what will transpire after the transition and their respective roles in the process.<sup>5–8</sup>

Structural impediments also influence the quality of care transitions. Under the current state of practice, it has become increasingly rare for any one clinician to manage a patient's care beyond a single setting.<sup>2,9,10</sup> Although institutions may perceive that their sole responsibility is for the care delivered in their particular setting, standards enacted by the Joint Commission for Accreditation of Healthcare Organizations and Conditions of Participation enacted by the Department of Health and Human Services clearly articulate that ensuring safe and effective transfers to the receiving care setting is well within the purview of the sending institution.<sup>11,12</sup>

Evidence that both quality and patient safety are jeopardized for patients in transitions continues to expand. Quantitative evidence for the problems of posthospital transitions includes unstable vital signs, medication errors and discrepancies, and recidivism.<sup>2,13–17</sup> Multiple qualitative investigations involving patients who have recently made transitions

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along with their caregivers have demonstrated consistent findings. These patients and their caregivers express feelings of significant anxiety because of a lack of preparation, a lack of understanding for self-care activities, a sense of abandonment attributable to the inability to contact an appropriate health care practitioner for guidance, and an overall disregard for their preferences and input into the design of the care plan.<sup>5-7,18</sup>

The recent Institute of Medicine report, *Crossing the Quality Chasm: A New Health System for the 21<sup>st</sup> Century*, promotes the interrelated goals of greater emphasis on patient-centered care throughout the delivery system and better coordination of care among services and settings.<sup>19</sup> Performance measurement is an essential step toward accomplishing these goals. To this end, federally sponsored initiatives, such as the Hospital Consumer Assessment of Health Plan Survey (HCAHPS)®,<sup>20,21</sup> need to focus not only on the care delivered in the hospital but how prepared patients are to receive care in the next setting. Although existing measures may include a few transition-related items, most surveys developed to date have not adequately addressed the quality of transitions from the perspective of the patient and caregiver.<sup>22-24</sup> Given that the patient and caregiver are often the only common thread weaving across settings, they are uniquely positioned to report on the quality of care transitions.

To better understand the care transition experience and to rigorously assess its quality, we have developed the Care Transitions Measure (CTM). Our primary objective has been to develop a measure that is both substantively and methodologically consistent with the concept of patient-centeredness<sup>19</sup> and useful for the purpose of performance measurement and public reporting.

The development of the CTM began with a series of focus groups involving older patients (and their caregivers) who had recently experienced posthospital transitions.<sup>6</sup> Qualitative analyses identified 4 domains: (1) Information Transfer; (2) Patient and Caregiver Preparation; (3) Support for Self-Management; and (4) Empowerment to Assert Preferences. With respect to the Information Transfer domain, confusion over the appropriate medication regimen often was cited as a serious problem. Within the Patient and Caregiver Preparation domain, participants frequently described situations where they did not comprehend what was to take place in the next care setting and what their role in the process would be. Caregivers repeatedly voiced that health care practitioners developed care plans that required their participation but did not first confer with them as to whether the plan was feasible. Regarding Self-Management, participants expressed concerns that the inability to access to health care practitioners who were knowledgeable about their recent care experiences impeded the ability to manage their own conditions. Under the Empowerment to Assert Preferences domain, patients' attempts to assume a more active role in their care or

assert their preferences were repeatedly discouraged by practitioners or institutional policies. These qualitative studies were followed by item construction, evaluation, and revision as outlined in Table 1.<sup>25,26</sup> This article reports on the testing of the CTM items developed in stage D.

## METHODS

### Setting

The health care delivery system from which patients for this study were drawn provides comprehensive care for patients residing in Oregon, Washington, and Alaska. It is a private, nonprofit, vertically integrated system that operates primarily under fee-for-service payment. The study patients were sampled from 3 hospitals. These hospitals are located in urban communities; serve both urban and rural populations; are moderately sized (approximately 350–450 beds); are located at least 100 miles apart; and vary in their level of integration with other components of the care delivery continuum, such as home health agencies and skilled nursing facilities. The hospitals also vary in the extent to which physicians that manage patients' care are affiliated with the health delivery system. In one hospital, the majority of patients are managed by physicians affiliated with the delivery system, while in another hospital, the patients are managed by physicians with no formal affiliation. Patients in the third hospital are managed by a mix of affiliated and non-affiliated physicians.

