Shared Vision among Acute Care Magnet® Hospital Nurses: Ordinal Confirmatory Factor Analysis

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Abstract

Psychometric testing of the Shared Vision scale that measures team efforts toward common patient-centered goals was initially estimated among rural hospital nurse executives. The purpose of this study was to estimate the scale's reliability (internal consistency), convergent validity (Pearson Correlation with Practice Environment Scale), and structural validity (ordinal confirmatory factor analysis) among acute care Magnet® hospital nurses. The study sample included 289 nurses from 27 acute care Magnet® hospitals. The scale demonstrated acceptable estimates for internal consistency (Cronbach's alpha = .902, 95% CI= .883, .919), convergent validity (r = .720, $p < .001$) and structural validity with a one-factor structure. The findings of this study supported the reliability and validity of the SV scale as a unidimensional construct in measuring shared vision among nurses in acute care Magnet® hospitals. Further testing among different nursing providers and healthcare settings is needed to accumulate evidence and expand use of the instrument.

Key words: Ordinal confirmatory factor analysis, Magnet® hospitals, Nurses, Psychometric testing, Shared vision

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Shared vision is the interdisciplinary effort that commits to common patient-centered goals within organizations (Newhouse, Morlock, Pronovost, Colantuoni, & Johantgen, 2009; Newhouse, Morlock, Pronovost, & Sproat, 2011). Higher shared vision among health clinicians is associated with better work environments that enhance care process and quality (Newhouse et al., 2009). Organizational and multi-disciplinary efforts are needed to foster shared vision by promoting common patient-centered goals and philosophies, and building a mutual decision-making and interdisciplinary teamwork climate (Djukic, Kovner, Brewer, Fatehi, & Cline, 2013). Disciplines working together with common patient-centered goals and unique contributions to the care of the patient may result in better patient outcomes (i.e., higher patient satisfaction and lower mortality) (McHugh et al., 2013; Yang, Liu, Huang, & Zhu, 2013). It is imperative to use a psychometrically valid, sound and precise measure for shared vision to evaluate the level of shared vision among healthcare providers as well as to identify potential problems within the organization. Once problems are identified, appropriate strategies can be applied to foster common patient care values, build strong teamwork, advance quality of care, and enhance organizational effectiveness in clinical practice (Yang et al., 2013).

The Shared Vision scale

The Shared Vision (SV) scale, which assesses the extent to which a group works together for common patient centered goals, was initially derived from the Nursing Environment Survey (NES) (Newhouse, 2005; Newhouse et al., 2009; Newhouse et al., 2011). The NES scale was developed using the Contingency Theory (Lawrence, Lorsch, & Garrison, 1967), which posits that environmental context (i.e., market forces) and organizational structure (i.e., hospital factors) are precursors of effective outcomes. The items of NES were identified through literature review of previously used measures and a qualitative study (Newhouse, 2005).

Prior studies estimated the reliability and validity of the SV scale among a national sample of nurse executives from rural hospitals in the U.S. (Newhouse et al., 2009; Newhouse et al., 2011). The scale demonstrated good psychometric properties with acceptable internal consistency (Cronbach's alpha =.832), better than adequate content validity (content validity index = 1.0), and good structural validity based on the findings that the 6 items resulted into one factor using exploratory factor analysis with principal component analysis with varimax rotation among 280 rural hospital nursing executives (Newhouse et al., 2009; Newhouse et al., 2011).

Additional psychometric estimates are needed using diverse samples and settings to support the validity of the SV scale. Staff nurses may have different perspectives from nurse executives with regard to shared vision and the locations and types of hospitals in which nursing staff work may influence nurses' responses. Comparatively, Magnet® hospitals have attributes of good work environments that nurses find essential to quality care and are thus able to successfully recruit and retain professional nurses despite a national nursing shortage of nursing workforce (Djukic et al., 2013; Stimpfel, Rosen, & McHugh, 2014). The level of shared vision as well as the psychometric performance of the SV scale might be different between Magnet® hospital nurses who provide direct patient care and rural hospital nursing executives who oversee nursing workforce and function administratively.

