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Validation of the Family Inpatient Communication Survey

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Abstract

Context—Although many family members who make surrogate decisions report problems with communication, there is no validated instrument to accurately measure surrogate/clinician communication for older adults in the acute hospital setting.

Objectives—To validate a survey of surrogate-rated communication quality in the hospital that would be useful to clinicians, researchers and health systems.

Methods—After expert review and cognitive interviewing (n=10 surrogates), we enrolled 350 surrogates (250 development sample and 100 validation sample) of hospitalized adults aged 65 and older from three hospitals in one metropolitan area. The communication survey and a measure of decision quality were administered within hospital days 3 and 10. Mental health and satisfaction measures were administered 6–8 weeks later.

Results—Factor analysis showed support for both one-factor (Total Communication) and two-factor models (Information and Emotional Support.) Item reduction led to a final 30 item scale. For the validation sample, internal reliability (Cronbach's alpha) was 0.96 (total), 0.94 (Information) and 0.90 (Emotional Support). Confirmatory Factor Analysis fit statistics were adequate (one factor model, CFI=0.981, RMSEA=0.62, WRMR=1.011; two factor model CFI=0.984, RMSEA=0.055, WRMR=0.930) Total score and subscales showed significant associations with the Decision Conflict Scale (Pearson correlation −0.43, p<.001 for total score). Emotional support was associated with improved mental health outcomes at 6–8 weeks such as

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anxiety (−0.19 p<0.001) and Information was associated with satisfaction with the hospital stay (0.49, p<0.001).

Conclusion—The survey show high reliability and validity in measuring communication experiences for hospital surrogates. The scale has promise for measurement of communication quality and is predictive of important outcomes such as surrogate satisfaction and well-being.

Keywords

Communication; Proxy; Decision Making

INTRODUCTION

Nearly half of hospitalized older adults require a surrogate, usually a close family member, to make decisions for them due to dementia, delirium or other causes of incapacity.[1] Unfortunately, many families report problems with communication and decision making[2–6] and there are poor outcomes of decision making such as delays in Do Not Resuscitate (DNR) orders,[7] high levels of unwanted care[8] and aggressive care that is unlikely to improve patient outcomes.[9] Surrogates also report high levels psychological distress.[10–13]

The quality of communication may be a modifiable factor that impacts patient and surrogate outcomes. A first step in improving clinician/surrogate communication is to accurately characterize and measure it. However, we were unable to identify a published, validated measure of surrogate-rated communication in the hospital. We found existing measures that address hospital communication from the patient's perspective,[14,15] family experience in specific settings such as the Intensive Care Unit (ICU)[16] or cancer care,[17] or family ratings of care at the end of life.[18–20] To address this gap, we developed the Family Inpatient Communication Survey (FICS). The specific aim of this study was to pilot test and validate this new survey of surrogate-rated communication quality so that it would be useful to researchers, clinicians and health systems seeking to measure and improve communication.

Literature review

We conducted a review of existing literature and incorporated findings from our prior qualitative interviews on surrogate/clinician communication.[21,22] The model proposes that communication affects decision making, which in turn affects outcomes for patients and surrogates.

Our preliminary conceptual model included six potential dimensions of communication that impact decision making and outcomes (Figure 1). Surrogates in our prior interviews expressed the importance of the *communication timing*, such as early information about the patient's condition.[22] One randomized trial in the ICU setting found that early family meeting for patients who are dying can reduce length of stay in the ICU and reduce surrogate distress.[11] Prior research also found that most patients and their surrogates desire high degrees of *information disclosure* about the medical conditions and decisions.[23,24,25,22]

The importance of *emotional support* is demonstrated through clinician statements of caring, taking the time to provide careful explanations and expressions of empathy.[26] Spiritual or

religious beliefs may affect medical decision making for patients[27–30] and surrogates.[31,3233] Patients also desire to feel they have been *treated with respect*, which includes recognition of individuality and dignity.[34] Clinician behaviors such as affirming surrogate input were helpful in improving *surrogate engagement and advocacy*.[22]

Finally, surrogate/clinician communication takes place in the contact of ongoing *relationships*.[35,36] We found that due to the high numbers of clinicians and frequent staff changes, many patients perceived that they had a relationship with a "team" of clinicians rather than particular individuals.[22] This led us to focus our survey on experiences with hospital staff generally rather than with an individual clinician.

METHODS

The Indiana University Institutional Review Board approved the study (IRB Approval Number 1203008188).

Survey Development and pilot testing

The research team first developed survey items based on the preliminary conceptual model and our prior surrogate interviews (Figure 2).[37] For example, because multiple surrogates expressed a desire for frequent communication, a communication timing item stated, "The hospital staff communicated with me as often as I would have liked." Items were drafted by one investigator and were revised by the entire research team. Items were rated on a 5 point Likert scale from strongly agree to strongly disagree. We then conducted expert review with 2 practicing physicians, a clinical psychologist and an expert in communication theory. Experts were asked to comment on content validity of the measure, including whether survey items reflected all relevant constructs.[38] We pilot tested the survey with 10 surrogates using techniques of cognitive interviewing.[39] Surrogates were asked about the meaning and understandability of items, comprehensiveness (whether they capture key elements important in communication) and response burden. Further revisions were made to the survey iteratively after about every 3 cognitive interviews. The administered version of the survey included 43 items.

Survey Validation

Validation was conducted using a development and a validation sample (Figure 2). Enrollment procedures were identical for both samples. Data was collected between April 2012 and June 2015.

Setting and Participants—The study took place in three hospitals in a single Midwest metropolitan area, a university tertiary referral hospital, an urban safety net hospital, and a suburban community hospital affiliated with the university. We enrolled patient/surrogate dyads. Patients were adults 65 and older admitted to the medical or medical ICU services of the three hospitals. Eligible patients lacked the capacity to make decisions based on physician report and had an available, legally authorized surrogate. Eligible surrogates had faced at least one of three major types of decisions during the current hospital stay regarding: life sustaining therapy such as code status or use of a ventilator; procedures and

surgeries requiring written informed consent; and placement in a nursing home or other facility.

Power and Sample Size—Power analyses were performed using Monte Carlo simulations based on the six-factor scale. The simulated data were generated from categorical distributions to accurately reflect the Likert scales, using an alpha level of 0.05 and power level of 0.80. For the developmental data set (n=250), there was ≥ 0.80 power to detect factor loadings of 0.50 or higher. For the validation data set (n=100), there was ≥ 0.80 power to detect factor loadings of 0.70 or higher.

Additional Measures—Health literacy was assessed using the Rapid Estimate of Adult Literacy in Medicine-Short Form (REALM-SF) for surrogates interviewed in person.[40] Low health literacy was defined as 6th grade or less (score of 3 or lower). For those interviewed by phone, we administered a single, previously validated item assessing whether the participant has trouble completing medical forms.[41]

Decision making quality was assessed with the Decisional Conflict Scale (DCS).[42] We modified wording slightly so questions were appropriate for surrogates. Post-traumatic stress was assessed with the Horowitz Impact of Events Scale-Revised (IES-R).[43,10,11] Anxiety was assessed with the Generalized Anxiety Disorder-7 (GAD-7), and depression with the Patient Health Questionnaire-9 (PHQ-9).[44] We also administered the Decision Regret Scale (DRS),[45] modified slightly for surrogates. Overall satisfaction was measured with a single item from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey[46] that rates the overall quality of the hospital stay on a 0–10 scale.

Enrollment/Administration—Potentially eligible patients were identified using the local electronic medical record (EMR). The research assistant paged the treating physician (intern, resident or attending) to determine whether a surrogate was required for all decisions and whether the surrogate faced any major decisions as defined above. We used physician report to determine decision making capacity because our goal was to study surrogate decision making as it actually occurred in the clinical setting.