### Participants and Sample

Study patients were identified using the health delivery system's administrative records. Eligibility criteria were as follows: age 18 years or older; discharge from one of the 3 hospitals of interest within the past 6 to 12 weeks; and hospital primary discharge diagnosis of chronic obstructive pulmonary disease, congestive heart failure, stroke, or hip fracture. Eligibility criteria also required that the patient be conscious, speak English, and not reside in a long-term care institution. Patients who had completed a recent hospital satisfaction survey or who were participating in another research study were not eligible for inclusion. This study protocol was approved by both the Colorado Multiple Institution Review Board and the institutional review board for the participating health delivery system.

A total of 623 patients were identified from the health delivery system's administrative records as meeting study eligibility criteria, and 201 were selected for participation using random consecutive selection. Of the 201 patients contacted (via telephone) and invited to participate in the CTM survey, only 1 refused. Five patients that were initially identified using these criteria were subsequently found to not have 1 of the 4 diagnoses listed previously. These individuals were included in the analyses and categorized as "other."

**TABLE 1.** Summary of Previous Research in the Development of the Care Transitions Measure (CTM)

Stage	Activity
A: Qualitative construct exploration	<p>Purpose: To better understand care transition experiences from the perspective of patients and their caregivers and how their transitions could have been improved.</p> <p>Method: Six focus groups conducted with older adults and their caregivers who had recently transitioned from a hospital to either home or a skilled nursing facility.</p> <p>Results: Findings suggested 4 care transition content domains: information transfer, preparation for what to expect next, support for self-management, and encouragement to assert preferences.<sup>6</sup></p>
B: Initial item construction and evaluation	<p>Purpose: Construct items to operationalize the 4 domains; test and evaluate items; perform cognitive testing and assess construct validity of items.</p> <p>Method: Specific self-report questionnaire items were constructed to operationalize each domain. Construct validity assessed by comparing items to selected items of the CAHPS® Survey (Version 2.0) and a measure of hospital quality developed by Hendriks et al.</p> <p>Results: Inter-item correlation (Spearman) ranged from 0.38 to 0.60 for selected CAHPS® items and 0.39–0.59 selected items developed by Hendriks et al.<sup>6,25,26</sup></p>
C: Construction and evaluation of transition-specific modules	<p>Purpose: Items were reconfigured into transition destination modules (eg, hospital to skilled nursing facility, hospital to home with home care, hospital to home without home health care).<sup>6</sup></p> <p>Method: Modules constructed and administered via phone survey to a random sample of 100 patients recently discharged from hospital.</p> <p>Results: Redundant items were identified and eliminated.</p>
D: Construction of 17 revised items	<p>Purpose: Construct and evaluate a reduced set of items intended to measure the quality of care transition out of hospital.</p> <p>Results: 17 common rating scale items were constructed. Items operationalized the 4 domains of care transition, contained actionable quality improvement content, and reflected patient-centered care as outlined in the Institute of Medicine report <i>Crossing the Quality Chasm</i>.<sup>19</sup></p>

After verbal informed consent from the participants, professional survey researchers specifically trained in interviewing recently hospitalized patients administered the interview schedule. Each of the CTM items had a 4-point response scale: strongly agree; agree; disagree; and strongly disagree. The complete wording of all items is provided in the Appendix.

In an effort to further assess the CTM's construct validity, 2 additional items asked patients (yes or no) if, since their discharge, they had an emergency department visit or were readmitted to the hospital for the same condition as their index hospitalization. An additional 9 items asked patients (yes or no) about specific situations or feelings after their discharge (eg, "I found that people did not really care about me as a person"). Because none of these items directly referred to the patient's transition, they were not intended to serve as potential candidate items for eventual inclusion of the CTM. An overriding goal in the development of the CTM has been to attempt to include as few items as possible, in keeping with current demand for measurement tools that are brief and parsimonious.

## Psychometric Analyses

The dimensionality and content domain structure of the items was assessed with exploratory and confirmatory factor analyses. True score reliability of the measure was assessed with Cronbach's alpha. Construct validity was examined by the ability of the CTM to discriminate patients who had an emergency department visit or rehospitalization for the index condition from those who did not and to converge with patients' reports of negative experiences after their discharge from the hospital.

## RESULTS

The demographic characteristics and health care use of the sample are summarized in Table 2. Older patients were more likely to be discharged to a skilled nursing facility than younger patients ( $P = 0.006$ ). Patients discharged to a skilled nursing facility experienced a longer hospital length of stay compared with patients who were discharged to their home ( $P = 0.020$ ).

