

Kansas City Cardiomyopathy Questionnaire Administered to Hospitalized Patients With Heart Failure

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Background and Purpose: The psychometric properties of the Kansas City Cardiomyopathy Questionnaire (KCCQ) have been examined primarily in community-dwelling patients with heart failure (HF). The objective of this research was to examine the properties of the KCCQ administered to patients hospitalized with HF ($N = 233$). **Methods:** Confirmatory factor analysis, Cronbach's alphas, and correlations were performed to examine the scale's dimensions, reliability, and validity. **Results:** Confirmatory factor analysis indicated a 5-factor solution (63.6% of the variance). The Cronbach's alpha levels were greater than .70, except for the self-efficacy dimension (.60). Convergent validity was not verified between the KCCQ and several illness severity measures. **Conclusions:** The psychometric properties of the KCCQ may be different based on the population in which the KCCQ is administered, which may have clinical implications.

Keywords: heart failure; factor analysis; chronic illness

The Kansas City Cardiomyopathy Questionnaire (KCCQ) was developed by Green, Porter, Bresnahan, and Spertus (2000) as a disease-specific, health-related quality of life measurement tool for patients with heart failure (HF). The KCCQ is a 23-item questionnaire that was designed to measure the construct of self-perceived health status which is defined by the following domains: physical limitation, symptoms (stability, frequency, and burden), self-efficacy, social limitation, and quality of life. Scores from select individual domains are collated into symptom, clinical, and an overall summary score, with higher scores indicating higher perceived health status (health-related quality of life).

The KCCQ has been found to be a valuable tool for accurately reflecting clinical change in patients with HF (Sauser, Spertus, Pierchala, Davis, & Pang, 2014; Spertus, Jones, Kim, & Globe, 2008; Spertus et al., 2005;) and as an independent predictor of event-free survival in the HF patient population (Parissis et al., 2008), including patients with HF with preserved ejection fraction (Joseph et al., 2013). The KCCQ has also been shown to be a useful scale to measure health-related quality of life in patients discharged

from the hospital after a myocardial infarction (Pettersen, Reikvam, Rollag, & Stavem, 2005), in patients postheart transplantation (Ortega et al., 2008), and monitoring patients with aortic stenosis (Arnold et al., 2013).

Despite the many reports of the clinical usefulness of the KCCQ, there is a lack of literature reporting evidence of the scale's conceptual domains. Ortega et al. (2008) reported a five-factor solution of the KCCQ in a sample of heart transplant patients. Masterson Creber, Polomano, Farrar, and Riegel (2012) were the first to publish a factor analysis of the KCCQ in a sample of patients with heart failure. The results of both of these factor analyses demonstrated a variation from the conceptual domains reported by the original designers of the KCCQ. Masterson Creber et al. report several suggestions for modification of the instrument but conclude that more psychometric testing of the KCCQ would be valuable to enhance its reliability, validity, and use.

The psychometrics of the KCCQ domains have been reported in only a few studies primarily with ambulatory patients, further examination of the psychometrics of this instrument is needed. Therefore, the purpose of this study is to further examine the conceptual domains, reliability, and validity of the KCCQ when administered to patients hospitalized for decompensating HF.

BACKGROUND AND CONCEPTUAL FRAMEWORK

HF has been a prevalent chronic disease and a significant indication among older adults for hospitalization and mortality. After the age 65 years, the incidence of HF was shown to be 10 per 1,000 people, and the prevalence of HF in 2010 was 5.1 million Americans (Go et al., 2013). The number of HF hospital discharges have not significantly changed from 2000 (1.008 million) to 2010 (1.023 million; Go et al., 2013). The number of mortalities caused by HF as an underlying cause in 1,009 was 56,410, and the estimated cost of HF for 2013 is \$32 billion (Go et al., 2013). These statistics demonstrate that HF is a substantial problem.