Surrogates were approached in the hospital or by phone for informed consent and the enrollment interview between hospital days 3 and 10. Surrogates consented for their own participation. Because the study involved patients who were entirely unable to make decisions, surrogate consent for the patient was obtained in all cases. Enrollment interviews were conducted orally, by phone or at the bedside and included the DCS and the FICS. Because the DCS addresses specific medical decisions, this scale was administered to each surrogate for up to three specific decisions at enrollment and up to one additional decision at follow-up to account for any decisions that may have been missed between the enrollment interview and hospital discharge. The highest DCS score was used to reflect the decision with the highest internal conflict for the surrogate. Follow-up interviews at 6–8 weeks included the GAD-7, PHQ-9, IES-R and satisfaction. The DRS was administered for each of the previously identified decisions. Similar to the DCS, the highest score for each participant was used in the analysis.

Data Analysis

Development Sample—The development sample results were used to assess the reliability and validity of the scale, to determine the factor structure, and to conduct item reduction to create a more efficient scale.

Item review, distribution, and reduction: We identified items for removal to generate a briefer survey. We reviewed nonresponse rates, the response distribution of the scale, subscales and individual items, and floor/ceiling effects. Items were considered for deletion if nonresponse was greater than 10%, item-total correlations were less than 0.20, inter-item correlations were greater than 0.80 indicating redundancy, or the worst or best possible item value was endorsed by more than 90% of participants (floor/ceiling effects). Additionally, items were reduced based on factor loadings and degree of cross loadings. Items were preferred if they had high loadings on one factor (> 0.50) and lower loadings on the other factor (< 0.50). Factor analysis methods are discussed in greater detail next. This numeric information was combined with judgment about the conceptual relevance of the item. For example, we also considered whether the item fit conceptually with its assigned factor.

Factor Analysis: Factor analysis was performed in order to identify optimal sub-scales of the survey using Mplus v6.1.[47] Statistical and clinical considerations were used in determining the optimal number of sub-scales/factors. We first performed confirmatory factor analysis (CFA) using the six factors hypothesized for the original scale, followed by a confirmatory test for the additionally hypothesized one-factor model (i.e., testing the idea that both a total score and 6 subscale scores would be a sensible scoring rubric). The CFA goodness-of-fit statistics (with cut-points) that we chose were: Comparative Fit Index (CFI) (> 0.95), Root Mean Square Error of Approximation (RMSEA) (<0.06),[48] and Weighted Root Mean Square Residual (WRMR).[49] Because CFA fit statistics indicated that the model could possibly be improved upon, exploratory analyses, including CFA modification indices and exploratory factor analyses (EFA) of one-factor through six-factor solutions, were performed to determine what factor structure (number of factors and which items loaded on those factors) was suggested by the data. We also examined the matrix of residuals. In addition, we tested for model invariance to determine if there were significant differences in loadings or intercepts between development and validation samples, and between sex and race groups in the total (development plus validation) sample. The EFA scree plot was used as an evidence-based visual method for determining the number of factors that should be analyzed, based on Eigen values. The conceptual relevance of the one-factor through-six factor EFA solutions was assessed by examining the content of the items that loaded high on one of the factors and low on the other factors. The RMSEA fit statistic was available for EFA results in the MPLUS output.

The top statistically and conceptually relevant alternative factor analytic models from EFA exploration were then assessed for fit by fixing the population loadings to zero for paths between each item and the other factors not assigned to that item. The best performing factor models were then analyzed to examine associations between the sub-scales based on those factors and related outcomes , using SAS v9.4 (SAS Institute, Cary, NC).

Promax rotation was used for EFA to allow estimation of inter-factor correlations because factors were theoretically expected to be correlated based on literature. The CFA and EFA models were fit to the FICS survey questions by modeling the items as ordinal categorical outcomes with the nonlinear ordinal probit link function and WLSMV estimation, rather than assuming continuous item indicators and a linear link function, to provide the best theoretical match to the measurement of items on the survey. As a sensitivity analysis, factor analyses were also performed using the items as continuous variables, which yielded models that did not fit any better than the theoretically preferred ordinal item specification. Standard errors of the loadings were similar for the ordinal categorical and continuous models indicating that the there was no issue with sparse item categories degrading the precision of the loading estimates for the ordinal categorical models. Invariance testing was done using methods described by Gregorich.[50]

Concurrent and predictive validity: We examined Pearson correlation coefficients between the FICS and the Decisional Conflict scale and the outcomes assessed at the follow-up interview.

Internal consistency: As a measure of internal consistency of the scales, we calculated Cronbach's alpha scores on the total scale and proposed subscales. An acceptable value is above 0.70.[51]

Validation Sample—After item reduction, CFA was performed in the validation sample using the final survey version and the same methods described above for the development sample. Pearson correlations with outcome measures were performed to assess concurrent and predictive validity.

RESULTS

Development Sample

Enrollment and Participant Characteristics—We identified 9189 potential patients based on the EMR and conducted 6043 physician interviews (Figure 3). Many were determined to be ineligible during physician screening due to the patient having regained decision making capacity. We successfully enrolled 254/576 (44.2%) dyads and completed 91% of follow-up interviews. Four dyads withdrew from the study. The majority of patients and surrogates were women. (Table 1).

Survey Responses—The total score had a possible range from 43–215. Scores ranging from 60–215. Scores were clustered on the higher end, indicating more positive ratings, and were slightly negatively skewed (Figure 5). For every item, respondents used the full distribution of responses and there were no worrisome floor or ceiling effects. One item regarding staff support to other family was not answered by 25% and was dropped, leaving a 42 item scale which then underwent factor analysis and item reduction.

Confirmatory Factor Analysis—The CFA based on our original hypothesized six factor and one factor models showed only moderate fit to the data, based on three fit criteria (Table 2).

Exploratory Factor Analysis—We then proceeded with EFA to determine if another model might fit the data better. The scree plot revealed a dominant single dimension, supporting a total score, and also a possible two-factor solution indicated by a drop from the 2nd to 3rd Eigen value supporting two subscales (Eigen values were: 26.57, 2.40, 1.52, 1.44, 1.04, 1.03, 0.86, 0.82). Item loadings for the two-factor solution suggested a dimension related to Information and a dimension related to Emotional Support. We found that the three- through six-factor models further divided the items in the Emotional Support factor, indicating that little conceptual information was added by extending the solution beyond two factors.

Item reduction and Confirmatory Factor Analysis—We identified 10 items for removal from the scale based on item- total correlations, inter-item correlations, factor loadings, cross loadings and item correlations with outcome measures. Two additional items were removed due to poor face validity with the scale construct, leaving a final scale with 30 items. None of the final items had item-total correlations under 0.20. All but one had inter-item correlations greater than 0.80 (one was 0.82, data not shown). Cronbach's alpha was found to be high for the total score and both subscales (Table 3).

We then calculated the factor model fit statistics for this semi-final 30-item two-factor solution in the development sample, the fit statistics showed marginally good fit (Table 2). The two-factor and one-factor models for both the original 42 items and the reduced 30 items met the threshold of good fit for the CFI fit statistic but not for the RMSEA and WRMR fit statistics. Examination of the matrix of residuals and modification indices led to allowing correlated residuals for pairs of items that shared similar wording if the p-value for each correlated residual was less than 0.01 (instead of 0.05 to avoid capitalizing on chance associations). These final 30-item modified two factor and one factor models with correlated residuals demonstrated good fit in the development sample according to all three fit statistics (CFI, RMSEA, WRMR) for the two factor model. For the final one factor model, CFI was satisfied and values for RMSE and WRMR were nearly exactly on the thresholds for good fit in the development sample .

In addition, compared to the semi-final model, the modified final models with correlated residuals resulted in a reduction of the goodness of fit chi-square statistic by 30% for the 2 factor model and 36% for the 1 factor model, as well as substantial reduction in the median value for the residual matrix (Table 2).

