Psychometric Testing of the Smoking Cessation Counseling Scale among Magnet® Hospital Nurses

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Abstract

Psychometrics of the Smoking Cessation Counseling scale, which measures adherence to evidence-based smoking cessation counseling practice, were originally estimated among rural hospital nurses. The purpose of this study was to estimate the scale's reliability, convergent validity, and factor structure among 289 nurses from 27 acute care Magnet® hospitals. The scale demonstrated acceptable estimates for internal consistency (Cronbach's alpha = .95, 95% CI= .94, .96). Convergent validity was supported by the association with comfort in conducting smoking cessation counseling (coefficient = 3.58, 95% CI = 2.80, 4.37) and shared vision (coefficient =.72, 95% CI = .02, 1.42). A four-factor structure (standard care, basic counseling, advanced counseling, and referral to services) was identified. The findings supported the scale's reliability and convergent validity among Magnet® hospital nurses. Further testing is needed to confirm the four-factor structure and accumulate psychometric evidence among different nursing providers and healthcare settings to expand the use of the instrument.

Keywords: Magnet® hospitals, nurses, psychometrics, smoking cessation; tobacco use

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Smoking cessation counseling is the interdisciplinary effort by nurses and other healthcare providers to help patients who smoke reduce or quit tobacco use. Smoking remains a major health concern, with evidence-based smoking cessation interventions expected in the delivery of quality healthcare. The Tobacco Treatment (TOB) measure set is a core measure of quality care for use in hospital settings, and is available for hospitals to use to meet their accreditation requirement (Salkind, 2012; The Joint Commission, 2016). Nurses play an important role in screening, counseling, and referral during patient care. Compared to usual care, nurse-delivered structured smoking cessation interventions significantly increased the likelihood of quitting tobacco use among patients (Rice & Stead, 2008). To guide clinical practice in evidence-based smoking cessation counseling, the U.S. Department of Health and Human Services published specific guidelines that addressed evidence-based nursing processes and interventions with regard to smoking cessation counseling practice (U.S. Department of Health Human Services, 2008b). It is important to use a psychometrically validated measure to evaluate nurses' efforts in implementing evidence-based tobacco use screening and treatment practice, as well as to identify potential deficits or problems in clinical practice to enhance the quality of patient care, and improve patient outcomes.

The Smoking Cessation Counseling Scale

The U.S. Department of Health and Human Services (DHHS) clinical practice guideline for Treating Tobacco Use and Dependence was initially published in 2005 and updated in 2008 (U.S. Department of Health Human Services, 2008b). This clinical practice guideline has one separate guide for each of the three groups: clinicians, system decision makers and tobacco users. The Smoking Cessation Counseling (SCC) scale was developed directly from the guide for clinicians, which addressed evidence-based smoking cessation counseling processes following the 5A recommendations: **Ask** about tobacco use at every visit, **Advise** all tobacco users to quit, **Assess**

readiness to quit, **Assist** tobacco users with a quit plan, and **Arrange** follow-up visits (U.S. Department of Health Human Services, 2008a). The total score of the SCC scale represents nurses' self-reported frequency of use of the evidence-based guidelines. The SCC scale can be used to evaluate interventions that aim to improve the adoption of best tobacco use screening and treatment practice among nurses based on the DHHS guidelines (Newhouse, Himmelfarb, & Liang, 2011; U.S. Department of Health Human Services, 2008a).

Prior research tested the reliability and validity of the SCC scale among a sample of 591 registered nurses from 23 acute-care rural hospitals in the eastern United States (Newhouse et al., 2011; Newhouse, Himmelfarb, & Liang, 2011). The scale demonstrated good internal consistency (Cronbach's alpha = 0.955), and good convergent validity based on correlation with comfort in smoking cessation counseling ($r = .604$, $p<.001$) and comfort in referral to resources ($r = .630$, $p<.001$) (Newhouse et al., 2011; Newhouse, Himmelfarb, & Liang, 2011). The SCC scale items resulted in four factors representing different dimensions of evidence-based tobacco use screening and treatment practice (standard care, basic counseling, advanced counseling, referral to services), which explained 68.3% of variation in the total SCC score using Principle Component Analysis (PCA) (Newhouse, Himmelfarb, & Liang, 2011).