Purposes

The psychometric testing of the SV scale was only preliminarily evaluated among a national sample of rural hospital nurse executives and the structural validity of the SV scale was only assessed using exploratory factor analysis. Further testing among different nursing populations and diverse healthcare settings (e.g., nurses in urban hospital settings) is needed to accumulate evidence and to expand the use of the SV scale. Therefore, the purposes of the study

were: 1) to evaluate the reliability (internal consistency) and convergent validity (Pearson correlation with Practice Environment Scale) of the SV scale; and 2) to evaluate the structural validity testing the one-factor model using ordinal confirmatory factor analysis among nurses in acute care Magnet® hospitals.

Methods

Design

This study was a secondary analysis of baseline SV data collected from a quasi-experimental study which evaluated the effect of an evidence-based nursing intervention (standardized education and follow-up after hospital discharge) on heart failure (HF) patient care between 2010 and 2012 (Johantgen & Newhouse, 2013). A secondary aim of the original study was to identify hospital and nursing characteristics that were associated with improvements in HF patient care, for which nurse participants were asked to complete a survey assessing HF knowledge, practice environment, shared vision, and smoking cessation counselling practice at baseline. Human subjects' approval was obtained from both University of Maryland and participating hospital Institutional Review Boards.

Sample and setting

The target primary sampling unit for the original study was a convenience sample of acute care Magnet® hospitals that was drawn from organizations that responded to a call for interest for a multi-site study commissioned by the American Nurses Credentialing Center. Hospitals were eligible to participate in the study if they volunteered and were: 1) U.S. acute care Magnet® hospitals; 2) affiliated with an Institutional Review Board; 3) currently reporting HF core measures to the Centers for Medicare and Medicaid Services; and 4) not participating in another HF study or initiative that could confound results at the time of recruitment. Participating

hospitals selected a unit that admitted patients with a diagnosis of HF for the original study. Nurses were eligible to participate in the original study if they worked in the selected hospital units and provided direct care for HF patients. Completion of the survey was voluntary and was managed by a third party to maintain confidentiality of nurses. A total of 307 nurses from 40 acute care Magnet® hospital units (response rate ranging from 1 to 29 nurses per hospital) completed survey data in the original HF study. This analysis only included hospitals that had a minimum of 3 nurses who completed the survey to ensure that the data from nurses were representative for the level of shared vision within the hospital unit.

Measures

Hospital descriptive data (region and bed size), as well as nurse descriptive data (age, gender, ethnicity, race, nurse license type and work type, highest degree, current enrollment in education, and time spent in direct patient care) were collected in the original study. In addition to the SV scale, nurses also completed the Practice Environment Scale (PES) at the same time.

The SV scale is a 6-item measure that asks survey participants to indicate their level of agreement on working together with other disciplines toward common patient-centered goals. Participants respond on a Likert scale which ranges from 1 (strongly disagree) to 4 (strongly agree). Responses are summed up to a total score ranging from 6 to 24. Higher scores indicate a higher level of shared vision between nurses and other healthcare disciplines. The SV items were originally constructed for a survey of rural hospital nurse executives (Newhouse et al., 2009). Data used in this analysis were from nurses that were participating in a survey associated with a multi-site study testing a HF intervention in Magnet® hospitals, so the word “rural” was removed from the SV scale items.

The Practice Environment Scale (PES), a 31-item scale derived from the Nursing Work Index (NWI), measures organizational characteristics and practice environment elements of the original Magnet® hospitals (Lake, 2002). The item responses range from 1 (strongly disagree) to 4 (strongly agree) on a Likert scale, with total score ranging from 31 to 124. Higher scores indicated better practice environment within the hospital unit. Five subscales were empirically derived from the PES: nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability, leadership, and support of nurses, staffing and resource adequacy, and collegial nurse-physician relations. The five-subscale structure provides a profile of key domains in the nursing practice environment both at the hospital and unit levels within the original Magnet® hospitals. Estimates of reliability and validity of the PES scale were acceptable (Gajewski, Boyle, Miller, Oberhelman, & Dunton, 2010; Lake, 2002).