Although there were a few items retained (due to their conceptual relevance) with cross-loadings in which items loaded less than 0.50 on their designated factor and above 0.40 on their non-designated factor, all items loaded above 0.40 on their designated factor and lower on their non-designated factor, adequate fit statistics were demonstrated, and median residuals were not substantial, indicating reasonably good fitting final models, despite statistically significant violation of goodness of fit according to the chi-square tests. The inter-factor correlation was 0.76 indicating a high (but not redundant) correlation between the two factors.

Concurrent and Predictive Validity—We found the total score and subscales were associated with both decision conflict and satisfaction (Table 5). For the measures of mental health, we found Emotional Support but not Information was modestly associated with these measures, while decision regret was significantly associated with the total and Information subscale.

Validation Sample

Participant Characteristics—The validation sample included 100 surrogates (Figure 4). We successfully enrolled 100/202 (49.5%), and completed 89% of follow-up interviews. Surrogates had a mean age of 57.54 and were 66% female (Table 1).

Confirmatory Factor Analysis—Fit statistics from the confirmatory factor analysis of the final 30-item 2-factor and 1-factor models in the validation sample (Table 2) demonstrated comparable fit statistics as observed for the final 30 items in the development sample. The models showed good fit according to the CFI, the WRMR was near the threshold of good fit, and the deviation from good fit for RMSEA was not substantial. The inter-factor correlation was 0.80 indicating a high (but not redundant) correlation between the two factors. Furthermore, the invariance testing (described below) demonstrated that factor loadings were not meaningfully different between development and validation samples. Cronbach's alpha values are also similar to the development sample (Tables 3). Factor loadings from the CFA are shown in Table 4. The final survey version is available at: http://medicine.iupui.edu/IUCAR/research/tools/FICS.

Concurrent and Predictive Validity—Pearson correlations between the FICS and outcome measures showed a similar pattern to the development cohort, with the exception that decision regret was significantly associated with Total and Factor 1 scores in the Development but not the Validation samples (Table 5; Factor 1, validation sample, $p = 0.053$).

Factor Invariance Testing—For the final 30 item 1 factor model, we tested for metric (i.e., loadings) and strong (i.e., thresholds) invariance for the development versus validation data sets. Results demonstrated statistically significant variation in loadings ($p = 0.015$) but non-significant variation in thresholds ($p = 0.68$) between the two samples, according to the chi-square difference test. However, the absolute differences between the loadings ranged from 0.00 to 0.09 with a median of 0.03 ($Q1 = 0.01$, $Q3 = 0.05$) indicating very small differences between loadings. Invariance testing also revealed that in the combined sample (development and validation), there was statistically significant variation in loadings for the male/female ($p < 0.001$) and Caucasian/Non-Caucasian ($p = 0.012$) comparisons but not significant variation in thresholds (sex, $p = 0.137$; race, $p = 0.075$), according to the chi-square difference test. However, the absolute differences between the loadings ranged from 0.00 to 0.17 with a median of 0.04 ($Q1 = 0.01$, $Q3 = 0.06$) for sex comparisons and 0.00 to 0.13 with a median of 0.04 ($Q1 = 0.01$, $Q3 = 0.07$) for race comparisons, indicating very small differences. Thus, the factor structure was reasonably similar between the development and validation samples, and between race and sex categories in the combined sample.

DISCUSSION

We created and validated a survey to assess quality of communication as experienced by family surrogates that has high internal reliability, evidence of predictive validity, and high item completion rates. We anticipate that this survey will be useful for researchers examining the associations between family/clinician communication and healthcare outcomes or developing communication-focused interventions. Because communication quality is an important aspect of quality care, this survey may be used by clinicians, hospitals and health systems who wish to improve medical care. The survey differs from other instruments that measure more general constructs such as satisfaction in the hospital[14] or ICU.[16] Additionally, our survey allows for assessment of overall communication during a hospital stay rather than with a single clinician.[19] This may be especially important given the high number of clinicians and encountered in many hospital stays.

We found strong support for a general communication construct and two distinct dimensions of communication, Information and Emotional Support. Evidence of this framework included the results of the factor analysis and the high internal consistency of the total scale and subscales. The two subscales also showed distinct patterns of association with important outcomes. Specifically while both Information and Emotional Support were associated with concurrent decisional quality and satisfaction at 6–8 weeks, Emotional Support was much more highly associated with psychological outcomes. Another framework describing patient/clinician communication in cancer have included information and emotion as separate "functions" within their model and have proposed associations with outcomes such emotional wellbeing.[25] Educational interventions such as Vitaltalk[52] and frameworks such as VALUE[53] that explicitly encourage recognition of emotions and expressions of empathy specifically recognize the importance of this type of communication. Further investigation is needed to explore both whether the associations between communication and these outcomes persist in surrogate/clinician communication when controlling for other characteristics of the patient or surrogate or whether interventions aimed at communication can improve outcomes.

Our factor analysis showed support for a simpler model than we originally proposed (Figure 1). Some concepts, such as communication timing and information, clustered together within a single factor. Inspection of the final items show that items addressing interpersonal relationships appeared within both the Information and Emotional Support subscales, suggesting that both of these types of communication are important for relationship building. We were also able to reduce the scale from the longer 42 items to a final 30 items scale with comparable model fit.

Limitations of our study include location in a single metropolitan area. Although we had a high proportion of African American subjects, Asian or Latinos were not well represented. Our study sample had diversity in terms of age, education and income. The FICS has now been tested with the surrogates of older adult hospitalized patients using oral survey administration. Different patient samples and different methods of administration may yield different results.

In summary, the FICS is a valid and reliable scale for measuring communication hospital surrogate decision makers of incapacitated older adults. Our factor analysis and internal reliability indices provided strong support for a general communication construct and two distinct dimensions. Further evidence that these two dimensions are distinct comes from the different pattern of associations with outcomes measures. This survey may be useful for researchers, clinicians and hospital administrators seeking to improve family experiences for seriously ill patients.

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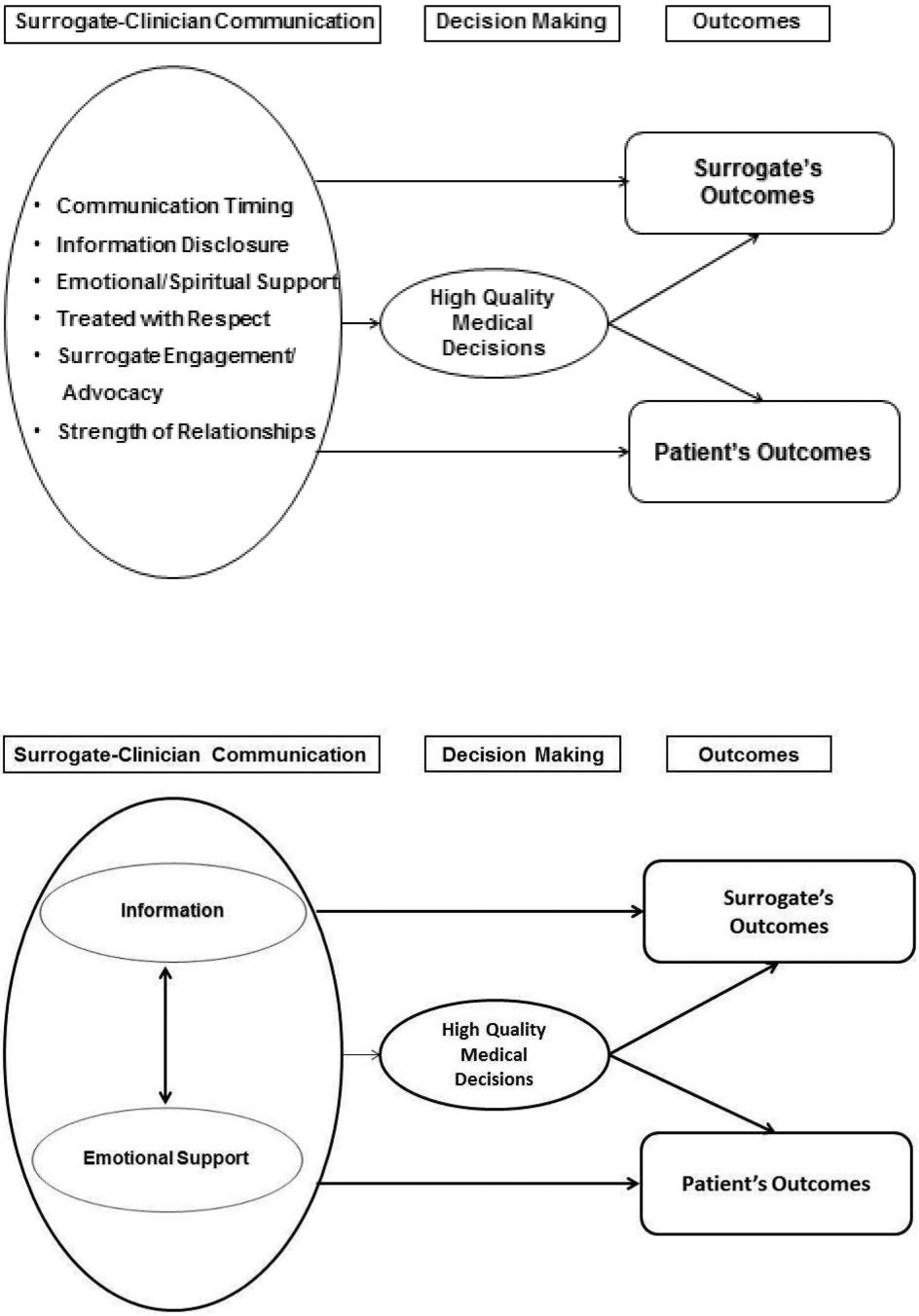