More psychometric testing among different nurse samples and healthcare settings is needed to further support the reliability and validity of the SCC scale. Magnet® hospitals are characterized by high quality work environment and culture (Stimpfel, Rosen, & McHugh, 2014), nursing excellence (e.g., staff perceptions of quality of care (Ulrich, Buerhaus, Donelan, Norman, & Dittus, 2007)), less missed nursing care (Kalisch & Lee, 2012), efficiency in operations (American Nurses Credentialing Center, 2016), high nurse retention (Lacey et al., 2007), job satisfaction (Schmalenberg & Kramer, 2008), quality patient outcomes (e.g., lower fall rate (Lake, Shang, Klaus,

& Dunton, 2010)), and lower mortality rate (McHugh et al., 2013). Staff nurses in Magnet® hospitals may respond differently with regard to compliance to smoking cessation counseling practice compared with those in rural hospitals. Examining the psychometric properties of the SCC scale among nurses from Magnet® hospitals may reveal differences.

Purpose

The psychometric testing of the SCC scale has been assessed among a sample of rural hospital staff nurses, and the factor structure of the SCC scale was estimated using PCA. Further testing among different nurse samples and other healthcare settings is needed to accumulate evidence as well as to expand the use of the scale. Therefore, the purposes of the study were to: 1) estimate reliability (internal consistency) and convergent validity (Pearson Correlation and Multilevel Linear Modeling) of the SCC scale among Magnet® hospital status, and 2) examine the factor structure using Ordinal Exploratory Factor Analysis (EFA) among acute care Magnet® hospital nurses.

Methods

Design

This study was a secondary data analysis of baseline data obtained from a quasi-experimental study that evaluated the effect of standardized education and follow-up after hospital discharge on heart failure (HF) care between 2010 and 2012 (Johantgen & Newhouse, 2013). A secondary aim of the parent study was to examine the association between hospital and nurse characteristics and HF patient care improvement. Nurse participants were asked to complete a baseline survey assessing HF knowledge, practice environment, shared vision, and smoking cessation counseling practice. Human subjects' approval was obtained from the Institutional Review Boards of University of Maryland Baltimore and participating hospitals.

Sample and Setting

The parent study included a convenience sample of acute care Magnet® hospitals drawn from organizations that responded to a call for interest for the multi-site study commissioned by the American Nurses Credentialing Center. Inclusion criteria were that hospitals were U.S. acute care Magnet® hospitals, affiliated with an Institutional Review Board, currently reporting HF core measures to the Centers for Medicare and Medicaid Services, and not participating in another HF study or initiative that could confound results. Hospitals that participated selected a general medical or medical-surgical unit that routinely admitted patients with HF diagnoses. Nurses were eligible to participate in the parent study if they worked in the selected hospital units and provided direct care for HF patients. Administration of the de-identified survey was managed by a third party to maintain confidentiality of nurses. A total of 307 nurses from 40 acute care Magnet® hospital units completed the baseline survey in the parent study. The number of nurses per hospital who responded to the survey was on average 7.67 (SD = 7.38), with a range from one to 29 nurses per hospital. The current study only included hospitals from which a minimum of three nurses completed the survey to ensure that data from nurses were representative of the hospital unit level characteristics and that an adequate sample size was used for the analysis.

Measures

Hospital descriptive data included region and bed size. Nurse descriptive data included age, gender, ethnicity, race, nurse license type, work type, highest degree, current enrollment in education, and time spent in direct patient care. In addition to the SCC scale, nurse participants in the parent study also completed the Shared Vision (SV) scale and the Practice Environment Scale (PES). The parent study used the Conceptual Model for Considering the Determinants of Diffusion, Dissemination, and Implementation of Innovations in Health Service Delivery and Organization

(Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004), which posits that organizational readiness affects evidence adoption. The SV and PES scales were used in the parent study to conceptualize system readiness for evidence-based nursing practice, including advanced heart failure clinical competency and compliance in evidence-based smoking cessation counseling practice (Johantgen & Newhouse, 2013).