**TABLE 2.** Demographic Characteristics and Health Care Use of Study Sample (n = 200)

Characteristic	Value
Age	Mean = 67.18 years
18–59	25.0%
60–69	21.0%
70–79	35.5%
80 and older	18.5%
Gender	
Male	40.0%
Female	60.0%
Primary discharge diagnosis	
COPD	55.0%
CHF	35.0%
Stroke	4.0%
Hip fracture	3.5%
Other	2.5%
Hospital length of stay	Mean = 4.70 days Median = 4.00 days SD = 3.11 days Minimum = 1 days Maximum = 26 days
Discharge destination	
Home without home health	164 (82.0%)
Home with home health	12 (6.0%)
Skilled nursing facility	24 (12.0%)

CHF indicates congestive heart failure; COP, coronary pulmonary obstructive disease.

**Domain Structure**

An exploratory factor analysis was conducted on the 17 CTM items using the latent trait analysis program, Mplus version 2.13®.<sup>27</sup> To obtain maximum likelihood estimation of missing values and appropriately treat the items as categorical indicators, both categorical and continuous dependent indicator estimation approaches were used within the Mplus framework. This technique recognizes that treating categorical indicators as continuous may give rise to biases in standard errors and goodness-of-fit tests. Further, procedures for handling missing data are currently not available for categorical indicators. Therefore, the data were analyzed 2 ways, first treating the items as continuous and then as categorical. This multimethod approach provides for a cross-method validation of the domain structure. With both the continuous and categorical approaches, the factor structure that best accounted for the covariance matrix and yet had a meaningful item-latent domain configuration was a four-factor structure. This was the case regardless of whether the rotation was orthogonal (varimax) or oblique (promax).

To test the hypothesis that the 17 items constitute 4 content domains that are part of a single overarching factor (quality of care transitions), the 4 latent domain structure model was evaluated as a second-order factor structure in a confirmatory factor analysis (CFA) using both the continuous and categorical indicator approaches described previously. In exploratory factor analysis, many models may appear to adequately capture the factor structure. The next order of testing, confirmatory factor analysis, evaluates each of these potential models. The results either confirm or fail to confirm that the given model fits the data. The fit of this 17-item second order factor model derived from the initial exploratory factor analysis was considered unacceptable, and thus a poor model for the data. The comparative fit index was 0.937 using the continuous indicators method and 0.985 using the categorical indicators method. The  $\chi^2$  result was 2238.99 (*df* = 120) for the baseline model and 231.37 (*df* = 97) for the default model using the continuous indicators method. The  $\chi^2$  result was 3156.26 (*df* = 17) for the baseline model and 55.63 (*df* = 11) for the default model using the categorical indicators method.

Model respecification was undertaken in an effort to identify the fewest number of items that constitute a psychometrically sound and conceptually meaningful measure of the quality of care transitions.<sup>28</sup> In addition to inspection of the 17-item CFA factor loadings, modification indexes were used in accordance with Joreskog’s caution<sup>29</sup> about evaluating modification indexes in the context of substantive and conceptual meaningfulness. Modification indexes reveal the decline in the overall model  $\chi^2$  that would occur were the parameter to be freely (vs. fixed) estimated. Expected parameter change indexes accompany modification indexes and show the expected change in the value and sign of the parameter were it to be respecified. Because modification indexes are not available for categorical dependent variables, 2 modification index approaches were taken to guide model respecification. Initially, modification and expected parameter change indexes were examined in the continuous indicator CFA. Then, first-order parameter derivatives were examined in the categorical indicator CFA. These analyses strongly suggested removing 2 items. The results of the respecified 15-item, second-order factor model are shown in Table 3.<sup>30–32</sup> The model uses both CFAs with continuous indicators (maximum likelihood missing estimation) and categorical indicators with no missing estimation. This 15-item model had good to excellent fit in both the continuous and categorical analyses (Table 3). The first order latent domains explain a large proportion of item response variance for most items and the second order factor explains a large proportion of the variance in each of the first order latent domains. The 4 first-order latent domains (critical understanding, preferences important, management preparation, care plan) are consistent with the original domains suggested in the focus

**TABLE 3.** Continuous and Categorical Dependent Variable Confirmatory Factor Analyses Results for the 15-Item Second-Order Factor Structure Model