There is a large number of people living with chronic illnesses for which goal of treatment has shifted from cure of disease to maintaining and improving health-related quality of life (Chen, Baumgardner, & Rice, 2011; Solomon, Kirwin, Van Ness, O'Leary, & Fried, 2010). General measures of health-related quality of life generally include questions related to self-reported symptoms, functional limitations, and overall quality of life and are used with many different populations of people (Mommersteeg, Denollet, Spertus, & Pedersen, 2008). However, measures of health related quality of life specific for HF patients (e.g., KCCQ, The Minnesota Living with HF Questionnaire) are reported to be more sensitive to clinical changes that can occur compared to general measures of health related quality of life (Eurich, Johnson, Reid, & Spertus, 2006).

Health-related quality of life has been an evolving concept for the last 20 years. Wilson and Cleary (1995) first published their conceptual model that depicted how biological and physiological variables, symptoms, functional status, and health perceptions would all impact the individual's overall quality of life measurement. This model was revised by Ferrans, Zerwic, Wilbur, and Larson (2005) to facilitate knowledge about the concept by providing theoretical background and definitions of the major components of the model and included examples of measurement tools that could be used to measure each component. Bakas et al. (2012) reviewed health-related quality of life models and recommended use of the Ferran and colleagues' model because of the enhanced clarifications on the components and its specificity to health-related quality of life. However, Bakas et al. did

report that there is no consistency in the literature with the health-related quality of life models and that this could partially be caused by many contextual or disease-specific models. The continued evolution of the concept of health-related quality of life could be one of the reasons that the originators of the KCCQ did not report using a specific conceptual model when designing the measurement tool's domains (Green et al., 2000). The design and evaluation of the KCCQ has been primarily based on clinical input and clinical outcomes. Therefore, a more thorough examination of the conceptual domains is warranted.

The KCCQ was designed as a measurement of perceived health status of patients with HF, and it has been found to be a significant predictor of mortality, hospitalization, and change in health (Eurich et al., 2006; Farkas, Nabb, Zaletel-Kragelj, Cleland, & Lainscak, 2009; Mommersteeg et al., 2008; Parissis et al., 2009). A lower perceived health status has predicted higher mortality, greater number of hospitalizations, and a decrease in clinical health status. Lower patient-perceived health status has been significantly associated with reduced 6-minute walk distance, higher plasma B-type natriuretic peptide (BNP), and higher proinflammatory markers in community living HF patients (Parissis et al., 2009). Because it has been shown to have significant associations with many clinical outcomes, it is important to further validate the construct being measured through additional psychometric testing, especially in patients hospitalized for decompensating HF.

The KCCQ has been evaluated for reliability and validity previously. Green et al. (2000) recruited two cohorts of ambulatory patients with HF with documented left ventricular ejection fraction less than 40%. The first cohort included participants who had no medication changes or hospitalizations for 2 months. They were labeled the reliability cohort ($n = 39$). The second cohort (responsiveness cohort) were hospitalized at least once during the study and were hypothesized to have a change in health status ($n = 39$). Internal consistency was reported via Cronbach's alpha levels for the domains ranged from .62 (self-efficacy) to .90 (physical limitation). The Cronbach's alpha levels for the functional status summary score was .93 and for the clinical summary score was .95. In the reliability cohort, the mean difference in test-retest scores over a 3-month period ranged from 0.8 (physical limitation) to 4.0 (quality of life), and none of the domains had any statistically significant differences. In the responsiveness cohort, the 3-month change scores ranged from 15.4 (self-efficacy) to 40.4 (symptom stability), and all domain scores demonstrated statistically significant improvements. The KCCQ physical limitation domain correlated positively with 6-minute walk test scores ($r = 0.48, p < .001$). Linear trends were found to explain relationships between New York Heart Association (NYHA) classification and KCCQ symptom score ($R^2 = .51; F = 142.2, p < .001$), NYHA classification and KCCQ clinical summary score ($R^2 = .55; F = 153, p < .001$), and NYHA classification and KCCQ overall summary score ($R^2 = .55; F = 156.8, p < .001$).