Figure 1.
Preliminary and Final Conceptual Models

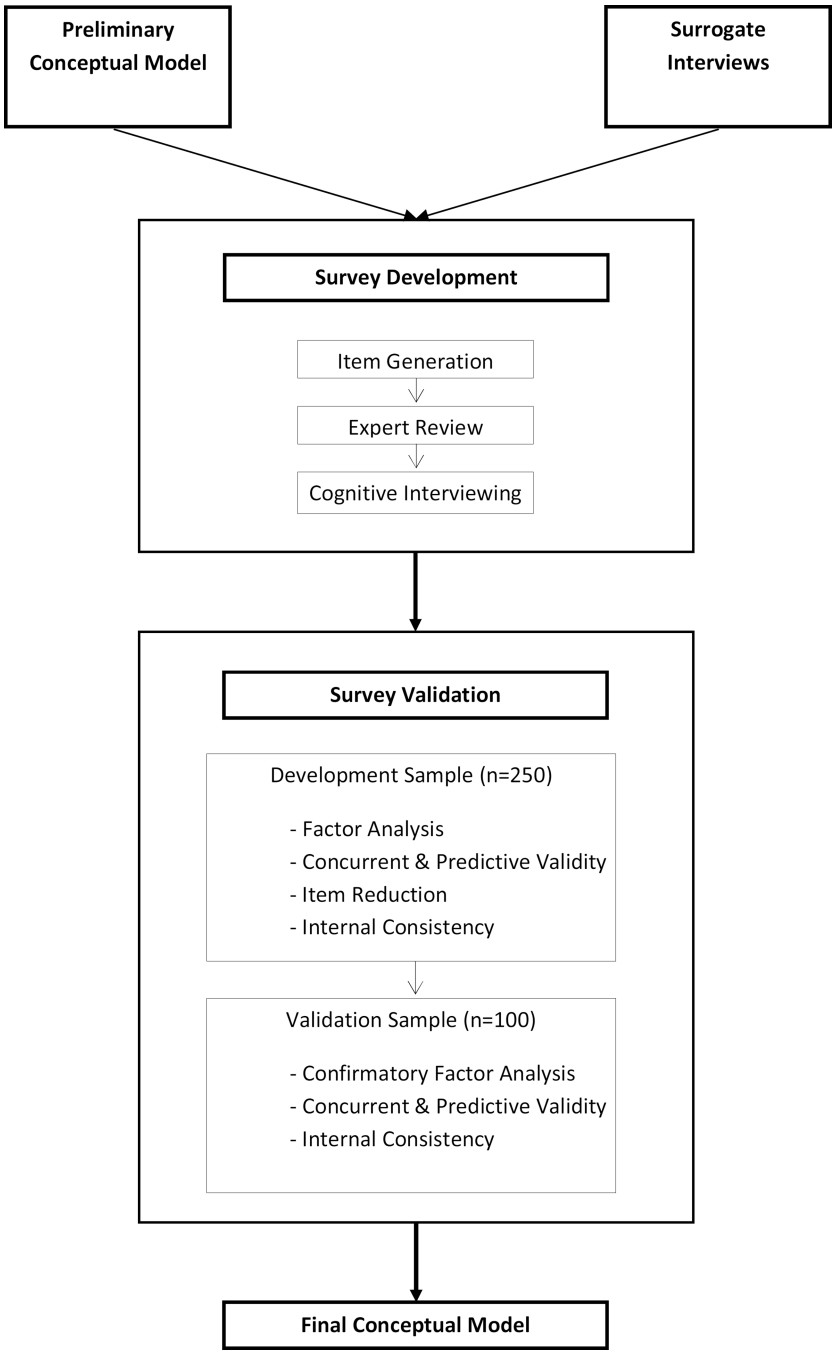

Figure 2.
Study Design

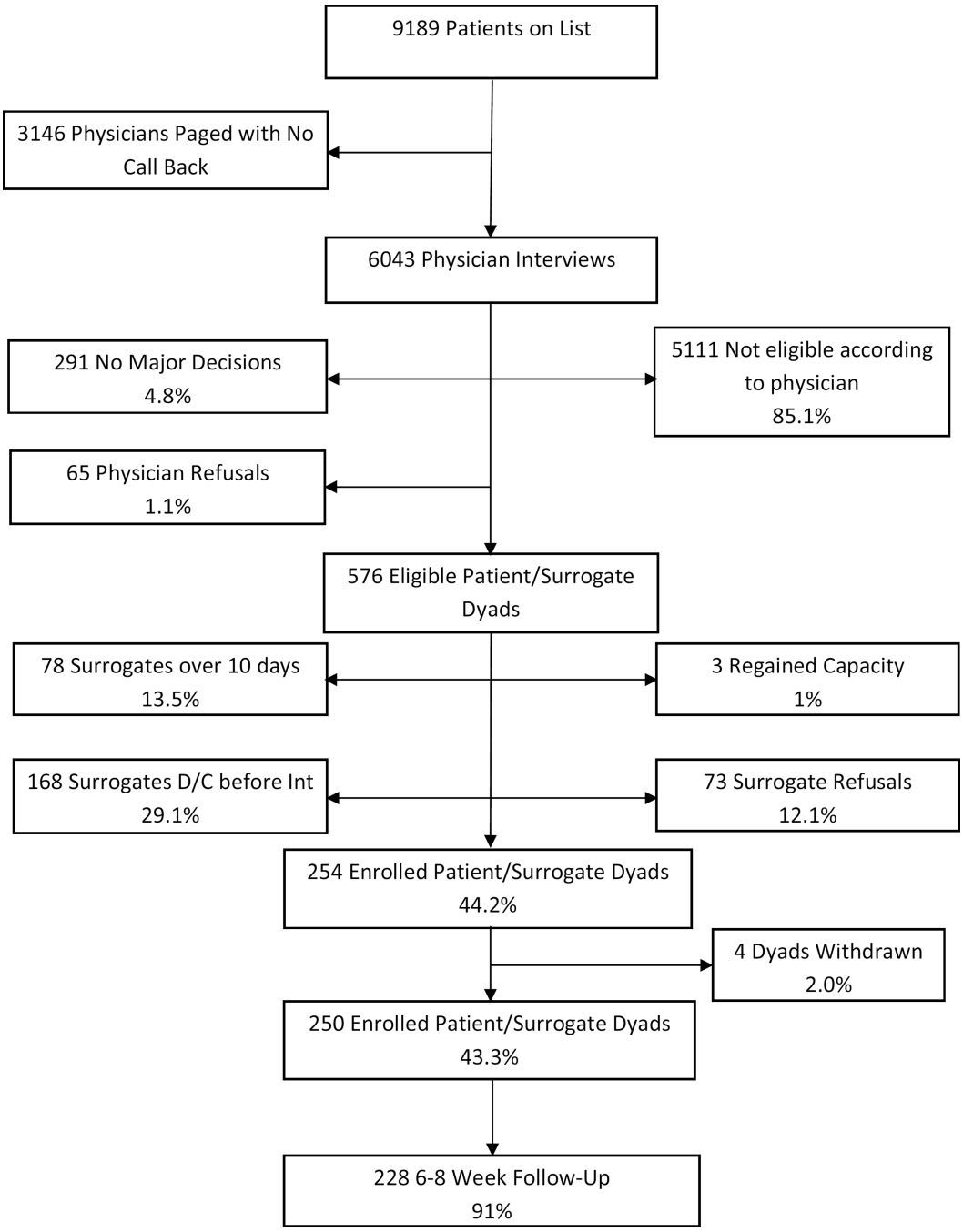

Figure 3.
Study Enrollment, Development Sample

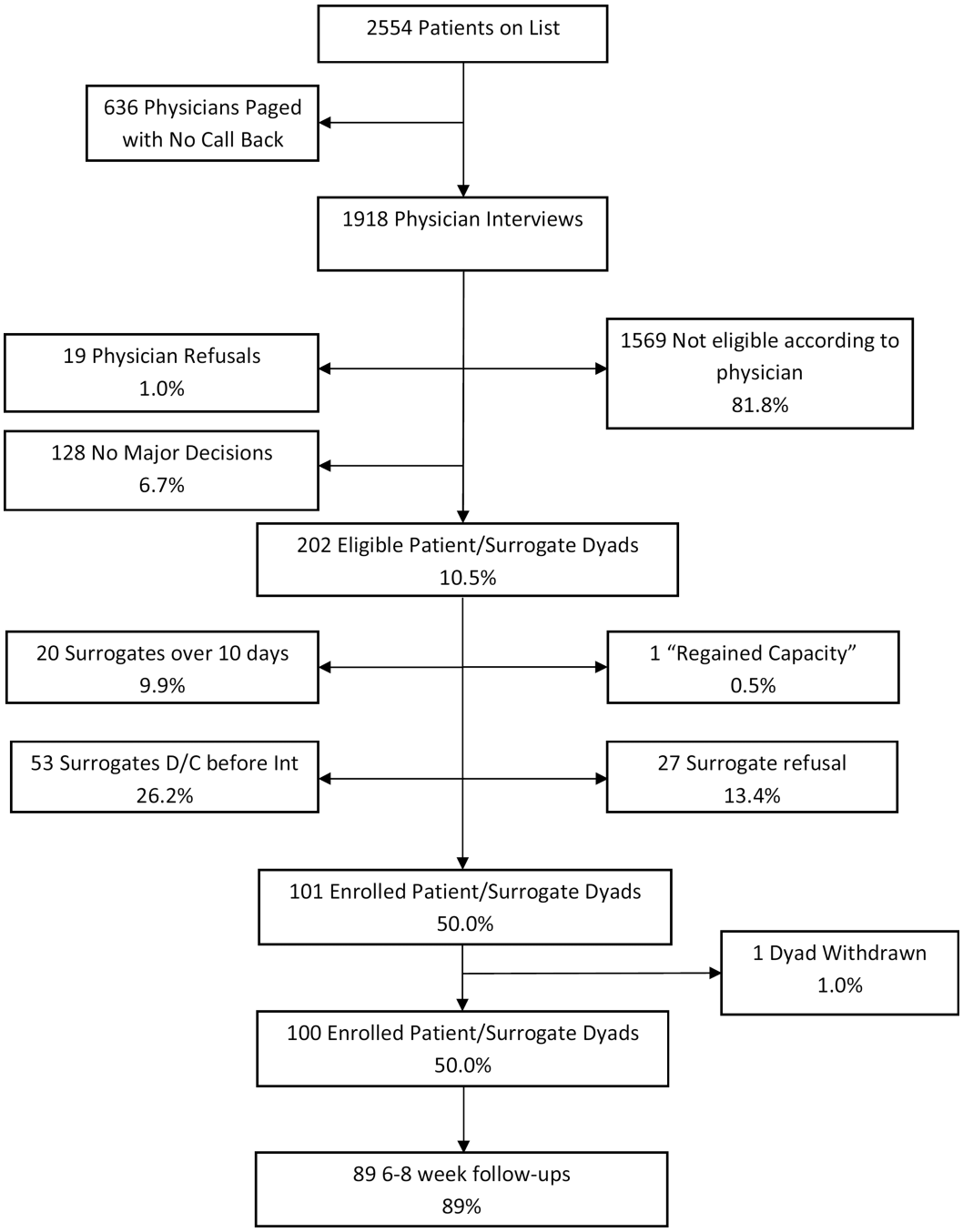

Figure 4.
Study Enrollment, Validation Sample

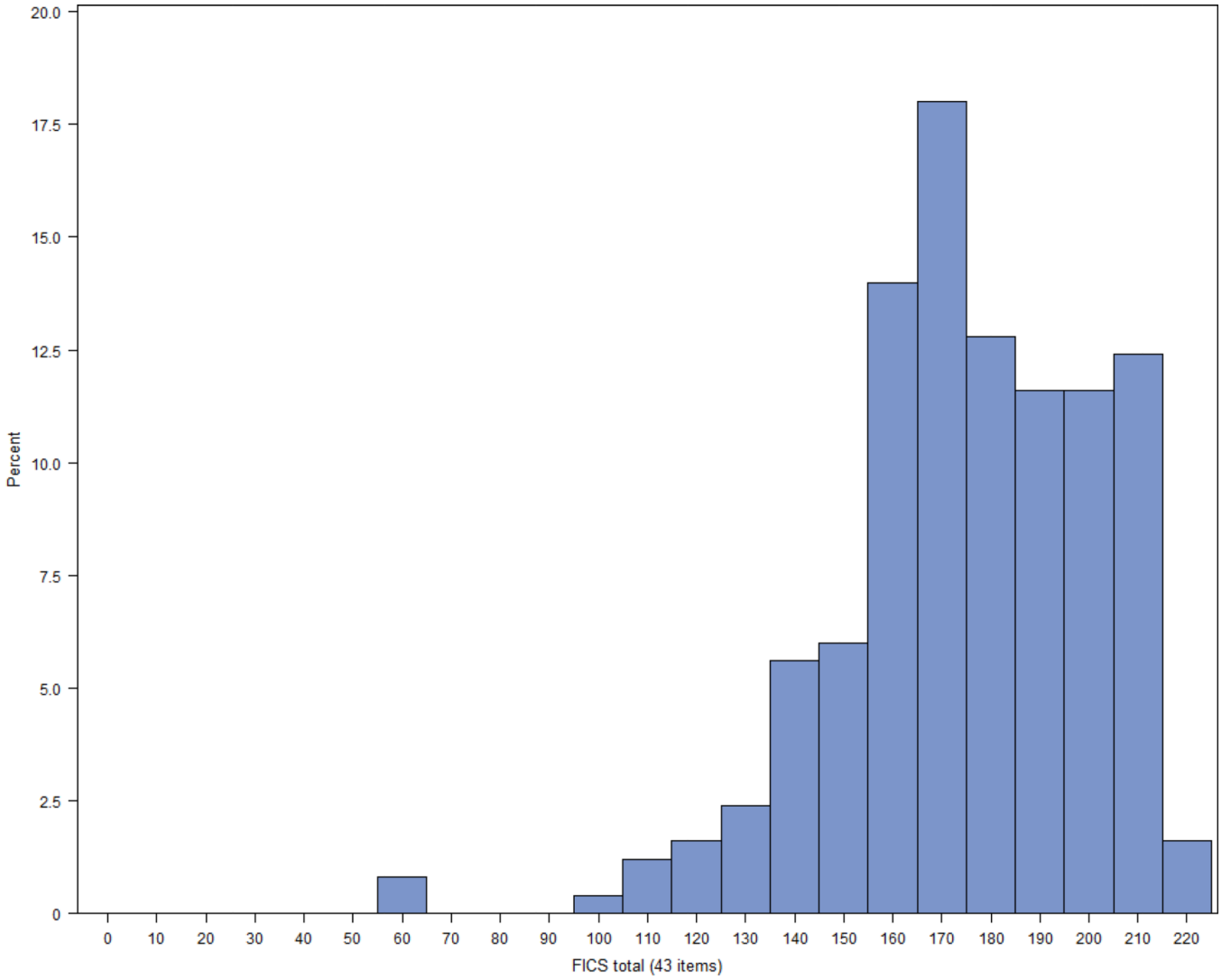

Figure 5.
Total Score Distribution: Family Inpatient Communication Survey

Table 1

Patient and Surrogate Characteristics. Values are number (percent) unless otherwise indicated.

Characteristic	Testing Sample (N=250)[1]		Validation Sample (N=100)	
	Patients	**Surrogates**	**Patients**	**Surrogates**
Age, mean (standard deviation (SD))	82.23 (8.13)	58.37 (10.53)	81.25 (8.59)	57.54 (12.78)
Education, mean (SD)	15.04 (16.62)	14.23 (5.90)	15.24 (15.11)	14.07 (2.58)
Sex: Female	144 (57.8)	181 (72.7)	70 (70.0)	66 (66.0)
Race				
African American/Black	70 (28.1)	73 (29.3)	30 (30.0)	29 (29.0)
White	169 (67.9)	168 (67.5)	68 (68.0)	68 (68.0)
Asian	4 (1.6)	3 (1.2)	0	0
American Indian/Alaskan	0	0	1 (1.0)	1 (1.0)
Multi	6 (2.4)	4 (1.6)	1 (1.0)	2 (2.0)
Refused to answer	0	1 (0.4)	0	0
Hispanic	2 (0.8)	3 (1.2)	1 (1.0)	0
Marital Status				
Married	81 (32.5)	163 (65.5)	31 (31.0)	65 (65.0)
Single	10 (4.0)	35 (14.1)	4 (4.0)	16 (16.0)
Divorced	38 (15.3)	42 (16.9)	14 (14.0)	15 (15.0)
Widowed	117 (47.0)	6 (2.4)	49 (49.0)	3 (3.0)
Opposite Sex Unmarried Partner	3 (1.2)	3 (1.2)	2 (2.0)	1 (1.0)
Religion				
None	17 (6.8)	11 (4.4)	5 (5.0)	5 (5.0)
Protestant	199 (79.9)	207 (83.1)	75 (75.0)	71 (71.0)
Catholic	24 (9.6)	20 (8.0)	16 (16.0)	18 (18.0)
Other	7 (2.8)	11 (4.4)	2 (2.0)	6 (6.0)
Don’t know	2 (0.8)	0	2 (2.0)	0
Income (Annual Salary) Category				
<$24,999		47 (18.9)		23 (23.0)