Data analysis

Descriptive statistics were used to describe hospital and nurse characteristics using SPSS 19.0 (SPSS, Chicago, IL). The frequency and percentage of each response option for the 6 SV items were described. The internal consistency of the SV and PES scales were estimated using Cronbach's alpha with 95% Confidence Interval (95% CI). Convergent validity of the SV scale was examined using Pearson Correlation coefficient with PES. The Interclass Correlation Coefficient was 2.98% for the SV scale, which did not exceed 5%, indicating small dependence of observations within hospitals (Rabe-Hesketh & Skrondal, 2012). Thus, the clustering effect of facilities was not controlled for in the analysis.

Ordinal confirmatory factor analysis (CFA) was conducted to examine the structural validity of SV scale using Mplus Version 7.1 (Muthén & Muthén, 2010). Ordinal CFA was performed to validate the one factor model of the 6-item SV scale and determine whether this

model was able to appropriately account for the pattern of correlation among the scale items (Kline, 2011). There was only .3-1% missing data in 4 of the 6 SV items, which were assumed to have little impact on the estimates of parameters and were treated as missing data. All the item data were treated as categorical data and Weighted Least Squares with Mean and Variance Adjustment (WLSMV) was used as default. Model fit indices were examined to determine how well the one factor model fit the data. The indices included the chi-square goodness-of-fit index, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Weighted Root Mean Square Residual (WRMR). A non-significant chi-square test indicates good fit. As chi-square is sensitive to large sample size, its significance should not be ignored but should be interpreted with caution (Kline, 2011). CFI and TLI above .95 suggest an acceptable fit (Hu & Bentler, 1999; Kline, 2011). A RMSEA of .08 or less indicate reasonable errors of approximation, whereas a RMSEA between .08 and .10 indicates mediocre fit (Byrne, 2012; Hu & Bentler, 1999). Although a WRMR of less than 1.0 represents good model fit for categorical data (Yu, 2002), it is still considered as an experimental fit index, which awaits further testing of its properties (Byrne, 2012). Also, it is important to note that these fit indices are mere guidelines and should not be interpreted as golden rules (Marsh, Hau, & Wen, 2004). Standardized factor loadings were also examined to assess the validity of the factor structures, as strong standardized factor loadings that do not cross load indicate good convergent validity. We followed the rule that factor loadings less than .40 are weak and factor loadings greater than .60 are strong (Garson, 2010).

Results

Sample characteristics

A total of 289 nurses from 27 acute care Magnet® hospitals were included in the analysis (response rate ranging from 3 to 29 nurses per hospital). Almost one third of the hospitals were from the Northeast (n=8, 29.6%), another third from the Midwest (n=9, 33.3%), while the remainder were from the South (n=7, 25.9%) or West (n=3, 11.1%) region. The majority of the hospitals were large with the number of beds ranging from 201 to 400 (n=12, 44.4%), from 401 to 600 (n=8, 30.8%), or 601 or more (n=5, 19.2%); only 2 (7.7%) hospitals had less than 201 beds.

The characteristics of nurse participants examined in this study are shown in Table 1 and 2. The majority of the participants were aged between 18-35 years, female, White, and not Hispanic or Latino. Nearly all of the 289 participants were registered nurses (99.3%) and more than three quarters worked full-time (77.5%). More than half of the registered nurses were baccalaureate-prepared (57.4%). A large proportion of participants were not currently enrolled in school for another degree (83.0%). The average proportion of work time devoted to direct patient care was 84.35% (SD = 26.01). On average, the level of shared vision (Mean SV = 18.76, SD = 2.96, range: 6-24) and practice environment (Mean PES = 94.68, SD = 11.75, range: 55-124) were both high among the participants.

