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Evaluating the Critical Care Family Satisfaction Survey for Chronic Critical Illness

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Abstract

Recognition of the family as a component of patient-centered critical care has shifted our attention to the assessment of family satisfaction in the intensive care unit (ICU). To date, there are no established measures of satisfaction with ICU care for family members of the chronically critically ill (CCI). This study evaluated psychometric properties of the Critical Care Family Satisfaction Survey (CCFSS) in 326 family members of the CCI using exploratory and confirmatory factor analysis (CFA). From the exploratory factor analysis, two unique structural models emerged, each with alpha coefficients of .72 to .91 and discriminant validity among factors ($r < .70$). The CFA confirmed the best-fitting structural model was a 14-item, three-factor solution ($\chi^2 = 354$, $df = 148$, $p < .001$, Tucker Lewis Index = .88, Comparative Fit Index = .90, root mean square error of approximation = .06). Thus, the modified 14-item version of the CCFSS is reliable and valid in family members of CCI patients.

Keywords

adults; population focus; critical care; location of care; statistical analysis; methods

More than three decades of research have explored the psychological needs of family members of the critically ill. This body of research has shown that family members of the critically ill want to receive timely and clear information, remain in close proximity to the critically ill patient, and have a trusting and compassionate relationship with health care providers (Azoulay et al., 2001; Fry & Warren, 2007; Hughes, Bryan, & Robbins, 2005; Molter, 1979; Nelson, Kinjo, Meier, Ahmad, & Morrison, 2005). Family satisfaction with care is thought to be a function of meeting the family member's psychological needs and expectations about the care provided to them and the patient during a hospitalization (Roberti & Fitzpatrick, 2010). Increasing attention to family satisfaction has led to the development of clinical practice guidelines and consensus statements advocating for the fulfillment of a family member's needs during critical illness as a proxy indicator for the quality of patient-centered critical care (Curtis et al., 2006; Davidson et al., 2007; Roberti & Fitzpatrick, 2010).

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As the incidence of chronic critical illness continues to increase, a growing population of family members will have prolonged exposure to care received in the intensive care unit (ICU). The growing subpopulation of the critically ill, referred to as the chronically critically ill (CCI), are generally defined by their protracted ICU stays and dependence on mechanical ventilation (Carson, Cox, Holmes, Howard, & Carey, 2006; Chelluri et al., 2004; Chelluri, Mendelson, & Belle, 2003; Combes et al., 2003; Douglas, Daly, Gordon, & Brennan, 2002). Douglas et al. (2002) and Daly et al. (2010) have conducted research that defined this emerging subpopulation of the critically ill by their need for at least 3 days of continuous mechanical ventilation. The impact of chronic critical illness on the psychological morbidity of family members is well supported (Hickman & Douglas, 2010). These family members report more symptoms of depression compared with family members of short-stay or non-CCI patients (Douglas & Daly, 2003; Douglas & Daly, 2005; Douglas, Daly, O'Toole, & Hickman, 2010; Hickman & Douglas, 2010; Im, Belle, Schulz, Mendelsohn, & Chelluri, 2004) and endure significant reductions in their self-reported quality of life and caregiver burden as a result of exposure to chronic critical illness (Douglas & Daly, 2005; Im et al., 2004). To date, there are no measures of satisfaction with ICU care for family members of the CCI. However, the steadily increasing incidence of the CCI and poor psychological outcomes of their family members signify a need to examine satisfaction with the care provided in the ICU during and after an episode of chronic critical illness.