The SCC scale is a 26-item measure that accesses the extent to which nurses comply with evidence-based smoking cessation counseling in clinical practice (Newhouse et al., 2011; Newhouse, Himmelfarb, & Liang, 2011). The first 24 items assessed the frequency of use of the smoking cessation counseling service using a four-level Likert response format (1 = *never*, 2 = *less than half the time*, 3 = *more than half the time*, 4 = *all of the time*). The total SCC score is computed for the first 24 items representing the overall self-reported frequency of use of the evidence-based guidelines. Total scores range from 24 to 96, with higher scores representing higher levels of evidence-based smoking cessation counseling practice. Two additional items assess the level of comfort in smoking cessation counseling skill and the level of comfort in referral to resources using a 10-point response format (1 = *not at all comfortable* to 10 = *very comfortable*). The scores of these two additional items do not contribute to the total SCC score.

The SV scale is a six-item measure that asks survey participants to indicate the extent to which a group works together toward common patient-centered goals. Participants respond on a Likert scale with item responses ranging from 1 (strongly disagree) to 4 (strongly agree). Responses are summed up to a total score ranging from 6 to 24. Higher scores indicate higher levels of shared vision between nurses and other healthcare disciplines. Reliability and validity of the SV scale were sufficient among U.S. rural hospital nurse executives (Newhouse, Morlock, Pronovost, Colantuoni,

& Johantgen, 2009; Newhouse, Morlock, Pronovost, & Sproat, 2011) as well as acute care Magnet® hospital nurses (Liu, Johantgen, & Newhouse, 2016).

The PES is a 31-item scale that measures organizational characteristics and practice environment elements of the original Magnet® hospitals (Lake, 2002). The PES accesses five domains of nursing practice environment: 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 item responses range from 1 (strongly disagree) to 4 (strongly agree) on a Likert scale, with total score ranging from 31 to 124. Higher score indicates better practice environment within the hospital unit. Estimates of reliability and validity of the PES were acceptable (Gajewski, Boyle, Miller, Oberhelman, & Dunton, 2010; Lake, 2002). The quality of nursing practice environment as measured by the PES was defined as the organizational characteristics of a work setting that facilitate or constrain professional nursing practice (Lake, 2002). Practice environment is conceptualized as an indicator of system readiness within the hospital units to predict the adoption of evidence-based smoking cessation counseling practice. Prior research has used the PES total score to predict the adoption of evidence-based practices, such as pain management (Samuels & Fetzer, 2009).

Data Analysis

Descriptive statistics were used to describe hospital and nurse characteristics using SPSS 23.0 (SPSS, Chicago, IL). The frequency and percentage of each response option for the 24 SCC items were described. The internal consistency of the SCC, SV and PES scales was estimated using Cronbach's alpha with 95% Confidence Interval (95% CI). Convergent validity of the SCC scale was examined using Pearson Correlation coefficients with the level of comfort in smoking cessation counseling skill and the level of comfort in referral to resources. The strength of the correlation was

interpreted following the rule that a correlation coefficient within the range of .00-.20 was considered very weak or no relationship, .20-.40 weak, .40-.60 moderate, .60-.80 strong and .80-1.0 very strong (Salkind, 2012).

Multilevel Linear Modeling using maximum likelihood estimation (Goldstein, 2003; Subramanian, 2004) was conducted with the total SCC score as the dependent variable to examine the association with comfort in smoking cessation counseling skill, comfort in referral to resources, and SV and PES (representing system readiness), after controlling for nurses' demographics (age, gender, race, education, and work status) using STATA version 13.0 (StataCorp, College Station, TX, USA). There was a small dependence of observations within hospital units for the SCC total score (Interclass Correlation Coefficient, ICC = .0114). However, a strong dependence of responses within hospital units was found for the PES total score (ICC = .1895) and five subscale scores (ICC ranged from .0719 to .3579). Thus, the clustering effect of hospital units was controlled for in the Multilevel Linear Modeling that used the PES total score (Rabe-Hesketh & Skrondal, 2012).