Psychometric properties of the KCCQ have also been evaluated when used in patients with a previous myocardial infarction with and without HF (Pettersen et al., 2005). The internal consistency reliability Cronbach's alpha levels for the domains ranged from .66 (self-efficacy) to .91 (physical limitation). The Cronbach's alpha levels for the functional status score was .93 and for the clinical summary score it was .95. Spertus et al. (2008) reported the Cronbach's alpha .92 and .93, respectively. Therefore, the internal consistency of the scale has been examined in several different populations.

Unlike the internal consistency, very few authors have reported a factor analysis for the KCCQ. Ortega et al. (2008) examined the reliability and validity of the KCCQ in a sample of heart transplant patients. These authors published factor analysis on the KCCQ which demonstrated five factors that explained 65.66% of the variance. The five factors were

listed as quality of life and social limitation, moderate physical limitation, total symptom score, severe physical limitation, and self-efficacy. It was not reported which original items corresponded to each of the factors. Masterson Creber et al. (2012) reported psychometric properties of the KCCQ when used for outpatient HF patients. Similarly to Ortega et al. (2008), a five-factor solution was found that explained 67.2% of the variance. The five factors were named social interference, physical limitations, symptoms, independent care, and self-efficacy. Therefore, the five factors were not named identically in the two studies. Based on the inconsistencies of findings in previous factor analyses of the KCCQ and the fact that it has not been tested with HF inpatients, further study is warranted which is the purpose of this research.

PROCEDURES FOR INSTRUMENT DEVELOPMENT

When Green et al. (2000) developed the KCCQ, they wrote questions to address the five clinically relevant domains (physical limitations, symptoms—frequency, severity, and change over time, self-efficacy and knowledge, social interference, and quality of life) identified from a review of the medical literature, previously written health related quality of life instruments, and focus groups composed of HF specialists and patients with HF. The authors wrote the questions to address the past 2 weeks of the patient's life.

Description, Administration, and Scoring of the Instrument

The KCCQ was designed as a survey instrument (23-item questionnaire) that could either be completed by the patient with HF without assistance or the questions could be read to the participant by a research assistant or clinician (Green et al., 2000). Questions were scored with Likert scale response sets. The items that correspond with each of the domains are physical limitations (Items 1a–1f; 6 items), symptom frequency (Items 3, 5, 7, and 9; 4 items), symptom severity (Items 4, 6, and 8; 3 items), symptom change over time (Item 2; 1 item), self-efficacy and knowledge (Items 10 and 11; 2 items), social interference (Items 15a–15d; 4 items), and quality of life (Items 12, 13, and 14; 3 items). Several different summary scores were calculated. The functional status score included items from the physical limitation and symptom domains. The clinical summary score was calculated using the functional status score in addition to the quality of life and social limitation domains. An overall summary score is a mean of the physical limitation, symptom, quality of life, and social limitation domains.

METHOD

Sample

A study was conducted to examine the association between the recognition of worsening symptoms by HF patients and time to hospitalization (Quinn et al., 2010). For this descriptive study, a convenience sample of 233 hospitalized chronic HF patients were recruited at three hospitals in Western New York. Inclusion criteria for the patients included older than 21 years, able to speak and read English, hemodynamically stable (stable vital signs and not intubated), free of acute psychiatric impairment, previously diagnosed with HF, and who had one prior HF admission. Patients were excluded if they were electively admitted

for evaluation or surgery for heart transplantation or ventricular assist device implantation. Patients were also excluded if they lived in an assisted living facility or a nursing home.

All data were collected after approval was received from the institutional review board. Potential participants were screened from computer-generated lists of patients admitted with a primary diagnosis of HF to the hospital recruitment sites. Patients were asked if they were interested in participating prior to obtaining informed consent. Then, structured interviews were conducted primarily by trained research assistants. The patient interviews were often completed in the patient's hospital room. Medical record abstraction was conducted at time of interview, 3- and 6-months postinterview for clinical background information and number of rehospitalizations.