The Critical Care Family Satisfaction Survey (CCFSS) is an established instrument that measures family satisfaction with the care received in an ICU (Wasser & Matchett, 2001; Wasser, Pasquale, Matchett, Bryan, & Pasquale, 2001). Wasser and colleagues (2001) constructed the CCFSS as a proxy measure for patient satisfaction with care received in the ICU through the appraisal of satisfactory patient care and the fulfillment of the family member's psychological and informational needs. Sound psychometric properties of the CCFSS have been reported (Wasser et al., 2001; Wasser, Pasquale, Matchett, Ray, & Baker, 2004), and the CCFSS is an accepted measure of family satisfaction with care provided in the ICU. The reliability and validity of CCFSS has not been evaluated among family members of the CCI and prior examinations of this instrument's psychometric properties have not captured its performance during an episode of a patient's critical illness.

Purpose

The aims of this research were to: explore the factor structure of the CCFSS when administered to family members at the onset of a patient's chronic critical illness as well as at the patient's discharge from an ICU; examine the hypothesized structural models using confirmatory factor analysis (CFA); and confirm the best fitting structural model to our longitudinal data.

Method

Design

This study is a secondary analysis of data collected for the primary purpose of evaluating the effectiveness of a structured communication process for family members of CCI patients. The main outcomes of the parent investigation and description of the structured

communication intervention are presented in Daly et al. (2010). In the parent investigation, family satisfaction, as measured by the CCFSS, did not differ between family members of the CCI who were exposed to the intervention compared with those who received usual care.

Sample

As part of a larger study, family members who met the following criteria were approached for participation: at least 18 years of age, available to attend formal family meetings, were the next-of-kin or legal representatives for health care decisions for a cognitively impaired patient who had undergone at least 3 days of acute mechanical ventilation and expected to remain in the ICU for at least 48 to 96 hr after meeting our criterion for chronic critical illness. Family members of patients who were cognitively intact or dependent on mechanical ventilation prior to an ICU admission were not approached for enrollment.

Procedure

Participants were recruited from five ICUs at two academic medical centers in Northeast, Ohio, between September 2005 and January 2008. Prior to participant enrollment, approval from each institutional review board and informed consent from each family member was obtained. In total, 489 family members consented to participate and 264 (37%) of those approached refused. Most family members entered the study either the day that the patient met the mechanical ventilation criterion or no later than 4 days after the patient's qualification date. As part of the larger study, participants were administered a set of psychological measures and the CCFSS on entry to the study and at patient's discharge from the ICU. Family members of patients who died in the ICU were not approached to complete a second CCFSS. In sum, 326 family members had complete CCFSS data at baseline and at the patient's discharge from the ICU and comprised the sample for this psychometric analysis.

Measures

CCFSS—The CCFSS is a self-report measure of family satisfaction with care delivery during a patient's critical illness. The CCFSS has 20 items and five subscales: Assurance, Information, Proximity, Support, and Comfort. When administering the CCFSS, the respondent endorses one of five choices from 1 (*very dissatisfied*) to 5 (*very satisfied*) for each of the 20 items. A mean subscale score is calculated for each subscale (range 1 to 5), and a total satisfaction score (range 5 to 25) is computed by summing the five subscale scores. Higher scores for the subscale and total satisfaction scores indicate a greater satisfaction as perceived by a patient's family member (Wasser & Matchett, 2001; Wasser et al., 2001, 2004).

Reliability and validity—Although psychometric analyses have been conducted on the CCFSS, evidence to support the reliability and validity of the instrument is limited to samples of family members of the general population of critically ill patients. The reliability and validity of the CCFSS has been established in family members who were a spouse, parent, or adult child of critically ill patients who were likely to have an ICU stay of 7 days or less from both adult and pediatric ICUs (Wasser et al., 2001, 2004). Prior research involved the administration of the CCFSS to family members at the patient's discharge or