Ordinal Exploratory Factor Analysis (EFA) using oblique rotation (geomin) was conducted to identify the initial factor structure of the SCC scale in the acute care Magnet® hospital nurse sample using Mplus Version 7.1 (Muthén & Muthén, 2010). Oblique rotation allows the observed variables to be correlated and produces more realistic and statistically more appropriate factor structures than orthogonal methods (Costello & Osborne, 2005; Schmitt, 2011). The clustering effect of hospital units was not controlled for in the Ordinal EFA analysis as there was small dependence of observations for the SCC scale with an ICC of .0114 that did not exceed .05 (Rabe-Hesketh & Skrondal, 2012). All of the item data were treated as categorical data and Weighted Least Squares with Mean and Variance Adjustment (WLSMV) was used as default. There were .3-2.4% missing data in the 24 SCC items, which were assumed to have little impact on the estimates of parameters

and were treated as missing data. Factor extraction was based on three criteria: eigenvalues greater than or equal to 1, the scree plot, and factor interpretability based on the content of the items (Munn et al., 2007). An item with a standardized factor loading greater than .40 on a certain factor is considered adequately loaded on that factor (Salkind, 2010). Factor loadings less than .40 are considered weak and factor loadings greater than .60 are strong (Garson, 2010). Items with cross-loadings greater than .40 on more than one factor were retained in the model and assigned to one single factor based on factor loadings as well as the content of the items (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Model fit indices included the chi-square goodness-of-fit index, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and standard root mean square residual (SRMR). 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 and SRMR of .05 or less indicate reasonable errors of approximation (Byrne, 2012; Hu & Bentler, 1999). 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).

Results

Sample Characteristics

A total of 289 nurses from 27 acute care Magnet® hospitals were included in the analysis. The number of responses from nurses was on average 10.7 (SD = 7.23), with a range from three to 29 responses per hospital. One third of the hospitals were from the Midwest (n=9, 33.3%), another third from the Northeast (n=8, 29.6%), while the other hospitals 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 two (7.7%) hospitals had fewer than 201 beds.

The characteristics of nurse participants are shown in Table 1 and Table 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 SCC (Mean = 69.15, SD = 15.67), comfort in conducting smoking cessation counseling (Mean = 6.34, SD = 2.40), and comfort in referring patients to smoking cessation resources (Mean = 6.66, SD = 2.39) were moderate to high among the nurses. Participants also endorsed high levels of shared vision (Mean = 18.76, SD = 2.96) and practice environment (Mean = 94.68, SD = 11.75).

Reliability and Convergent Validity of the SCC Scale

The internal consistency was good for the 24 SCC items (Cronbach's alpha = .951, 95% CI= .941, .959), the SV scale (Cronbach's alpha = .902, 95% CI=.883, .919) and PES (Cronbach's alpha = .940, 95% CI=.930, .950). Based on the Multilevel Linear Model (not shown, results are available upon request), the total SCC score was significantly associated with the level of comfort in conducting smoking cessation counseling (coefficient = 3.58, 95% CI = 2.80, 4.37, $p < .001$) and the level of shared vision (coefficient =.72, 95% CI = .02, 1.42), after controlling for participants' demographics and the nesting effect of hospital units. As nurses' level of comfort in smoking cessation counseling skill increases by one point, their compliance with evidence-based smoking cessation counseling practice increases by 3.58 points. As nurses' level of shared vision increases by

one point, their compliance with SCC practice increases by .74 points. The total SCC score was not associated with level of comfort in referring patients to resources, or PES total or subscale scores.

Exploratory Factor Analysis

Three factors with eigenvalues greater than one (i.e., 13.737, 2.071 and 1.473) were extracted from the 24 SCC items, indicating a three-factor model based on Kaiser's criteria. The scree plot yielded different numbers of factors to be retained based on different criteria: a single-factor structure should be tested based on Cattell's (1966) criteria, and a four-factor structure was supported based on Stevens' (2009) recommendation. Therefore, fit indices for the one-, two-, three- and four-factor models with unrestricted between-covariance (Table 3) were examined. Both the one- and two-factor structures did not fit to the data. The three-factor structure had mixed model fit, while the four-factor structure demonstrated a desirable fit to the data.

Table 4 shows the standardized factor loadings for the four-factor structure. All of the items had significant loadings greater than .40 on one single factor, except for the item "I ask tobacco users if they are willing to quit", which had cross-loadings greater than .40 on two factors. Based on the content of the items and standardized factor loadings, four factors emerged and were labeled as "standard care" (item 1-2), "basic counseling" (item 3-16), "referral to services" (item 17-19), and "advanced counseling" (item 20-24). There were weak to moderate correlations between standard care and the other three factors (r = .405, .143, and .271, p<.001), and weak correlations between referral to service and the other two factors (r =.341 and .379, p<.001). There was strong correlation between basic counseling and advanced counseling (r =.754, p<.001). The correlation between these factors indicated that these four factors were positively correlated but were not measuring the same latent construct.