$25,000-$49,999		62 (24.9)		30 (30.0)
$50,000-$74,999		62 (24.9)		15 (15.0)
$75,000-$99,999		21 (8.4)		10 (10.0)
>$ 100,000		31 (12.5)		13 (13.0)
Not Determined		4 (1.6)		1 (1.0)
Refused to Answer		22 (8.8)		8 (8.0)
Income (Subjective)				
Not enough to make ends meet		25 (10.0)		14 (14.0)
Just enough to make ends meet		80 (32.1)		32 (32.0)

Characteristic	Testing Sample (N=250)[1]		Validation Sample (N=100)	
	Patients	Surrogates	Patients	Surrogates
Comfortable		139 (55.8)		54 (54.0)
Refused to answer		3 (1.2)		0
Don't know		2 (0.8)		0
General Health				
Excellent		38 (15.3)		13 (13.0)
Very Good		73 (29.3)		29 (29.0)
Good		76 (30.5)		30 (30.0)
Fair		47 (18.9)		27 (27.0)
Poor		15 (6.0)		1 (1.0)
Health Literacy[2]				
High		101 (40.6)		23 (23.0)
Low		148 (59.4)		77 (77.0)
Relationship to Patient				
Spouse		39 (15.7)		18 (18.0)
Spouse Equivalent/Unmarried Partner		1 (0.4)		0
Son/Daughter		174 (69.9)		61 (61.0)
Son/Daughter- In-Law		8 (3.2)		2 (2.0)
Grandchild		4 (1.6)		5 (5.0)
Neighbor/Friend		0		1 (1.0)
Other		23 (9.2)		13 (13.0)
Do you feel you were the primary decision maker for the patient?				
No		28 (11.2)		9 (9.0)
Yes		184 (73.9)		91 (91.0)
Missing		37 (14.9)		0
CIRS total score[3]	24.98 (5.66)		23.04 (6.23)	
Before this hospitalization, the patient lived:				
Alone at home	29 (11.6)		18 (18.0)	
In assisted living	27 (10.8)		12 (12.0)	
At home with surrogate	88 (35.2)		36 (36.0)	
At home with someone else	47 (18.8)		12 (12.0)	
Nursing home	59 (23.6)		22 (22.0)	

[1]Some variables sum to 249 due to one participant who did not complete all survey items

[2]Health literacy is a composite of the REALM-SF for surrogates interviewed in person or a single item regarding medical forms for surrogates interviewed by phone.[41,54]