The frequency of each response option for the 6 SV items were shown in Table 3. Participants' levels of agreement were skewed toward being agree or strongly agree with the statements across the six items. Specifically, more than 92% of participants agreed or strongly agreed with the statements about "item 1: patient-centered care is widely shared by all within the organization" (95.1%), "item 4: patient-centered care is valued by all within the organization" (93.3%), "item 6: teams in your hospital work collaboratively to focus on common goals" (92.9%), and "item 5: a strong multi-disciplinary climate is evident in your hospital" (92.3%).

Comparatively, less than 87% of participates agreed or strongly agreed with the statements about "item 2: the medical staff shares patient-centered common goals and philosophies with nursing" (86.2%), and "item 3: there is high level of shared decision-making between nurses and physicians on clinical issues" (75%). The distribution of levels of agreement may indicate that the statements for some items (e.g., item 1, 4, 5, 6) were easier to endorse among nurses than the other items (i.e., item 2 and 3).

Reliability and validity

The internal consistency of SV was good (Cronbach's alpha = .902, 95% CI= .883, .919), indicating that all the 6 items clustered together to represent one single underlying construct. The internal consistency values of five subscales of PES were also fairly good (Cronbach's alpha ranging from .814 to .859). Based on the prior report that higher shared vision was associated with better hospital nursing work environment (Newhouse et al., 2009), the level of shared vision among nurses to work together for common patient-centered goals is assumed to be correlated with their perceptions of the practice environment within Magnet® hospitals**.** The total SV score was highly correlated with total PES score (r = .720, p < .001), and moderately to highly correlated with the five subscales of PES (r = .413 - .706, p all < .001), demonstrating that the SV scale had good convergent validity.

Ordinal confirmatory factor analysis

A single factor model was examined in the ordinal CFA based on prior findings of the factor structure for the SV scale (Newhouse et al., 2009; Newhouse et al., 2011). All six items had strong standardized factor loadings (>.75), indicating that the convergent validity of the single factor structure was desirable (Figure 1) (Garson, 2010). The explained variance of each item was significant, indicating that all six items had statistically significant contribution to the

single factor model. The single-factor CFA model produced mixed model fit results. The high CFI (.985) and TLI (.975) values suggested acceptable model fit, whereas the significant chi-square value [χ^2 (df) =111.408 (9), p<.001], and the high RMSEA (RMSEA = .200, 95% CI=0.168, 0.234, p< 0.001) and high WRMR (1.436) indicated poor model fit. However, the significance of chi-square test and the WRMR as an experimental fit index needed to be interpreted with caution versus as gold standard for evaluating model fit.

Discussion

Results of this study provided evidence to support psychometric estimates for the SV scale (internal consistency, convergent validity and structural validity) based on responses from a national sample of staff nurses that work in acute care Magnet® hospitals. In addition, nurse respondents reported similar levels of SV as reported by nurse executives in prior studies.

The single-factor structure of the 6-item SV scale was confirmed with generally acceptable model fit and further validated based on high correlation with PES scale among nurses in acute care Magnet® hospitals. The findings indicated that all the 6 items clustered together well and the item set represented a unidimensional construct. Current findings suggested that the whole item set still performed well when used in Magnet® hospitals, indicating that the SV scale can be used broadly in different settings.

The distribution of response options on the levels of agreement across items may provide some evidence for the level of difficulty that each item statement represents on the latent trait continuum of shared vision for the nurses to endorse. Such distribution can be associated with the level of inter-disciplinary efforts required to achieve these perceptional or behavioral situations within the hospital settings. For example, the fact that “patient-centered care is widely shared by all within the organization” involves the perceptions or behaviors of multiple

healthcare disciplines but requires less inter-disciplinary or collaborative efforts, and thus is an easier statement to endorse by nurses. On the other hand, the scenarios that “medical staff shares patient-centered common goals and philosophies with nursing” or “there is high level of shared decision-making between nurses and physicians on clinical issues” require more inter-disciplinary and collaborative efforts, and thus are much more difficult to accomplish in hospital units and to be endorsed by nurses. The ordering of these descriptions provided useful information for clinical practice to evaluate the level of shared vision among healthcare teams in hospital settings. Endorsement of the more difficult situations indicates higher level of shared vision among nurses and other healthcare disciplines, whereas endorsement of only the easier scenarios suggests lower level of shared vision.