following the patient's death in the ICU (Wasser & Matchett, 2001; Wasser et al., 2001, 2004). The CCFSS's factor structure has been specified and validated using exploratory and confirmatory factor analyses in two samples ($n = 145$, $n = 2,494$) of family members' of critically ill patients (Wasser et al., 2001, 2004) after an exposure to the care of a critically ill patient. From previous psychometric analyses, the four subscales of the CCFSS have demonstrated acceptable internal reliability consistency: Assurance (.90, .86), Information (.88, .77), Proximity (.83, .84), and Support (.91, .84); however, the Comfort subscale had weaker internal consistency reliability (.31, .74; Wasser et al., 2001, 2004). Wasser and colleagues (2001) found strong associations between the Support and Information subscales ($r = .88$) and between the Support and Assurance subscales ($r = .83$). These findings violated their criterion for discriminant validity and suggest that these two subscales (Support and Assurance) capture the same dimension of a latent construct, presumed as family satisfaction with ICU care.

Analysis

In preparation for this psychometric evaluation of CCFSS, the randomized split function of the Statistical Package for Social Sciences (SPSS; version 17.0) was used to randomly sort the 326 family members with complete CCFSS data into an exploratory factor analysis (EFA) subsample ($n = 163$) and a CFA subsample ($n = 163$). Statistical analyses were conducted in two stages. The first stage consisted of an EFA and the second stage employed CFA using the multigroup analysis technique to examine the best fitting model to our data and to examine each structural model of the CCFSS across two time points.

EFA

In the first stage of the statistical analysis, two independent series of EFAs using principal axis factoring (PAF) with oblique rotation were conducted to assess the factor structure of the CCFSS in family members at the onset of patient's critical illness (T1) and after the patient's discharge from the ICU (T2). The aims of the EFA were to determine the extent to which the observed variables were associated with latent variables and to produce the most parsimonious factor structure for the CCFSS at each time point (Byrne, 2001; Fabrigar, Wegener, MacCallum, & Strahan, 1999).

Extraction of factors—PAF was selected as the extraction method because it captures the covariance of an observable variable and partitions the covariance into its unique variance and error variance to reveal the underlying factor structure. It is capable of analyzing data that may violate the assumption of multivariate normality (Costello & Osborne, 2005; Fabrigar et al., 1999). An oblique rotation was selected because the construct of family satisfaction is hypothesized to be a multidimensional construct. Therefore, direct oblimin, with the delta parameter set at zero, was used for the factor analyses to provide interrelated factor structures for the CCFSS.

Determination of factors—Interpretation of the scree plot and eigenvalues guided the specification of the number factors to be retained for the EFA. First, an inspection of the scree plot, a graphic representation of each factor and the eigenvalues, was conducted to identify the number of factors that provided substantial variance to the factor structure

(Costello & Osborne, 2005; Fabrigar et al., 1999). Costello and Osborne (2005) suggest that the number of factors above the break, the point at which the curve becomes flat, indicates the number of factors to be retained. The second method used to confer the factor structure was the evaluation of each model's eigenvalues, the total amount of variance explained by each factor (Mertler & Vannatta, 2005). Although the interpretation of the scree plot and eigenvalue are traditional methods of specifying the number of factors to retain, our factor analysis was also guided by theory and empirical evidence regarding on the needs of family members of the critically ill and family satisfaction during acute and chronic critical illness.

Item reduction—Items of the CCFSS were retained based on the following criteria: those with primary factor loadings $>.40$ and secondary factor loadings $<.30$ as well as all items that did not load on more than one factor (Pai, Millins, Burant, Wagner, & Chaney, 2006). Item 16 of the CCFSS, “preparation for my family member’s transfer from the critical care unit,” was excluded from the factor analysis because participants were administered the CCFSS within the first few days of the patient’s chronic critical illness and a discussion regarding discharge from the ICU may not have been clinically appropriate. Otherwise, items that did not meet these criteria were removed individually and the factor analysis repeated until all remaining items of the CCFSS met criteria for item retention.