[3]Cumulative Illness Rating Scale[55]

Table 2

Confirmatory Factor Analysis Model Fit Statistics

	Development Sample 42 item survey		Semi-Final Models Development sample 30 item survey		Final Models[1] Development sample 30 item survey		Final Models[1] Validation Sample 30 item survey	
	2 factor	**1 factor**	**2 factor**	**1 factor**	**2 factor**	**1 factor**	**2 factor**	**1 factor**
GOF Chi square	1821.566	1981.648	970.689	1168.678	677.384	743.839	646.587	689.751
df	818	819	404	405	386	380	394	393
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CFI	0.963	0.957	0.970	0.959	0.984	.981	0.972	0.967
RMSEA	0.070	0.075	0.075	0.087	0.055	.062	.080	0.087
WRMR	1.387	1.486	1.224	1.402	0.930	1.011	1.032	1.092
Min Residual	0.44	0.43	0.45	0.43	0.22	0.03	0.24	0.25
Max Residual	0.95	0.94	0.96	0.94	0.94	0.92	0.93	0.92
Median Residual	0.81	0.80	0.83	0.81	0.74	0.53	0.76	0.75

[1]Residuals allowed to be correlated if significant at 0.01 alpha because the correlated residuals made conceptual sense due to shared item wording. The same pairs of residuals that were allowed to be correlated in the development sample were allowed to be correlated in the validation sample.

Table 3

Final Scale Reliability

	Number of items	Cronbach's alpha development sample	Cronbach's alpha validation sample
Total score	30	0.96	0.96
Information subscale	18	0.95	0.94
Emotional/relational support Subscale	12	0.91	0.90

Table 4

Final 30 item Scale Organized by Two Factor Solution, Showing Final EFA Factor Loadings. Items are read aloud to participants. The participant's relationship to the patient is stated in place of (patient), e.g., your mother, your brother.