Factors and Items	Continuous Indicators Missing Estimated (n = 200)	Categorical Indicators Listwise Deletion (n = 107)
Factor 1: Critical understanding		
15: Confident knew how to manage	0.928	0.998
14: Understand care responsibilities	0.875	0.986
16: Confident could do what needed	0.819	0.831
8: Understand medications' purpose	0.699	0.977
9: Understand how to take medications	0.634	0.857
10: Understand medications' side effects	0.611	0.717
Factor 2: Preferences important		
2: Preferences deciding health needs	0.882	0.881
3: Preferences deciding where needs met	0.841	0.956
1: Agreed health goals and means	0.681	0.754
Factor 3: Management preparation		
5: Understand how to manage health	0.856	0.942
6: Understand signs and symptoms	0.834	0.919
13: Understand what makes better or worse	0.796	0.951
4: Had information needed for self-care	0.795	0.954
Factor 4: Care plan		
12: Had written list appointments and tests	0.790	0.858
11: Had written care plan	0.735	0.720
Second-order factor: care transition		
Factor 1: Critical understanding	0.893	0.929
Factor 2: Preferences important	0.625	0.744
Factor 3: Management preparation	0.976	0.996
Factor 4: Care plan	0.788	0.801
Latent variable r-square		
Factor 1: Critical understanding	0.797	0.864
Factor 2: Preferences important	0.390	0.553
Factor 3: Management preparation	0.953	0.992
Factor 4: Care plan	0.621	0.641
Model fit		
$\chi^2$ baseline model	1989.74 (df = 105)	2890.45 (df = 11)
$\chi^2$ default model	267.19 (df = 86)	54.46 (df = 16)
CFI*	0.957	0.990
RMSEA <sup>†</sup>	0.069	—
SRMR <sup>‡</sup>	0.048	0.058
WRMR <sup>§</sup>	—	0.961

\*The Comparative Fit Index<sup>30</sup> represents the fit of the model relative to the baseline model of independence among the observed variables. Values range from 0 to 1 with the minimum acceptable value for good model fit being 0.95.<sup>31</sup>

<sup>†</sup>The root mean square error of approximation is a population discrepancy function measure of the acceptability of the model that takes into account the complexity of the model. RMSEA assesses how well the model would fit the population covariance matrix were it known. Hu and Bentler<sup>31</sup> suggest a value less than 0.06 indicates good model fit.

<sup>‡</sup>The standardized root mean square residual is a summary measure of average standardized residuals when the model variance-covariance matrix is compared to the sample data variance-covariance matrix. Values range from 0 to 1. Values less than 0.08 represent good model fit.<sup>31</sup>

<sup>§</sup>The weighted root mean square residual is a measure of the average model versus data variance-covariances matrix residuals weighted by the variability in the sample statistics variances. Simulation studies<sup>32</sup> suggest that with categorical dependent variables RMSEA should perhaps be replaced by WRMR with a value of less than 0.90, indicating good model fit.

groups.<sup>6</sup> The loadings for Factor 2, although substantial, are lower than the loadings of the other first-order factors. Nevertheless, the 4 factors sufficiently comprise a unidimensional instrument. Cronbach's alpha for the 15-item measure was 0.93.

## Scoring

Given the fit of the second-order CFA model and Cronbach's alpha, the 15 items were treated as unidimensional measure and simple mean scores (1–4) on answered items were calculated for each patient and converted with a linear transformation to a 0–100 scale with the lowest possible score being zero and the highest possible score being 100. The higher the score the better the quality of the care transition. The mean number of items answered was 13.9 (standard deviation [SD], 1.56). Twelve patients answered fewer than 12 items with 5 being the minimum. The mean score was 67.34, the median and mode were 66.67, and the SD was 13.67. The minimum score was 12.82 and the maximum was 100. The ceiling effect was 1.1% ( $n = 2$ ), and there was no floor effect.

## Construct Validity

Construct validity was evaluated by assessing the ability of the CTM to discriminate between patients who were hypothesized to differ on the quality of their care transition (Table 4). No significant difference in CTM score was found by gender. CTM scores had a small, but significant, negative correlation with age ( $r = -0.156$ ,  $P = 0.033$ ). CTM scores also had a small, but significant, correlation with length of stay ( $r = 0.144$ ,  $P = 0.049$ ).

As shown in Table 4, a significantly lower quality transition was experienced by patients who had a subsequent emergency department visit for their index condition, who were rehospitalized for their index condition, whose index hospital admission was for congestive heart failure versus chronic obstructive pulmonary disease, and who transitioned to a skilled nursing facility rather than home. CTM scores of patients discharged from the 2 hospitals (A and C) varying the most in the degree to which physicians were part of an integrated health care delivery system were significantly different in the expected direction (ie, higher scores for patients cared for in the more integrated hospital).

Respondents were asked if they had experienced 9 different situations or feelings that were considered experiences likely to be associated with lower quality care transitions. For 8 of the 9 experiences, the difference in care transition quality for those patients who did and did not report the experience was in the expected direction and statistically significant (Table 4).