Estimation of internal reliability consistency and discriminant validity—The estimation of internal consistency reliability and discriminant validity for the factor structure generated by the EFA was conducted to describe the strength of the associations among the retained items and each factor, as well as to examine the degree of independence between factors. To assess internal consistency of the hypothesized factor structure, factors with an internal consistency coefficient of $.70$ were considered to be reliable (Cortina, 1993). For the evaluation of discriminant validity, we used the criterion $r < .70$ between two factors of a hypothesized structural model (Cortina, 1993; Field, 2005).

CFA

Testing the validity of the factor structure—To investigate the validity of the factor structure derived from the EFA of the CCFSS, a first-order CFA was conducted using Analysis of Moment Structures (AMOS, version 17.0) for each of the three factor structures. This test of construct validity was conducted with the remaining 163 participants who were randomly assigned to the CFA subsample. The following goodness-of-fit indices were used to assess the model and the sample: χ^2 , Tucker Lewis Index (TLI; $>.90$ acceptable, $>.95$ excellent), the Comparative Fit Index (CFI; $>.90$ acceptable, $>.95$ excellent), and root mean square error of approximation (RMSEA: $<.08$ acceptable, $<.05$ excellent; Bentler, 1990; Bentler & Bonnett, 1980; Brown & Cudeck, 1993; Tucker & Lewis, 1973).

Evaluating a time invariant structural model—A multigroup CFA was conducted to identify differences in the factor structure over time. In this multigroup CFA, the grouping variable was the two time points at which the CCFSS were administered to the participants. Through this CFA method, differences in the goodness-of-fit indices across the time points is confirmed (Byrne, 2001; Pai et al., 2006). Comparisons of the magnitude of change in the goodness-of-fit indices over time will be evaluated to confirm if the two hypothesized

structural models and Wasser and colleagues' structural model for the CCFSS are time invariant in our sample of family members of CCI patients.

Results

Sample Characteristics

The demographic characteristics of each analytic sample of family members are presented in Table 1. There were no statistically significant differences in family members, as well as the patient characteristics between the EFA and CFA subsamples. In addition to the family members' characteristics shown in Table 1, there was not a statistically significant difference in the mean age in years between the EFA subsample ($M = 54.3$, $SD = 13.9$) and CFA subsample ($M = 53.4$, $SD = 14.2$, $t = .61$, $p = .54$). Consistent with the demographics of family members of the CCI who participated in prior research (Douglas & Daly, 2003; Douglas & Daly, 2005; Douglas et al., 2010; Estenssoro et al., 2006; Im et al., 2004; Nelson et al., 2004, 2005, 2007), participants in this study were middle-aged, White females who were mostly spouses or the adult children of the patient. In addition, CCI patients were most often White males who were middle aged ($M = 56.5$ years) with a mean duration of mechanical ventilation of 11 days and a mean ICU length of stay of 15 days, which is congruent with the clinical profile of patients with chronic critical illness (Chelluri et al., 2003, 2004; Combes et al., 2003; Daly & Douglas, 2005; Douglas & Daly, 2001; Douglas et al., 2002).

EFA

The EFA revealed two unique structural models that varied based on when the instrument was administered to our study participants. The first hypothesized structural model, which reflects the first few days of a patient's episode of chronic critical illness, yielded a 17-item, three factor solution, which accounted for 62% of the total explained variance in family satisfaction at baseline. In total, two items were removed based on our predetermined removal criteria: "ability to share in the care of my family member" and "flexibility of the visiting hours." The factor loadings of the items retained in this EFA model are presented in Table 2.

A second hypothesized structural model for the CCFSS was identified at the second time point, at the patient's discharge from the critical care unit. Our analysis of the factor structure at discharge from the ICU yielded a 14-item, three-factor solution that accounted for 62% of the explained variance in family satisfaction at the patient's discharge from the ICU. Based on our predetermined criteria for item retention, the following five items were removed: "honesty of the staff about my family member's condition"; "sensitivity of the doctor(s) to my family member's needs"; "privacy provided for me and my family member during visits"; "flexibility of the visiting hours"; and "noise level in the critical care unit." The factor loadings for this second structural model are presented in Table 3.