Reliability and Convergent Validity of the Four Factors

The internal consistency was good for all the four factors (ranges of Cronbach's alpha: .851 - .938). The "standard care" factor had weak correlation with comfort in conducting smoking cessation counseling ($r = .287$, $p < .001$) and comfort in referring patients to smoking cessation resources ($r = .184$, $p < .001$). The other three factors had moderate to strong correlation with comfort in conducting smoking cessation counseling ($r = .621, .351, .594$, $p < .001$), and weak to moderate correlation with comfort in referring patients to smoking cessation resources ($r = .466, .350, .379$, $p < .001$).

Distribution of SCC Item Responses

The distribution of the 24 SCC items was also described (Online Resource 1). Participants' responses were skewed toward performing "standard care" for assessing for and documenting tobacco use more than half time or all the time, less skewed in the frequency of use of "basic counseling" and "advanced counseling", and relatively evenly distributed in the use of "referral to services". The distribution of item responses indicated that standard care practice was most frequently endorsed among nurses, followed by basic counseling and advance counseling activities. Comparatively, referral to services was least frequently endorsed by nurses among the four factors of the SCC scale in the acute care Magnet® hospitals.

Discussion

The findings of the study provided evidence to support psychometric estimates for the reliability (internal consistency) and convergent validity of the SCC scale based on responses from a national sample of acute care Magnet® hospital staff nurses. This study resulted in a slightly different four-factor structure among acute care Magnet® hospital nurses compared to that among rural hospital staff nurses (Newhouse, Himmelfarb, & Liang, 2011).

The SCC scale demonstrated adequate internal consistency, indicating that the 24 items could be summed up to measure the latent construct of smoking cessation counseling practice among acute care Magnet® hospital staff nurses. Convergent validity was supported based on correlations with comfort in conducting smoking cessation counseling practice, which was consistent with prior report of rural hospital nurses (Newhouse et al., 2011; Newhouse, Himmelfarb, & Liang, 2011). Furthermore, higher nursing perceptions of shared vision with healthcare teams were associated with higher adoption of the DHHS evidence-based smoking cessation counseling practice as supported by the parent study's framework (Greenhalgh et al., 2004). Nurses who endorse higher perceptions that team members work together toward common patient-centered goals (e.g., helping patients to quit smoking) provide more smoking cessation counseling practice. It is critical to create and maintain a supportive practice environment with higher shared vision across healthcare disciplines to achieve a better nurse-reported quality of care in tobacco use screening and treatment.

The perception of practice environment was not associated with the adoption of evidence-based smoking cessation counseling practice among nurse participants in this study, which was consistent with prior report that the perception of practice environment was not associated with the documentation of evidence-based pain management by nurses (Samuels & Fetzer, 2009). This is surprising, since the relationship between better practice environments and nurse and patient outcomes are well established (Lake et al., 2010; McHugh et al., 2013; Rhew et al., 2007; Stimpfel et al., 2014). With the paucity of studies focusing on the relationship between the practice environment and use of evidence-based practices by nurses, additional research is needed. Similarly, the level of comfort in referring patients to resources was not associated with the adoption of evidence-based smoking cessation counseling practice in the study, probably due to the low levels of referral to services practice being endorsed among nurse participants. There were only three items

representing referral to services practice in the SCC scale, and these items had the lowest level of endorsement among the 24 items (online resource 1).

A four-factor model was supported with desirable model fit among the sample of nurses in acute care Magnet® hospitals. The four factors represented distinctly different dimensions of smoking cessation counseling practice: “standard care” (item 1-2), “basic counseling” (item 3-16), “referral to services” (item 17-19), and “advanced counseling” (item 20-24). All the four factors had acceptable estimates for reliability and convergent validity based on correlations with comfort in conducting smoking cessation counseling and comfort in referring to resources.