Measures

Perceived Patient Health Status. The KCCQ (Green et al., 2000) was used to measure disease-specific, health-related quality of life of the patient with HF.

Illness Severity. Clinical measures that were abstracted from the medical records as measures of illness severity were NYHA classification and BNP levels. It is unknown if the BNP levels included some N-terminal pro-BNP values. Comorbidity was also measured with the Charlson Comorbidity Index (CCI). The CCI is designed to be able to prospectively predict 1-year mortality based on an individual's comorbidity (Charlson, Pompei, Ales, & MacKenzie, 1987).

Statistical Analyses

The data set was checked for coding errors and, if needed, corrected. The amount and type of missing data were examined. Because the total percentage of missing data was quite low (less than 5%), it was decided not to perform imputation techniques to minimize bias. If a patient had not completed at least half of the KCCQ, he or she would have been deleted from the study. However, none of the patients fit this description. Data analysis was performed with listwise deletion. The independent variable that had the highest percentage of missing data was the NYHA classification (45% missing). Imputation techniques were not performed with this variable because of the lack of variability (92% of the participants were classified as either III or IV).

RESULTS

Sample and Descriptive Data

The data set that was used is from a previously described study (Quinn et al., 2010) and included data from 233 HF patients. The characteristics of the sample are depicted in Table 1. The patients were mostly male (64.3%), with a mean age of 66 years ($SD = 14.8$), primarily White (77%), and more than half were married (51%). The range of years since HF diagnosis was less than 1 year to 35 years with a mean of 7 years ($SD = 6.9$).

Factor Analysis

The original dimensions of the KCCQ were physical limitation, symptoms (stability, frequency, burden), self-efficacy, social limitation, and quality of life (Green et al., 2000). Because previous authors reported five-factor solutions (Masterson Creber et al., 2012;

TABLE 1. Characteristics of Patients

	Frequency	Percentage
Gender (<i>N</i> = 233)		
Male	151	64.3%
Female	82	34.9%
Race (<i>N</i> = 233)		
White	182	77.4%
Black	42	17.9%
Hispanic	4	1.7%
Asian/Pacific Islander	1	0.4%
American Indian/Alaskan	4	1.7%
Marital status (<i>N</i> = 233)		
Married	120	51.1%
Single with partner	12	5.1%
Widowed	46	19.6%
Divorced	26	11.1%
Never married/no partner	25	10.6%
Separated	4	1.7%
Household income (<i>n</i> = 217)		
<\$30,000/year	137	58.3%
= or >\$30,000/year	80	34.0%
New York Heart Association classification (<i>n</i> = 122)		
I	1	0.4%
II	5	4.7%
III	55	23.4%
IV	55	23.4%
	<i>M</i> (<i>SD</i>)	Range
Age (<i>N</i> = 233)	66 (14.8)	22–97
Left ventricular ejection fraction (<i>n</i> = 218)	32 (18.0)	5–70
B-type natriuretic peptide (<i>n</i> = 107)	1761 (3479.8)	6–34,013
Beck Depression Inventory score (<i>n</i> = 132)	16 (10.9)	0–50
Charlson Comorbidity Index score (<i>N</i> = 144)	3 (2.3)	0–14

Ortega et al., 2008), a confirmatory factor analysis was performed (Table 2). Principal axis factors with promax rotation was used for the factor analysis. The final factor solution for the KCCQ included five factors (symptoms and quality of life, physical limitations, independent care, swelling, and self-efficacy) which explained 63.6% of the variance. Two items (15c, 15d) cross-loaded on two factors (1, 3).