Interpretation and labeling of the factors—The interpretation and labeling of each factor consisted of analyzing the factor loadings and reviewing the content of the retained items of the factor. Items loading on the first factor included content focused on the

communication characteristics of the physicians interacting with family members, such as their availability to meet, sensitivity, and honesty, as well as the family member's ability to participate in decision making for their loved one. This factor is labeled "Satisfaction with Informational and Decisional Support." Items that loaded on the second factor capture satisfaction with the waiting room environment through appraisal of the peacefulness and cleanliness of the space. Finally, items loading on the third factor reflect "Satisfaction with the Nursing Care and Support" provided to the patient, as well as to the family through the provision of quality care provided to patient, and the demonstration of support as well as encouragement from critical care nurses.

Estimation of internal reliability consistency and discriminant validity—The second hypothesized factor structure consisting of 14-items from the original CCFSS had acceptable internal reliability consistency and discriminant validity. Each subscale of the two hypothesized structural models met our criterion for internal consistency reliability and alpha coefficients for the subscales ranged from .71 to .91. Discriminant validity was confirmed among all factors of each of the hypothesized factor structures, except for the association between two factors of the first hypothesized structure labeled "Informational and Decisional Support" and "Nursing Care and Support" ($r = .82, p < .01$). Therefore, both hypothesized structural models were reliable with the first hypothesized structural model demonstrating limited discriminant validity.

CFA

The hypothesized structural models identified by the EFAs were cross-validated in 163 family members who were randomly assigned to this analytic subsample. A CFA with multigroup analysis was conducted to determine whether the hypothesized structural models specified from our factor analysis and Wasser and colleagues' structural model for the CCFSS were valid across two points in time. All three structural models were confirmed to have adequate fit to our data. From our analysis, the structural model of Wasser and colleagues ($\chi^2 = 704, df = 250, p < .001, TLI = .80, CFI = .86, RMSEA = .07$) had the poorest fit to our data compared with the first hypothesized structural model ($\chi^2 = 545, df = 232, p < .001, TLI = .87, CFI = .90, RMSEA = .06$) and the second hypothesized structural model ($\chi^2 = 354, df = 148, p < .001, TLI = .88, CFI = .91, RMSEA = .06$). However, the best fitting structural model was the second hypothesized structural model, which was derived from data obtained from family members at the patient's discharge from the ICU.

To address the second aim of the study, an evaluation of the change in the goodness-of-fit indices were conducted to assess the stability of the fit of structural models to our data across two discrete time points. There was no change in the goodness-of-fit indices of the first hypothesized structural model and minimal change in the goodness-of-fit of the second hypothesized structural model ($\chi^2 = 14, df = 11, p = .25, TLI = -.007, CFI = -.001, RMSEA = -.001$) as well as Wasser and colleagues' (2001) structural model ($\chi^2 = 12, df = 13, p = .56, TLI = -.01, CFI = -.001, RMSEA = -.002$). Therefore, our psychometric evaluation of the CCFSS in family members of the CCI indicates that the most reliable and valid structure for longitudinal data collection is the second hypothesized structural model which consists of 14-items with a three factor structure.

Discussion

The present research had three aims: to examine the factor structure of CCFSS when administered to family members during and after an episode of chronic critical illness; to cross-validate the hypothesized structural models in family members of the CCI using CFA; and to compare the change in the goodness-of-fit indices of Wasser and colleagues' (2001) structural model with our two structural models across two time points.

EFA

The structural models that emerged from our exploratory factor analyses were confirmed to be reliable and achieved sufficient discriminant validity. The internal reliability consistency coefficients for each subscale of the hypothesized structural models were $>.70$, which met our a priori criterion for sufficient reliability. Discriminant validity of the factor scores were confirmed between each factor ($r < .70$), except for the association between the Factor 1, Informational and Decision Support, and Factor 2, Nursing Care and Support, of the first hypothesized structural model ($r = .82$). Therefore, the results of our factor analysis indicated that the second hypothesized model, which was derived from the data from T2, more fully met our criteria for internal consistency reliability and discriminant validity compared with the hypothesized structural model derived from data from T1.