## Individual Items

In recognition of the fact that 15 items may not be practical for some applications due to cost or respondent burden, an attempt was made to identify individual items that shared a similar association with recidivism as the full measure. The four-point agree-disagree responses were collapsed into agree and disagree and  $2 \times 2$  cross tabulations were performed for each item. Item 16, "When I left the hospital, I was confident I could actually do the things I needed to do to take care of my health." was significantly related to subsequent emergency visits (Fisher exact test probability = 0.010,  $\phi = -0.201$ ). Of those who gave a disagree response, 40.0% had an emergency visit compared with 14.9% of those who gave an agree response. Item 14, "When I left the hospital, I had a good understanding of the things I was responsible for in managing my health." was also significantly related to subsequent emergency visits (Fisher exact test probability = 0.049,  $\phi = -0.153$ ). Of those who disagreed on this item 38.5% had an emergency visit, compared with 15.5% of those who agreed. Lastly, item 5, "When I left the hospital, I clearly understood how to manage my health." was also significantly associated with subsequent emergency visits (Fisher exact test probability = 0.049,  $\phi = -0.150$ ). Of those patients disagreeing on this item 35.3% had an emergency visit compared with 15.4% of those agreeing.

## DISCUSSION

### Summary of Findings

The 15-item CTM appears to be a precise, unidimensional measure of the quality of the posthospital care transition experience from the patient's perspective. The factor structure closely resembles the initial content domains identified through qualitative analysis.<sup>6</sup> The ability of the measure to discriminate between patients with and without recidivism and to converge with reported negative posthospital experiences provides support for the construct validity of the CTM, as well as its utility.

### Comparison With Other Instruments

To date, there has been a paucity of measures developed that focus on the quality of the transition experience from the patient's perspective. Although the questionnaire developed by Hendriks and colleagues includes several items that address hospital discharge, it primarily addresses satisfaction with the overall hospital experience.<sup>25</sup> Grimmer and Moss have created an instrument designed to assess the quality of discharge planning based on 4 key process domains: information exchange; preparation for coping; medication management; and control of discharge circumstances.<sup>33</sup> These domains are similar to those that form the basis for the CTM. Two review articles conclude

**TABLE 4.** Mean CTM Score as a Function of Selected Variables

Variable	Groups (n)	Mean CTM Score	F	df	P Value	
Gender	Female (119)	68.3	< 1.00	1/196	0.341	
	Male (79)	66.4				
I had to go to the emergency department for the same problem for which I went to the hospital.	No (162)	68.6	6.16	1/195	0.014	
	Yes (35)	62.5				
I had to be admitted to the hospital again for the same problem.	No (159)	68.1	4.09	1/189	0.045	
	Yes (32)	63.0				
Primary diagnosis	COPD (110)	70.5	10.77	1/176	0.001	
	CHF (68)	64.0				
Transition	Home (162)	68.8	8.57	1/184	0.004	
	Skilled nursing (24)	60.2				
Facility	Hospital A (105)	69.7*	3.30	2/191	0.039	
	Hospital B (32)	66.4				
	Hospital C (57)	64.2*				
Experiences	I felt like the different people I was seeing for my care were not communicating to each other about my needs.	Yes (23) No (167)	63.2 68.3	2.85	1/188	0.93
	I felt like I really needed to talk to a health professional, but did not know whom to call.	Yes (17) No (179)	53.3 69.0	23.48	1/194	< 0.001
I was treated more like a number than a person.	Yes (17) No (181)	56.2 68.6	14.23	1/196	< 0.001	
	I went to a doctor, nurse, or technician who seemed to not understand my health care needs.	Yes (20) No (173)	56.0 69.1	18.23	1/191	< 0.001
I went to a test or appointment and found that they did not have much knowledge about the health condition I had.	Yes (15) No (177)	56.7 68.7	11.49	1/190	< 0.001	
	I found that people did not really care about me as a person.	Yes (8) No (189)	54.1 68.2	8.76	1/195	0.003
I felt down hearted or blue.		Yes (37) No (160)	62.2 68.8	7.53	1/195	0.007
	I had difficulty getting the care I thought I needed.	Yes (20) No (178)	53.6 69.1	27.35	1/196	< 0.001
I had to explain my health condition every time I saw someone new.		Yes (40) No (155)	61.7 67.4	9.70	1/193	0.002

\*Means with shared superscript are significantly different (Bonferroni post hoc with alpha = 0.050).  
CHF indicates congestive heart failure; COP, coronary pulmonary obstructive disease.

that most previous studies of hospital transfer have focused primarily on the discharge or sending aspect of the transition rather than on preparing the patient to receive care in the next setting.<sup>34,35</sup> In contrast, the CTM was explicitly designed to encompass the overall transition experience. To our knowledge, the CTM is the only instrument that has been shown to be associated with other indicators of the quality of care transitions and demonstrated to have the

potential ability to discriminate among different health care institutions.