Interestingly, the Magnet® hospital nurses in this study reported similar high levels of shared vision (Mean = 18.76 out of 24, SD = 2.96) as was indicated among the rural hospital nursing executives in prior studies (Mean = 18.6, SD = 2.8) (Newhouse et al., 2009; Newhouse et al., 2011). Possible reasons might be that the Magnet® hospitals have a common set of desirable organizational attributes, which include: decentralization of decision making to the level of the nursing unit; strong, effective and visible nursing leadership; recognition of professional nurse autonomy, accountability, and responsibility for quality patient care; and adequate staffing and flexible scheduling (Djukic et al., 2013; Kelly, McHugh, & Aiken, 2011; Stimpfel et al., 2014). As was reported in prior research of Magnet® hospitals, a high level of shared vision among multi-disciplinary healthcare providers is more likely to promote quality of nursing care and result in desirable patient outcomes (i.e., higher patient satisfaction and lower mortality) (McHugh et al., 2013; Yang et al., 2013).

This study supports the use of the SV scale as a reliable and valid measure of shared vision in hospitals. As the importance of teamwork and communication in healthcare settings is realized, all team members need to work together toward common patient-centered goals. Another strength of the study is the use of a large national sample of staff nurses in acute care Magnet® hospitals. Previous studies included chief nurse executives from rural hospitals, so current findings broadened the generalizability of the SV scale to other types of nursing providers and other types of hospitals. Also, the use of the Ordinal CFA analysis to confirm the single-factor model provided additional evidence of the psychometric performance of the SV scale.

Despite the strengths, several limitations must be acknowledged. While the study sample represented a national sample of Magnet® hospital nurses working in general medical or medical-surgical units, the findings of this study may not be generalized to other heterogeneous nursing healthcare workers (i.e., nursing aids and nursing assistants) in Magnet® hospitals. Also, the desirable organizational attributes and philosophy of nursing care practice in Magnet® hospitals may influence the estimates of parameters and model fit statistics, and future work may collect data among nurses in non-Magnet® hospitals to compare estimates and model fit indices across different types of hospitals. The sample nurses were also fairly homogenous, and future psychometric testing of the SV scale is needed among different races and ethnicities and with more male nurses. Since all of the psychometric studies of the SV scale have used cross-sectional data, future testing should examine the reliability of the measure over time.

In conclusion, this study provided additional support for the reliability and validity of the SV scale as a unidimensional structure in measuring the latent construct of shared vision among nurses in acute care Magnet® hospitals. This should expand the application of the SV scale in

clinical practice and nursing research. By using the SV scale, nursing administrators or leaders are able to access nurses' perceived level of shared vision in working together with other disciplines toward common patient-centered care goals. Using these results can be helpful to foster interdisciplinary teamwork and promote improvements in the quality of care. Because the psychometric property of a measure is population dependent, further testing may be needed among other settings and healthcare providers to accumulate more evidence.

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Table 1. Sample characteristics for categorical data (N=289)		
Characteristics	**n**	**%**
Age, year		
18 - 35	148	51.2
36 - 50	96	33.2
51 - 65	45	15.6
Gender		
Female	265	91.7
Male	23	8.0
Ethnicity		
Hispanic or Latino	14	4.8
Not Hispanic or Latino	270	93.4
Race		
American Indian or Alaska Native	7	2.4
Asian	37	128
Black or African American	11	3.8
Native Hawaiian or Other Pacific Islander	5	1.7
White	235	81.3
Nurse license type		
LPN	2	.7
RN	287	99.3
Work type		
Full time (≥36 hours/week)	224	77.5

Part time (< 36 hours/week)	62	21.5
Highest nursing degree if RN		
AA	104	36.0
BS or BA	166	57.4
Masters	12	4.2
Doctorate	2	.7
Currently enrolled in school for another degree		
Yes	44	15.2
No	240	83.0
If yes, what degree		
AA	2	.7
BS or BA	29	10.0
Masters	18	6.2
Doctorate	2	.7
Note. The numbers in the cells may not add up to total N due to missing.		