In the present study, a 14-item, three factor model was the most parsimonious structural model supported by prior research on the needs of family members during critical illness. Effective communication and informational support have been reported as an influential need of family members of the CCI and non-CCI (Wall, Curtis, Cook, & Engelberg, 2007; Wall, Engelberg, Downey, Heyland, & Curtis, 2007). Characteristics of effective communication identified by family members include high quality, frequent, and tailored approaches that facilitate the inclusion of the family in decision making (Heyland et al., 2002; Nelson et al., 2005, 2007); honest, clear, and intelligible information (Azoulay et al., 2001); and the perception of a caring empathetic attitude from the medical staff (Azoulay et al., 2001; Eggenberger & Nelms, 2007). These characteristics are consistent with our first factor, Satisfaction with Informational and Decisional Support, which reflect communication practices and engagement of the family member in decisions about the care the patient to promote satisfaction. The second factor, Satisfaction with the Waiting Room Environment, has been identified in previous research exploring the needs of families during a patient's critical illness (Leske, 1991). A significant portion of the family member's time is spent waiting in this environment and is viewed as an extension of the ICU environment. The third factor revealed by our factor analysis was Satisfaction with Nursing Care and Support, which embodies the display of hope and encouragement, the provision of assurance, and delivery of satisfactory patient care from critical care nurses. The need for compassionate and high quality nursing care has also been recognized as important characteristic of family satisfaction with care in the ICU (Eggenberger & Nelms, 2007; Leske, 1986; Norris & Grove, 1986).

Although the factor structure generated from our factor analysis of the CCFSS is consistent with published findings regarding the needs of family members of CCI and non-CCI patients, our results differed from previously published reports by Wasser and colleagues

(2001, 2004). Several factors may contribute to the difference in the reported structural model. First, family satisfaction with care received in the ICU was conceptualized as a multidimensional construct; therefore, the CCFSS factor structure would also have several interrelated factors. This conceptualization of the construct guided our statistical analyses and an oblique rotation was used to address the dimensionality and interrelatedness of the factors associated with family satisfaction. In contrast, the factor analysis conducted by Wasser and colleagues (2001, 2004) employed principal components analysis (PCA) with an orthogonal rotation, a method that implies that no association is held between the factors measuring a latent variable.

Second, the choice of extraction method, PAF, may also explain some of the difference in the factor structure between our study and Wasser and colleagues' (2001, 2004) findings. PCA was employed to identify the initial structural model of the CCFSS. Costello and Osborne (2005) argue that PCA is not a true method of factor analysis, but simply a data reduction method. To further support Costello and Osborne's (2005) position on PCA, Fabrigar and colleagues (1999) recommend that in most cases maximum likelihood or PAF is used as the method extraction for factor analysis (Fabrigar et al., 1999). The method of factor extraction used by Wasser and colleagues (2001) differed significantly compared with the method employed by the present study, which may have also contributed to the differences in structural models for the CCFSS.

A third contributor to the difference in the factor structure is the psychological state of family members at the time when the CCFSS was administered. In our study, family members were administered the CCFSS while experiencing ongoing care from critical clinicians as well as the conclusion of their ICU experience. The psychological states of our family members and the severity of the patients' conditions at the onset of a critical illness and at ICU discharge may be quite different from Wasser and colleagues' samples of family members who had a loved one in the ICU. Nelson and colleagues have recognized that family members of CCI patients have distinct psychological needs because of the duration of critical illness and the uncertainty trajectories of recovery for patients with chronic critical illness (Nelson et al., 2005, 2007). The present study departs from the previous application of the CCFSS and utilizes the instrument to capture family satisfaction with care during and immediately following an episode of chronic critical illness. The incongruence in the factor structure between our study and the studies conducted by Wasser and colleagues (2001, 2004) suggests family satisfaction may vary based on changes in psychological states and needs of the family members at a specific time during a patient's critical illness. Therefore, the two structural models derived from our factor analysis may confirm the influence of psychological state at the time when the instrument was administered.