### Significance

The development and testing of the CTM needs to be considered in a broader context. The importance of care transitions to the overall quality of an episode of care has historically been underappreciated and, consequently, un-

derstudied.<sup>2</sup> The design of the CTM was motivated, in part, to draw attention to the fact that the scope of care transitions is broader than simply the discharge process; it involves the comprehensive preparation of the patient in a manner that optimizes continuity and coordination of practitioners and services across settings.<sup>1</sup> Our exploration of the content domains of care transitions confirms that the construct is highly complex, but can be adequately captured using the CTM.

An ideal measure of care transitions should not only be developed using rigorous psychometric methods, it must also possess items that are meaningful to those who deliver care and those who receive care during transitions. The items that comprise the CTM were directly informed by the positive and negative experiences of patients with complex care needs and their informal caregivers.<sup>6</sup> The items were also created to be fully aligned with the tenets of patient-centered care.<sup>19</sup>

Our findings have potential application to current national efforts aimed at increasing public reporting of health care quality.<sup>20,21,36,37</sup> Independent and federal oversight bodies clearly delineate that hospitals and skilled nursing facilities are responsible for ensuring that patients experience smooth and safe transitions to subsequent care settings.<sup>11,12</sup> The evidence presented herein suggests that the CTM may have potential utility in assessing system performance with respect to care transitions. The CTM appears to have the potential to discriminate between facilities within a given community. Current efforts to develop and test hospital performance using the Hospital Consumer Assessment of Health Plans Survey (HCAHPS®)<sup>20,21</sup> should consider incorporating items that assess the quality of care transitions. Further, aligning financial incentives to institutions' scores on validated measures of care transitions could create the proper environment for implementing a "pay-for-performance" approach to quality improvement.<sup>36–38</sup>

### Strengths and Limitations

With respect to strengths, the CTM was created with significant consumer input and designed to reflect what is most important from the patient's perspective. It was then constructed using rigorous psychometric approaches. The CTM items are "actionable" and well within the purview of hospitals and integrated delivery systems. To minimize response burden, individual CTM items that are independently associated with recidivism could supplement existing patient self-report instruments used in continuous quality improvement efforts.

With respect to limitations, the results herein are based on a relatively small sample from a single large integrated health delivery system in the Pacific Northwest and may not be generalizable to other patient populations. Larger studies of diverse hospital systems or geographic areas are needed to determine whether the relationship between CTM scores and recidivism is robust. Furthermore, this study excluded per-

sons who were not able to communicate or who resided in long-term care—2 groups that are potentially at high-risk for experiencing poor care transitions. Finally, it is apparent that the construct characterizing high-quality care transitions is inherently complex. It is possible that the CTM does not incorporate every dimension of this construct or that one or more of its components are confounded by other factors that have yet to be identified.

### CONCLUSION

The CTM may potentially fill an important gap in assessing the quality of care transitions from the patient's perspective. The content of this instrument is closely aligned with a growing body of literature that clearly articulates the needs of patients experiencing care transitions, and from this standpoint, it is truly patient-centered.<sup>19</sup> In addition to including items that are meaningful to consumers, the CTM is strongly associated with postdischarge use of both hospital and emergency services. Unquestionably, reducing recidivism is in the interest of all involved parties; including the patient and caregiver, practitioners, quality improvement organizations, managed care organizations, and third-party payers such as the Centers for Medicare and Medicaid Services.

Further studies of the CTM need to include greater representation of underserved populations. In addition, protocols need to be refined for obtaining reliable scores in populations that suffer from temporary or chronic cognitive functional decline. Finally, cohorts of patients who have completed the CTM need to be followed longitudinally to ascertain whether the CTM or its individual items are predictive of future poor care transitions and whether the CTM is responsive to interventions designed to improve the quality of care transitions.