TABLE 2. Pattern Matrix for Confirmatory Factor Loadings for the Kansas City Cardiomyopathy Questionnaire

Item	Original Dimensions	Factors				
		1 Symptoms and QoL	2 Physical Limitations	3 Independent care	4 Swelling	5 Self-efficacy
1a	Physical limitation	-.038	-.007	.864	.098	.014
1b	Physical limitation	-.176	.077	.912	.127	.033
1c	Physical limitation	.100	.655	.128	.020	.103
1d	Physical limitation	.026	.791	.101	.003	-.038
1e	Physical limitation	-.100	.914	-.005	-.061	.072
1f	Physical limitation	.002	.865	-.139	-.036	-.111
2	Symptom stability	.397	-.076	-.178	.162	.014
3	Symptom frequency	.009	-.001	.066	.844	-.025
4	Symptom burden	.067	-.078	.124	.849	-.044
5	Symptom frequency	.630	.174	-.027	.073	-.021
6	Symptom burden	.778	.045	-.132	.159	-.038
7	Symptom frequency	.563	.122	-.005	.136	.057
8	Symptom burden	.691	.056	-.113	.154	.093
9	Symptom frequency	.385	.040	-.032	.094	.178
10	Self-efficacy	.007	.055	.052	.019	.633
11	Self-efficacy	.076	-.065	-.010	-.101	.737
12	Quality of life	.802	.023	.039	-.085	-.047
13	Quality of life	.668	-.107	-.109	-.035	.006
14	Quality of life	.479	-.056	.130	-.104	.109
15a	Social limitation	.580	-.017	.260	-.135	-.102
15b	Social limitation	.537	.188	.146	-.104	-.114
15c	Social limitation	.579	-.067	.365	-.126	.016
15d	Social limitation	.371	-.168	.362	-.056	-.039

Note. Extraction method: principal axis factoring. Rotation method: Promax with Kaiser normalization; $n = 210$; Cumulative % variance = 63.6%; Determinant = 2.20E-006; KMO of sampling adequacy = .863; Bartlett's test of sphericity sig. 0.00. QoL = quality of life. Factor loadings >0.3 were bolded.

Reliability

The Cronbach's alpha levels for the original dimensions of the KCCQ are shown in Table 3. The KCCQ dimensions that had low alpha levels ($<.70$) were symptom frequency (.65), symptom burden (.64), self-efficacy (.60), and quality of life (.69). The Cronbach's alpha levels for the KCCQ factors from the factor analysis are depicted in Table 4. The only factor in the KCCQ that had a low alpha level ($<.70$) was self-efficacy (.60).

TABLE 3. Internal Consistency Reliability of Entire Scale and Original Dimensions of the Kansas City Cardiomyopathy Questionnaire

	Alpha (<i>N</i>)
Entire scale (23 items)	.90 (210)
Physical limitation (6 items)	.87 (221)
Symptom frequency (4 items)	.65 (222)
Symptom burden (3 items)	.62 (221)
Self-efficacy (2 items)	.64 (220)
Quality of life (3 items)	.67 (218)
Social limitation (4 items)	.82 (216)

Validity

The KCCQ measures were tested for convergent validity by examining the correlations of the dimension scores and summary scores with illness severity as measured by NYHA, BNP, and CCI scores. No linear relationships were found. Ninety percent of the patients in this study who had a NYHA classification recorded were either class III or IV. Correlations were also examined between the new factors and BNP levels, and there were no significant correlations. Therefore, there was no evidence of convergent validity of the KCCQ original dimensions or summary scores with illness severity measures in this sample of hospitalized patients with HF.

Summary of Results

The confirmatory factor analysis validated the five factors reported in Ortega et al. (2008) and Masterson Creber et al. (2012), and 63.6% of the variance was explained. The results of the internal consistency analysis were mixed. Some dimensions demonstrated low (<.70) Cronbach's alpha levels for the original dimensions. However, the overall summary score (perceived health status measure) alpha level was high (.90). The new factors all had high internal consistency except for the self-efficacy factor (.64). The KCCQ measures did

TABLE 4. Internal Consistency Reliability of Factors of the Kansas City Cardiomyopathy Questionnaire

KCCQ Factors	Alpha (<i>N</i>)
Symptoms and QoL	.88 (214)
Physical limitations	.88 (222)
Independent care	.91 (222)
Swelling	.87 (221)
Self-efficacy	.64 (220)

Note. KCCQ = Kansas City Cardiomyopathy Questionnaire; QoL = quality of life.

not demonstrate convergent validity with illness severity measures. They were not linearly correlated with illness severity as measured by NYHA classification, BNP, and CCI scores.