Finally, the contextual factors of chronic critical illness and the patient's state of cognitive impairment likely influenced the results of the EFA. In comparison to family members of non-CCI patients, the patient's need for prolonged mechanical ventilation and impaired cognition constitute a unique experience for family members of the CCI. Family members of cognitively impaired CCI patients are often expected to take active roles in the deliberation and implementation of the patient's plan of care. The needs of family members of the CCI with cognitive impairment are likely to diverge from the needs of typical family members of

patients who are cognitively intact and do not experience a protracted course of mechanical ventilation (Nelson et al., 2005). It is possible that the difference in structural models was influenced by family members' perception of the patient's chronic critical illness and impaired state of cognition.

CFA

Validation of the factor structure was examined using a CFA and the 14-item, three factor model was shown to our data from family members of CCI patients. In addition, the examination of the stability of the structural models across time points, confirmed that both hypothesized structural models as well as the Wasser and colleagues' (2001) structural model were time invariant, meaning the factor structure of the CCFSS is stable when administered at two time points (at enrollment and at the patient's ICU discharge) in this cohort of family members. The validation and confirmation of a time invariant structural model of the CCFSS is a significant contribution to our understanding of capturing family satisfaction during and after patient's episode of chronic critical illness. Therefore, the 14-item CCFSS is a reliable and valid measure of family satisfaction with ICU care when administered to family members during and after an episode of chronic critical illness.

This study has several limitations. First, our sample of family members primarily consisted of White females who were either the spouse or daughter of a critically ill patient. Second, the generalizability of our study is further limited by our inclusion criterion based on the patient's requirement of at least 3 days of mechanical ventilation with cognitive impairment. Third, the present study did not capture family members with a brief encounter (<72 hr) or family members of patients who died in the ICU. Despite these limitations, this evaluation of the CCFSS provides insight on dynamics of family satisfaction among surrogate decision makers of critically ill patients

This psychometric evaluation of the CCFSS indicates that a refined 14-item, version of the CCFSS is a valid and reliable measure of family satisfaction during and after an episode of chronic critical illness. Given the limited number of reliable and valid measures of family satisfaction with ICU care, this evaluation of the CCFSS extends the applicability of the measure to a specific subpopulation of family members of the critically ill. The results of our EFA are consistent with the literature on the needs of relatives of the critically ill and family satisfaction with critical care services. Differences in the factor structure of the CCFSS from the previous validation studies are most likely a function of differences in sample characteristics, as well as the statistical methods employed to identify and validate the instrument's factor structure. Although a description of the psychological states of the participants was not presented in this study, the uncertainty of the patient's prognosis for survival and symptoms of anxiety, depression, and acute stress may have contributed to the emergence of structural models that differ from the origin structural mode of the CCFSS for family members of non-CCI patients. Our results further illustrate the need to evaluate the psychometric properties of a measure to enhance the internal validity of future studies that utilize the CCFSS in specific subpopulations of family members of critically ill patients. Future studies should employ longitudinal designs to examine the structural models of the

measure and the change over time in CCFSS scores in family members of CCI and non-CCI patients.