### REFERENCES

1. Coleman EA, Boult C. Improving the quality of transitional care for persons with complex care needs. *J Am Geriatr Soc.* 2003;51:556–557.
2. Coleman EA. Falling through the cracks: challenges and opportunities for improving transitional care for persons with continuous complex care needs. *J Am Geriatr Soc.* 2003;51:549–555.
3. Naylor M, Bowles K, Brooten D. Patient problems and advanced practice nurse interventions during transitional care. *Public Health Nurs.* 2000;17:94–102.
4. Kiely DK, Bergmann MA, Murphy KM, et al. Delirium among newly admitted postacute facility patients: prevalence, symptoms, and severity. *J Gerontol Ser A.* 2003;58:M441–M445.
5. Levine C. *Rough Crossings: Family Caregivers Odysseys Through the Health Care System.* New York, NY: United Hospital Fund of New York; 1998.
6. Coleman EA, Eilertsen T, Smith J, et al. Development and testing of a measure designed to assess the quality of care transitions. *Int J Integrated Care.* 1 June 2002; Available from: <http://www.ijic.org>. Accessed December 16, 2004.
7. vom Eigen K, Walker J, Edgman-Levitan S, et al. Carepartner experiences with hospital care. *Med Care.* 1999;37:33–38.
8. Ellers B, Walker J. Facilitating the transition out of the hospital. In: Gerteis M, Edgman-Levitan S, Daley J, et al, editors. *Through the Patient's Eyes: Understanding and Promoting Patient-Centered Care.*

- San Francisco: Jossey-Bass; 1993:204–223.
9. Wachter R, Goldman L. The hospitalist movement 5 years later. *JAMA*. 2002;287:487–494.
  10. Katz T, Walke L, Jacobs L. A geriatric hospitalist program for nursing home residents. *Ann Long Term Care*. 2000;8:51–56.
  11. Joint Commission on Accreditation of Healthcare Organizations. Health Centers' Most Challenging Standards. April 2003. Available from: <http://www.jcaho.org/accredited+organizations/ambulatory+care/specialized+programs/challenging+standards.htm>. Accessed December 16, 2004.
  12. Centers for Medicare and Medicaid Services. Conditions of participation: discharge planning. *Fed Regis*. 2001;Section 482. 43(42(3)):503–504.
  13. Halm E, Magaziner J, Hannan E, et al. Frequency and impact of active clinical issues and new impairments on hospital discharge in patients with hip fracture. *Arch Intern Med*. 2003;163:107–112.
  14. Forster A, Murff H, Peterson J, et al. The incidence and severity of adverse events affecting patients after discharge from the hospital. *Ann Intern Med*. 2003;138:161–167.
  15. Boockvar K, Halm E, Litke A, et al. Hospital readmissions after hospital discharge for hip fracture: surgical and nonsurgical causes and effect on outcomes. *J Am Geriatr Soc*. 2003;51:399–403.
  16. Moore C, Wisnevesky J, Williams S, et al. Medical errors related to discontinuity of care from an inpatient to an outpatient setting. *J Gen Intern Med*. 2003;18:646–651.
  17. Beers M, Sliwkowski J, Brooks J. Compliance with medication orders among the elderly after hospital discharge. *Hosp Formul*. 1992;27:720–724.
  18. Bull M. Patients' and professionals' perceptions of quality in discharge planning. *J Nurs Care Qual*. 1994;8:47–61.
  19. Institute of Medicine. *Crossing the Quality Chasm: A New Health System of the 21st Century*. Committee on Quality of Health Care in America, editor. Washington, DC: National Academy Press; 2001.
  20. Agency for Healthcare Research and Quality RM. Measuring patient's hospital care experiences: development of a national standard. June 2002. Available from: <http://www.ahrq.gov/qual/hspcahps.htm>. Accessed December 16, 2004.
  21. Agency for Healthcare Research and Quality RM. Update on hospital CAHPS (HCAHPS). February 2003. Available from: <http://www.ahrq.gov/qual/cahps/hcahpsupdate.htm>. Accessed December 16, 2004.
  22. Wenger NS, Young R. Quality Indicators for Continuity and Coordination of Care in Vulnerable Elders. 2003. Available from: <http://www.acponline.org/sci-policy/acove/>. Accessed December 16, 2004.
  23. Bonomi A, Wagner E, Glasgow R, et al. Assessment of chronic illness care (ACIC): a practical tool to measure quality improvement. *Health Serv Res*. 2003;37:791–820.
  24. National Chronic Care Consortium. Self-assessment for system integration tool. SASI 1998. Available from: [http://www.nccconline.org/SASI/SASI\\_Objectives.pdf](http://www.nccconline.org/SASI/SASI_Objectives.pdf). Accessed December 16, 2004.
  25. Hendriks A, Vrielink M, Smets E, et al. Improving the assessment of (In)patients' satisfaction with hospital care. *Med Care*. 2001;39:270–283.
  26. Coleman EA, Eilertsen T, Smith JD, et al. Developing and testing of a measure designed to assess the quality of care transitions (abstract). *J Am Geriatr Soc*. 2002;50(4 suppl):S7.
  27. Muthen LMB. Mplus Statistical Analysis with Latent Variables. Version 2. Los Angeles: Muthen and Muthen; 2001.
  28. MacCallum R. Specification searches in covariance structure modeling. *Psychol Bull*. 1986;100:107–120.
  29. Joreskog K. Testing structural equation models. In: Bollen KA, Long JS, editors. *Testing Structural Equation Models*. Thousand Oaks, CA: SAGE Publications; 1993.
  30. Bentler PM. Comparative fit indexes in structural models. *Psychol Bull*. 1990;107:238–246.
  31. Hu Lt, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equation Model*. 2001;6:1–55.
  32. Yu C-Y, Muthen B. Evaluation of model fit indices for latent variable models with categorical and continuous outcomes. In: Muthen B, Muthen L, eds. *Technical Report*. Los Angeles, CA: Mplus; 2001:362.
  33. Grimmer K, Moss J. The development, validity and application of a new instrument to assess the quality of discharge planning activities from the community perspective. *Int J Qual Health Care*. 2001;13:109–116.
  34. Hedges G, Grimmer K, Moss J, et al. Performance indicators for discharge planning: a focused review of the literature. *Aus J Adv Nursing*. 1999;16:20–28.
  35. Parkes J, Shepperd S. Discharge planning from hospital to home (Cochrane Review). The Cochrane Library 3. 2003.
  36. The Leapfrog Group. Purchasing Principles. 2003. Available from: [http://www.leapfroggroup.org/about\\_us/leapfrog-factsheet](http://www.leapfroggroup.org/about_us/leapfrog-factsheet). Accessed December 16, 2004.
  37. California Health Care Foundation. Results from the Patients' Evaluation of Performance (PEP-C) Survey. 2003. Available from: <http://www.chcf.org/documents/consumer/quality/PEPCTechReport.pdf>. Accessed December 16, 2004.
  38. Anonymous. History of IHA's Pay for Performance Initiative. 2003. Available from: <http://www.iha.org/payfprfd.htm>. Accessed December 16, 2004.