	Factor 1	Factor 2
Informational (Factor 1)		
1. The hospital staff communicated with me as often as I would have liked.	.81	.05
2. There were times when I needed to talk to a member of the health care team and I was not able to do so. *	.65	.16
3. I was confident that I could reach at least one member of the hospital staff when I needed them.	.60	.21
4. The hospital staff communicated with me on a regular basis throughout (patient's) time in the hospital.	.86	.08
5. In general, the hospital staff gave me enough information about (patient's) medical condition.	.88	.04
6. The information I received helped me understand (patient's) medical condition.	.92	−0.09
7. The information I received made me feel comfortable about the care (patient) was receiving.	.74	.17
8. The hospital staff carefully explained the treatments (patient) was receiving.	.82	.13
9. I was well informed about (patient's) daily routine in the hospital.	.85	−.02
10. I had to struggle to get the information I needed.*	.69	.23
11. The hospital staff talked to me about What to expect in the future.	.76	−.08
12. I trusted the information that I received From the hospital staff.	.77	.10
13. I always knew which doctor was in charge of (patient's) care.	.52	.20
14. The hospital staff explained what they were going to do for (patient) before they did it.	.62	.25
15. The hospital staff encouraged me to ask questions about (patient's) medical condition.	.73	.19
16. During the time (patient) was in the hospital, there was at least one hospital staff person I could rely on.	.52	.36
17. I knew the names of the most important Staff members caring for (patient).	.64	.21
18. The staff changed so often it was hard to get to know anyone. *	.47	.35
Emotional (Factor 2)		
19. Overall, the hospital staff gave me too	−.11	.80

	Factor 1	Factor 2
Informational (Factor 1)		
much information about the medical condition.*		
20. I wish I had gotten more emotional support from the hospital staff.*	.03	.81
21. I wish I had gotten more religious/spiritual support from the hospital staff.*	−.22	.78
22. It was easy to talk to the hospital staff about my personal concerns.	.41	.55
23. The hospital staff tended to talk down to me.*	.14	.68
24. The hospital staff treated me as an equal when they talked to me.	.35	.61
25. The hospital staff often seemed like they were in a hurry when they were talking to me.*	.30	.62
26. My opinions were valued by the hospital Staff.	.40	.53
27. The hospital staff really listened to me when we talked.	.41	.61
28. I felt comfortable asking the hospital staff questions when I didn't understand something.	.43	.49
29. I felt comfortable telling the hospital staff when there was something (patient) needed	.32	.53
30. If I had a concern about (patient), I sometimes felt there was no staff member who could help me.*	.43	.48

*Reverse Coded

Table 5

Concurrent and Predictive Validity. Values are Pearson correlations between the communication survey and surrogate-rated outcomes.

FICS Score	Decision Conflict	Decision regret	Depression	Anxiety	Post traumatic stress	Satisfaction
	Baseline	6–8 weeks	6–8 weeks	6–8 weeks	6–8 weeks	6–8 weeks
	Development Sample					
Total	−0.43 p<0.001	−0.16 p<0.019	−0.13 p=0.053	−0.14 p=0.028	−0.08 p=0.235	0.52 p<0.001
Factor 1 (Information)	−0.39 p<0.001	−0.16 p=0.016	−0.09 p=0.192	−0.11 p=0.100	−0.03 p=0.641	0.52 p<0.001
Factor 2 (Emotional Support)	−0.43 p<0.001	−0.13 p=0.061	−0.19 p=0.004	−0.19 p=0.003	−0.16 p=0.014	0.44 p<0.001
	Validation Sample					
Total	−0.39 p<0.001	−0.09 p=0.083	−0.13 p=0.019	−0.14 p=0.012	−0.03 p=0.507	0.45 p<0.001
Factor 1 (Information)	−0.36 p<0.001	−0.12 p=0.053	−0.17 p=0.124	−0.11 p=0.048	−0.01 p=0.851	0.49 p<0.001
Factor 2 (Emotional Support)	−0.43 p<0.001	−0.09 p=0.121	−0.17 p=0.002	−0.19 p<0.001	−0.15 p=0.039	0.37 p<0.001

Table 6

Final 42 item Scale Organized by Two Factor Solution, Showing Final EFA Factor Loadings and reason for removal of 11 items. Items are read aloud to participants. The participant's relationship to the patient is stated in place of (patient), e.g., your mother, your brother.

	Factor 1	Factor 2	Reason item was removed
Informational (Factor 1)			
The hospital staff communicated with me as often as I would have liked.	.83	.01	
When (patient) was admitted to the hospital, it took a long time for me to find out what was going on. *	.47	.04	Low factor loading
There were times when I needed to talk to a member of the health care team and I was not able to do so. *	.66	.15	
I was confident that I could reach at least one member of the hospital staff when I needed them.	.60	.25	
When speaking with me, the hospital staff took enough time to answer my questions.	.53	.40	Low factor loading
The hospital staff communicated with me on a regular basis throughout (patient's) time in the hospital.	.84	.05	
In general, the hospital staff gave me enough information about (patient's) medical condition.	.89	−.01	
The information I received helped me understand (patient's) medical condition.	.91	−0.05	
The information I received made me feel comfortable about the care (patient) was receiving.	.79	.13	
The hospital staff carefully explained the treatments (patient) was receiving.	.81	.12	
I was well informed about (patient's) daily routine in the hospital.	.87	−.06	
The hospital staff used words I could understand when they talked to me.	.47	.36	Low factor loading
I had to struggle to get the information I needed. *	.67	.24	
The hospital staff talked to me about what to expect in the future.	.82	−.19	
I trusted the information that I received from the hospital staff.	.77	.09	
I always knew which doctor was in charge of (patient's) care.	.51	.22	
The hospital staff helped my other family members understand the situation.	.34	.31	High non-response
The hospital staff explained what they were going to do for (patient) before	.79	.10	32

	Factor 1	Factor 2	Reason item was removed
Informational (Factor 1)			
they did it.			
Some members of the hospital staff	.40	.47	

*Reverse Coded

Table 7

Frequency of responses to FICS survey questions

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Non response	Spearman Correlation with 43 item total score and p-value	Spearman Correlation with 30 item total score and p-value
The hospital staff communicated with me as often as I would have liked.	118 (47.2)	91 (36.4)	10 (4.0)	23 (9.2)	8 (3.2)		0.756; p<0.0001	0.764; p<0.0001
When (patient) was admitted to the hospital, it took a long time for me to find out what was going on. *	19 (7.6)	35 (14.0)	11 (4.4)	97 (38.8)	86 (34.4)	2 (0.8)	0.468; p<0.0001	
There were times when I needed to talk to a member of the health care team and I was not able to do so. *	13 (5.2)	29 (11.6)	11 (4.4)	115 (46.0)	82 (32.8)		0.714; p<0.0001	0.722; p<0.0001
I was confident that I could reach at least one member of the hospital staff when I needed them.	123 (49.2)	99 (39.6)	10 (4.0)	13 (5.2)	4 (1.6)	1 (0.4)	0.655; p<0.0001	0.659; p<0.0001
When speaking with me, the hospital staff took enough time to answer my questions.	140 (56.0)	101 (40.4)	4 (1.6)	2 (0.8)	2 (0.8)	1 (0.4)	0.669; p<0.0001	
The hospital staff communicated with me on a regular basis throughout (patient's) time in the hospital.	116 (46.4)	92 (36.8)	16 (6.4)	20 (8.0)	6 (2.4)		0.786; p<0.0001	0.798; p<0.0001
In general, the hospital staff gave me enough information about (patient's) medical condition.	118 (47.2)	99 (39.6)	13 (5.2)	14 (5.6)	6 (2.4)		0.790; p<0.0001	0.799; p<0.0001
The information I received helped me understand (patient's) medical condition.	122 (48.8)	103 (41.2)	12 (4.8)	10 (4.0)	3 (1.2)		0.782; p<0.0001	0.790; p<0.0001
The information I received made me feel comfortable about the care (patient) was receiving.	130 (52.0)	103 (41.2)	3 (1.2)	9 (3.6)	4 (1.6)	1 (0.4)	0.780; p<0.0001	0.781; p<0.0001
The hospital staff carefully explained the treatments (patient) was receiving.	122 (48.8)	94 (37.6)	15 (6.0)	14 (5.6)	4 (1.6)	1 (0.4)	0.797; p<0.0001	0.799; p<0.0001