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Table 1 Comparison of Demographic Characteristics of Family Members ($N = 326$)

Variable	EFA Sample ($n = 163$)		CFA Sample ($n = 163$)		χ^2	p
	n	%	n	%		
Gender: Female	132	81.0	121	74.0	2.1	.14
Race: White	111	68.1	111	68.1	0.00	1.0
Marital status: Married ^a	121	74.2	123	75.9	0.12	.72
Relationship to patient					3.3	.19
Spouse	62	38.0	65	39.9		
Adult child	32	19.6	43	26.4		
Other (parent, sibling, nonrelative)	69	42.3	55	33.7		
Education ^b					0.61	.74
Less than high school	13	8.1	13	8.1		
High school graduate	109	67.7	114	71.3		
College graduate	39	24.2	33	20.6		
First ICU experience: Yes ^c	67	41.9	74	39.8	0.87	.35

Note: EFA = exploratory factor analysis; CFA = confirmatory factor analysis; ICU = intensive care unit.

^a CFA sample ($n = 162$) for marital status (married vs. not married).^b EFA sample ($n = 161$) and CFA sample ($n = 160$) for education.^c EFA sample ($n = 160$) for first ICU experience.

Table 2

Factor Loadings for EFA with Direct Oblimin of the CCFSS at Enrollment (T1)

Item	Factor 1	Factor 2	Factor 3
Informational and decisional support			
14. Sensitivity of the doctor(s) to my family member's needs	.792		
20. Sharing in discussion regarding my family member's recovery	.790		
2. Availability of the doctor to speak with me on a regular basis	.789		
12. Sharing in decisions regarding my family member's care on a regular basis	.697		
6. Clear explanation of tests, procedures, and treatments	.685		
10. Clear answers to my questions	.568		.280
1. Honesty of the staff about my family member's condition	.519		.242
3. Waiting time for results of tests and X rays	.519	.297	
Waiting room environment			
17. Peacefulness of the waiting room		.888	
8. Cleanliness and appearance of the waiting room		.585	
Nursing care and support			
4. Peace of mind in knowing my family member's nurse			.811
11. Quality of care given to my family member			.775
7. Promptness of the staff in responding to alarms and request for assistance			.707
15. Privacy provided for me and my family member during visits			.609
13. Nurses' availability to speak with me everyday about my family member's care			.582
9. Support and encouragement given to me during my family member's stay in the critical care unit	.269		.525
19. Noise level in the critical care unit			.510

Note: EFA = exploratory factor analysis. $n = 163$, loadings on factors $< .25$ were suppressed and are not presented in the table. Two items were removed from the measure based on EFA at T1: "ability to share in the care of my family member" and "flexibility of the visiting hours."

Table 3

Factor Loadings for EFA with Direct Oblimin of the CCFSS at ICU Discharge (T2)

Item	Factor 1	Factor 2	Factor 3
Informational and decisional support			
6. Clear explanation of tests, procedures, and treatments	.805		
20. Sharing in discussion regarding my family member's recovery	.789		
12. Sharing in decisions regarding my family member's care on a regular basis	.681		
10. Clear answers to my questions	.663		
2. Availability of the doctor to speak with me on a regular basis	.614		
3. Waiting time for results of tests and X rays	.593		
Waiting room environment			
17. Peacefulness of the waiting room		.801	
8. Cleanliness and appearance of the waiting room		.775	
Nursing care and support			
4. Peace of mind in knowing my family member's nurse			.847
13. Nurses' availability to speak with me everyday about my family member's care			.800
11. Quality of care given to my family member			.712
9. Support and encouragement given to me during my family member's stay in the critical care unit			.581
7. Promptness of the staff in responding to alarms and request for assistance			.550
5. Ability to share in the care of my family member	.269		.459

Note: EFA = exploratory factor analysis; CCFSS = Critical Care Family Satisfaction Survey; ICU = intensive care unit. $n = 163$, loadings on factors $< .25$ were suppressed and are not presented in the table. Five items were removed from the measure based on EFA at T2: "honesty of the staff about my family member's condition"; "sensitivity of the doctor(s) to my family member's needs"; "privacy provided for me and my family member during visits"; "flexibility of the visiting hours"; and "noise level in the critical care unit."