Table 2. Sample characteristics for continuous data (N=289)			
Characteristics	**Mean**	**SD**	**Range**
Time for direct care, %	84.35	26.01	0-100
Shared vision (SV, 6 items)	18.76	2.96	6-24
Practice environment (PES, 31items)	94.68	11.75	55-124
Nurse Participation in Hospital Affairs (9 items)	27.37	3.95	18-36
Nursing Foundations for Quality of Care (10 items)	31.81	3.82	21-40
Nurse Manager Ability, Leadership, and Support of Nurses (5 items)	15.47	2.55	7-20
Staffing and Resource Adequacy (4 items)	11.19	2.25	4-16
Collegial Nurse-Physician Relations (3 items)	9.00	1.40	4-12

Table 3. Frequency of each response option for items in the Shared Vision scale (N=289)				
SV items	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**
	n (%)			
1. Patient-centered care is widely shared by all within the organization.	2 (.7)	12 (4.2)	186 (65.5)	84 (29.6)
2. The medical staff shares patient-centered common goals and philosophies with nursing.	3 (1.1)	36 (12.7)	198 (69.7)	47 (16.5)
3. There is high level of shared decision-making between nurses and physicians on clinical issues.	3 (1.1)	68 (23.9)	171 (60.2)	42 (14.8)
4. Patient-centered care is valued by all within the organization.	4 (1.4)	15 (5.3)	171 (60.2)	94 (33.1)
5. A strong multi-disciplinary climate is evident in your hospital.	3 (1.1)	19 (6.7)	180 (63.4)	82 (28.9)
6. Teams in your hospital work collaboratively to focus on common goals.	2 (.7)	18 (6.3)	185 (65.1)	79 (27.8)

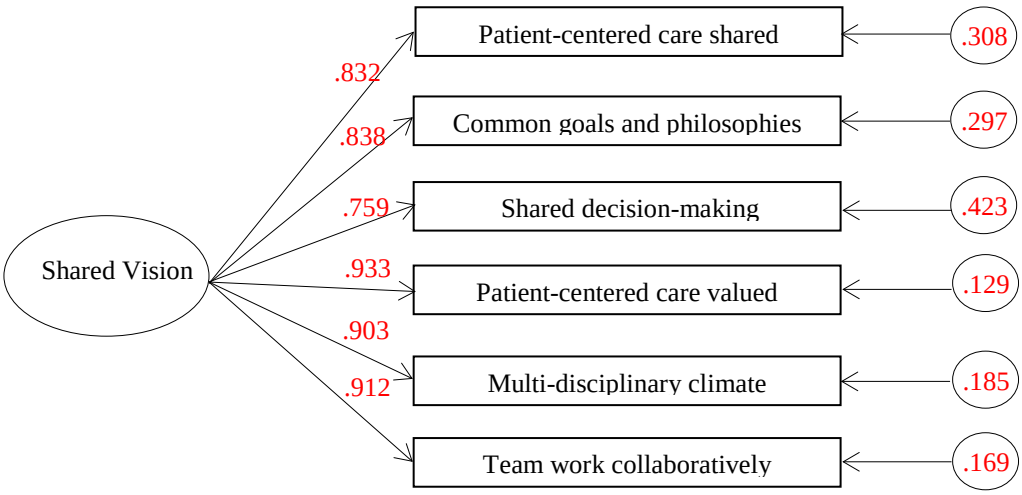

Figure 1. Ordinal confirmatory factor analysis of the one factor model – standardized loadings (N=289). The numbers on the arrows to the left of the rectangles represent the standardized factor loadings of each item. The numbers in the circles to the right end are the residual variance ("error" term) for each item.