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Non response	Spearman Correlation with 43 item total score and p-value	Spearman Correlation with 30 item total score and p-value
I was well informed about (patient's) daily routine in the hospital.	85 (34.0)	85 (34.0)	30 (12.0)	34 (13.6)	12 (4.8)	4 (1.6)	0.774; p<0.0001	0.781; p<0.0001
The hospital staff used words I could understand when they talked to me.	128 (51.2)	112 (44.8)	5 (2.0)	5 (2.0)	0		0.697; p<0.0001	
Overall, the hospital staff gave me too much information about the medical condition. *	0	3 (1.2)	6 (2.4)	150 (60.0)	91 (36.4)		0.418; p<0.0001	0.438; p<0.0001
I had to struggle to get the information I needed. *	10 (4.0)	14 (5.6)	11 (4.4)	125 (50.0)	90 (36.0)		0.745; p<0.0001	0.760; p<0.0001
The hospital staff talked to me about what to expect in the future.	66 (26.4)	92 (36.8)	26 (10.4)	43 (17.2)	9 (3.6)	14 (5.6)	0.628; p<0.0001	0.632; p<0.0001
I trusted the information that I received from the hospital staff.	110 (44.0)	126 (50.4)	5 (2.0)	6 (2.4)	3 (1.2)		0.728; p<0.0001	0.733; p<0.0001
I always knew which doctor was in charge of (patient's) care.	80 (32.0)	98 (39.2)	13 (5.2)	51 (20.4)	8 (3.2)		0.634; p<0.0001	0.645; p<0.0001
I received conflicting information from different members of the hospital staff. *	9 (3.6)	25 (10.0)	11 (4.4)	129 (51.6)	75 (30.0)	1 (0.4)	0.555; p<0.0001	
The hospital staff helped my other family members understand the situation.	57 (22.8)	105 (42.0)	15 (6.0)	9 (3.6)	2 (0.8)	62 (24.8)	0.717; p<0.0001	
The hospital staff explained what they were going to do for (patient) before they did it.	92 (36.8)	124 (49.6)	10 (4.0)	14 (5.6)	6 (2.4)	4 (1.6)	0.746; p<0.0001	0.748; p<0.0001
I wish I had gotten more emotional support from the hospital staff. *	2 (0.8)	13 (5.2)	23 (9.2)	140 (56.0)	63 (25.2)	9 (3.6)	0.632; p<0.0001	0.645; p<0.0001
I wish I had gotten more religious/spiritual support from the hospital staff. *	1 (0.4)	21 (8.4)	24 (9.6)	139 (55.6)	51 (20.4)	14 (5.6)	0.380; p<0.0001	0.398; p<0.0001

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Non response	Spearman Correlation with 43 item total score and p-value	Spearman Correlation with 30 item total score and p-value
It was easy to talk to the hospital staff about my personal concerns.	91 (36.4)	126 (50.4)	15 (6.0)	12 (4.8)	3 (1.2)	3 (1.2)	0.720; p<0.0001	0.729; p<0.0001
I felt comfortable expressing my anxieties and fears with hospital staff.	83 (33.2)	124 (49.6)	17 (6.8)	14 (5.6)	1 (0.4)	11 (4.4)	0.683; p<0.0001	
Some members of the hospital staff really showed me that they cared.	128 (51.2)	104 (41.6)	7 (2.8)	9 (3.6)	1 (0.4)	1 (0.4)	0.709; p<0.0001	
The hospital staff treated me with respect.	127 (50.8)	113 (45.2)	4 (1.6)	4 (1.6)	1 (0.4)	1 (0.4)	0.740; p<0.0001	
The hospital staff tended to talk down to me. *	1 (0.4)	5 (2.0)	4 (1.6)	132 (52.8)	106 (42.4)	2 (0.8)	0.614; p<0.0001	0.621; p<0.0001
The hospital staff treated me as an equal when they talked to me.	92 (36.8)	142 (56.8)	8 (3.2)	6 (2.4)	1 (0.4)	1 (0.4)	0.725; p<0.0001	0.735; p<0.0001
The hospital staff was always courteous to me.	121 (48.4)	116 (46.4)	6 (2.4)	5 (2.0)	1 (0.4)	1 (0.4)	0.701; p<0.0001	
The hospital staff often seemed like they were in a hurry when they were talking to me. *	3 (1.2)	22 (8.8)	17 (6.8)	124 (49.6)	83 (33.2)	1 (0.4)	0.727; p<0.0001	0.736; p<0.0001
My opinions were valued by the hospital staff.	78 (31.2)	132 (52.8)	26 (10.4)	8 (3.2)	3 (1.2)	3 (1.2)	0.757; p<0.0001	0.760; p<0.0001
The hospital staff really listened to Me when we talked.	96 (38.4)	136 (54.4)	8 (3.2)	7 (2.8)	2 (0.8)	1 (0.4)	0.816; p<0.0001	0.819; p<0.0001
The hospital staff asked my opinions on important matters about (patient).	76 (30.4)	119 (47.6)	24 (9.6)	20 (8.0)	4 (1.6)	7 (2.8)	0.688; p<0.0001	
I felt comfortable asking the hospital staff questions when I didn't understand something.	116 (46.4)	125 (50.0)	4 (1.6)	3 (1.2)	1 (0.4)	1 (0.4)	0.701; p<0.0001	0.704; p<0.0001

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Non response	Spearman Correlation with 43 item total score and p-value	Spearman Correlation with 30 item total score and p-value
I felt comfortable telling the hospital staff when there was something (patient) needed	107 (42.8)	131 (52.4)	6 (2.4)	1 (0.4)	1 (0.4)	4 (1.6)	0.656; p<0.0001	0.658; p<0.0001
The hospital staff encouraged me to ask questions about (patient's) medical condition.	86 (34.4)	105 (42.0)	27 (10.8)	23 (9.2)	6 (2.4)	3 (1.2)	0.762; p<0.0001	0.768; p<0.0001
During the time (patient) was in the hospital, there was at least one hospital staff person I could rely on.	99 (39.6)	109 (43.6)	16 (6.4)	18 (7.2)	5 (2.0)	3 (1.2)	0.748; p<0.0001	0.749; p<0.0001
During the hospital stay, I developed a strong relationship with one or more members of the health care team.	54 (21.6)	83 (33.2)	51 (20.4)	49 (19.6)	6 (2.4)	7 (2.8)	0.625; p<0.0001	
If I had a concern about (patient), I sometimes felt there was no staff member who could help me. *	6 (2.4)	15 (6.0)	7 (2.8)	131 (52.4)	90 (36.0)	1 (0.4)	0.742; p<0.0001	0.746; p<0.0001
I knew the names of the most important staff members caring for (patient).	78 (31.2)	118 (47.2)	15 (6.0)	31 (12.4)	6 (2.4)	2 (0.8)	0.696; p<0.0001	0.696; p<0.0001
The staff changed so often it was hard to get to know anyone. *	6 (2.4)	43 (17.2)	35 (14.0)	109 (43.6)	52 (20.8)	5 (2.0)	0.700; p<0.0001	0.702; p<0.0001
There were too many different people taking care of (patient). *	7 (2.8)	27 (10.8)	26 (10.4)	130 (52.0)	58 (23.2)	2 (0.8)	0.633; p<0.0001	
There was at least one member of the hospital staff who looked out for (patient).	83 (33.2)	131 (52.4)	22 (8.8)	10 (4.0)	3 (1.2)	1 (0.4)	0.730; p<0.0001	

*Reverse Coded