DISCUSSION

Interpretations of Findings

Factor Analysis. Prior to this study, a factor analysis of the KCCQ had been performed in two other studies. Ortega et al. (2008) administered a Spanish version of the KCCQ to 98 Spanish heart transplant patients and found a five-factor solution that explained 65.7% of the variance. It was not reported which items were related to which factor. The researchers named the factors: quality of life/social limitation, moderate physical limitation, total symptom score, severe physical limitation, and self-efficacy. Masterson Creber et al. (2012) administered the KCCQ to patients with HF who were not hospitalized and found a five-factor solution that explained 67.16% of the variance. These researchers named the factors social interference, physical limitations, symptoms, independent care, and self-efficacy.

There were some similarities of the results of the factor analysis in this study compared to previous research. In fact, three of the five factors were identical to the findings by Masterson Creber et al. (2012). The first two questions of the KCCQ factored out separately from the next four. This would indicate that dressing and shower/bathing are conceptualized separately than the other physical activities addressed in Items 1c–1f (walking, yard work, climbing stairs, jogging). In addition, the items designed to measure self-efficacy factored out separately from other items. Furthermore, the quality of life items and social limitation items factored out onto the same factor.

There were some differences found in this analysis compared to previous research. Both Ortega et al. (2008) and Masterson Creber et al. (2012) reported all of the symptom items factoring out onto one factor. However, in this study, the two items questioning the patient about swelling, factored separately from the items questioning about other symptoms. The differences found may be because of the different sample sizes and/or the different subsets of patients. This study examined English-speaking (mostly White) hospitalized chronic HF patients. Ortega et al. studied heart transplant patients, and Masterson Creber et al. studied ambulatory patients with HF. It is a possibility that the items addressed the symptom of swelling factor out differently in patients who are currently hospitalized compared to ambulatory patients. It was also found that the items addressed symptoms other than swelling factored together with the items addressing quality of life and social limitation. It may be that the KCCQ measure is a useful tool to depict overall health-related quality of life in several subset of populations, but that the latent variables are different for different populations and settings.

Internal Consistency. The reliability of the KCCQ has previously been evaluated (Green et al., 2000; Masterson Creber et al., 2012; Patel, Ekman, Spertus, Wasserman, & Persson, 2008; Pettersen et al., 2005; Ortega et al., 2008). The self-efficacy subscale consistently has demonstrated the lowest internal consistency Cronbach's alpha scores (<.70). Most of the other subscales consistently demonstrate adequate internal consistency, except Patel et al. found a low alpha level for the quality of life subscale (.68). In this study, several of the original dimensions had low internal consistency (alpha <.7): symptom frequency (.65), symptom burden (.62), self-efficacy (.64), and quality of life (.67). However,

the internal consistency of the new factors was all greater than .7, except the self-efficacy factor (.60). This finding was consistent with the report from Masterson Creber et al. (2012), who reported the self-efficacy Cronbach's alpha value as .626. In fact, Masterson Creber et al. suggest revising and/or eliminating the questions measuring self-efficacy because of the low internal consistency. Despite some of the lower alpha levels for some of the original dimensions, the internal consistency was very high (.90) when all 23 items of the scale were included. This demonstrates that the internal reliability of the KCCQ in this study is adequate and congruent with previous research.