**APPENDIX** Means, Standard Deviations, and Missing Values for the 15 CTM Items\*

Item <sup>†</sup>		Mean <sup>‡</sup>	SD	Proportion Missing	Percent Missing	Number Missing	Total n
q1	Before I left the hospital the staff and I agreed about clear health goals for me and how these would be reached.	3.00	0.603	0.060	6.00	12	200
q2	The hospital staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left the hospital.	3.04	0.573	0.100	10.00	20	200
q3	The hospital staff took my preferences and those of my family or caregiver into account in deciding where my health care needs would be met when I left the hospital.	3.01	0.565	0.135	13.50	27	200
q4	When I left the hospital, I had all the information I needed to be able to take care of myself.	3.11	0.574	0.030	3.00	6	200
q5	When I left the hospital, I clearly understood how to manage my health.	3.06	0.542	0.035	3.50	7	200
q6	When I left the hospital, I clearly understood the warning signs and symptoms I should watch for to monitor my health condition.	3.06	0.616	0.055	5.50	11	200
q8	When I left the hospital, I clearly understood the purpose for taking each of my medications.	3.14	0.536	0.035	3.50	7	200
q9	When I left the hospital, I clearly understood how to take each of my medications, including how much I should take and when.	3.19	0.542	0.055	5.50	11	200
q10	When I left the hospital I clearly understood the possible side effects of each of my medications.	2.87	0.659	0.095	9.50	19	200
q11	When I left the hospital, I had a readable and easily understood written list of the appointments or tests I needed to complete within the next several weeks.	2.98	0.600	0.175	17.50	35	200
q12	When I left the hospital, I had a readable and easily understood written plan that described how all of my health care needs were going to be met.	2.85	0.629	0.135	13.50	27	200
q13	When I left the hospital I had a good understanding of my health condition and what makes it better or worse.	3.03	0.569	0.040	4.00	8	200
q14	When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.	3.09	0.466	0.040	4.00	8	200
q15	When I left the hospital I was confident that I knew what to do to manage my health.	3.10	0.517	0.025	2.50	5	200
q16	When I left the hospital, I was confident I could actually do the things I needed to do to take care of my health.	3.04	0.589	0.020	2.00	4	200

\*The CTM was created for use in the public domain. Individuals or institutions interested in using the CTM may go to <http://www.caretransitions.org> to download the instrument.

<sup>†</sup>Note that the CTM item numbers correspond to those presented in Table 3.

<sup>‡</sup>Scale 1, strongly disagree; 2, disagree; 3, agree; 4, strongly agree.