Relationship of Patient Health Status and Illness Severity. No relationship was found with patient health status and illness severity as measured by NYHA classification, BNP, or comorbidity scores. Several researchers have found that lower perceived health status was related to higher NYHA classification (Green et al., 2000; Luther et al., 2005); however, these studies were performed with ambulatory HF patients with higher KCCQ scores and lower NYHA classifications than the participants of this study. The research is mixed regarding the relationship of perceived health status and BNP levels. Parissis et al. (2008) found that ambulatory HF patients with lower perceived health status had higher BNP levels. However, similar to this study, other investigators (Luther et al., 2005) found no association between patient-perceived health status and BNP levels in HF patients that were not hospitalized. The lack of relationship between patient-perceived health status and number of comorbidities is contrary to previous studies that included patients with several different chronic diseases (including HF; Hopman et al., 2009). These authors did not measure health status as perceived by the patient with the KCCQ, and they included ambulatory patients with osteoarthritis, chronic wounds, and multiple sclerosis.

One of the reasons that no relationships were found with perceived health status and illness severity may have been because of the sample characteristics. For example, only 122 of the 233 patients had a NYHA classification, and 110 of those patients were classified as either III or IV. The large number of unknown NYHA classifications and the lack of variability could have precluded any significant association. Furthermore, because of the patients' acute situation, perceived health status was generally rated low, which may be expected. Because the patient was in the hospital for acute HF management, both the low perceived health status and high illness severity measures may have lacked the variability to show a statistical relationship. Comorbidities may not have been relevant in the patients' perception of health status at this time because their hospitalization was caused by HF.

Limitations

Limitations to this study need to be considered. First, the sample included only patients hospitalized for worsening HF. Second, the sample was fairly homogeneous in gender, race, and illness severity, which limits generalizability to other populations of HF patients. Although the sample size was adequate for general analysis, subgroup sizes were smaller than desired. Third, the health status measures were completed only at one point in time, during the patient's hospitalization. Test-retest reliability data for the KCCQ was not collected.

CONCLUSION

The objective of this research was to examine the reliability and validity of the KCCQ in a sample of patients hospitalized for decompensating HF. There are important findings from

this study that are consistent with previous studies. Internal consistency for the KCCQ was good, demonstrating good reliability of the internal structure of the measures.

There were some findings in this study that differed from previous studies. Two of the factors were not consistent with previously reported factor analyses (Masterson Creber et al., 2012; Ortega et al., 2008). Patient-perceived health status was not related to illness severity, which was probably because of the high level of illness severity within the sample of participants and/or the lack of variability in some of the variables. This may indicate that only assessing perceived health status of the HF patient during hospitalization may not be as clinically useful as assessing when the patient is ambulatory. However, Sauser et al. (2014) found the KCCQ scores serially increased when 52 patients admitted to the hospital with HF were administered the KCCQ three times (within 12 hours of admission, 7 days postadmission and 30 days postadmission). Score changes were not found to predict readmission to the hospital.

The findings from this study alone did not show enough evidence to warrant changing the measurement tool. However, the questions aimed at measuring self-efficacy demonstrated low internal consistency. Because this corroborates other researchers' findings, it may be useful to revise or eliminate these questions to strengthen the scale.

Several implications for future research are identified. A reassessment of the reliability and factor structures of the KCCQ with a larger and more heterogeneous sample of HF patients (both in and out of the hospital setting) is needed to be more confident in the factor solution. If the KCCQ was to be revised to eliminate the self-efficacy scale, both the psychometric data and clinical implications would need to be reexamined. Furthermore, the most efficient and effective timing of administration of the KCCQ needs to be ascertained.

There are several clinical implications of this research as well. Administering the KCCQ to patients with HF in the hospital was found to be extremely feasible for nurses and research assistants to accomplish. However, we are not sure of how the administration timing of the assessment will effect the predictive ability of the measurement tool. It may be especially useful for clinicians to know that the symptom "swelling" as measured by the KCCQ seems to influence the concept of health-related quality of life differently in patients who are in the hospital versus patients who are not. Most important, nurses can be aware that despite the ongoing evolution of the conceptual models and continuing research about the domains within the KCCQ, perceived health-related quality of life is undisputedly an important indicator of their patient's overall health.

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