Compared to the four-factor model among rural hospital nurses (Newhouse, Himmelfarb, & Liang, 2011), this model that emerged from responses of Magnet® hospital nurses had one major difference. The items 7-16, which belonged to the “advance counseling” factor in the rural hospital nurse sample, moved together to the “basic counseling” factor in the Magnet® hospital nurse sample. All of the other items remained where they were in the four-factor structure. Some of the advanced counseling activities that require higher levels of nurse competency based on rural hospital context were categorized as basic counseling service based on responses of Magnet® hospital nurses. Such differences may be explained by the fact that Magnet® hospitals are recognized as having high levels of transformational leadership, structural empowerment, exemplary professional practice, new knowledge, innovations and improvements, and empirical outcomes (American Nurses Credentialing Center, 2016). These Magnet® attributes provide a high quality working environment to support nursing excellence, which further results in better compliance to evidence-based tobacco use screening and treatment practice.

The findings from rural hospitals and Magnet® hospitals, which provide generally different levels of hospital healthcare service, may provide insight to better understand the different

dimensions of tobacco use screening and treatment practice. Comparison of the two different four-factor models provided some evidence to support that: 1) the factors of standard care and referral to service were valid and consistent across rural and Magnet® nursing practice; and 2) the distinction of basic and advanced counseling possibly varied depending on nursing and organizational characteristics. It should be noted that the four-factor structures resulted from the two different nurse samples were estimated using different variable reduction techniques (i.e., PCA in the rural hospital sample and ordinal EFA in the Magnet® hospital sample). PCA is used to reduce the number of observed variables to a smaller number of principal components which account for most of the variance of the observed variables, while EFA is used to identify the number of latent constructs and the underlying factor structure of a set of measured variables without imposing any preconceived structure. Comparison of the factor structure findings should take into consideration the different approaches being used and be interpreted with caution. Future research is needed to further explore and confirm the factor structure among different nurse samples in other healthcare settings using exploratory and confirmatory factor analysis approaches.

The study findings demonstrated clinical implications for evidence-based smoking cessation counseling practice. The distribution of SCC items within each factor provides information on the level of difficulty that each factor represents along the latent construct of smoking cessation counseling. The findings indicate where improvements can be made to contribute to higher compliance to tobacco use screening and treatment practice. The differences in the distribution of SCC items within each factor could be associated with the level of knowledge and skills required, as well as the level of awareness of available resources among nurses to accomplish different aspects of smoking cessation counseling interventions. For example, the two items in standard care were endorsed most frequently by nurses - possibly because these actions are very straightforward,

already integrated into standard routine care for assessment and documentation, and apply to both smoker and non-smoker patients. Comparatively, the items in basic counseling were endorsed less frequently by nurses than standard care items, but more frequently than advanced counseling items. Basic counseling actions are mostly fundamental and educational counseling behaviors, while advanced counseling activities such as comprehensive assessment, decision making, complex individualized care planning, relapse planning and follow-ups require higher levels of knowledge and skill and take more time of direct patient care. In addition to reinforcing good compliance with standard care and basic counseling, efforts should be made to provide appropriate training to nurses, integrate advanced smoking cessation counseling behaviors into standard care processes, and engage nurses to provide comprehensive evidence-based tobacco use screening and treatment practice for all patients. The items in "referral to service" were least frequently endorsed by nurses, possibly indicating a lack of awareness of available resources or that referral to service was not part of the routine care. By knowing the possible reasons why referral to service was less frequently provided by nurses, efforts could be made to contribute to the overall improvement in the compliance with smoking cessation counseling practice among nurses.

This study supported the use of the SCC scale as an instrument with good reliability and convergent validity to measure the quality of smoking cessation counseling practice in Magnet® hospitals. One strength of the study is the use of a large national sample of staff nurses in acute care Magnet® hospitals. Previous studies included staff nurses from rural hospitals, so current findings broadened the generalizability of the SCC scale to another type of hospital setting. Another strength is that the use of the Ordinal EFA analysis to examine the four-factor model provided evidence of the psychometric performance of the SCC scale, though further confirmation of the four-factor

model using the Ordinal Confirmatory Factor Analysis approach is needed among Magnet® and non-Magnet® settings.

The study had some limitations. The study used a national sample of Magnet® hospital nurses working in general medical or medical-surgical units that provided HF patient care, so the findings may not be generalizable to other healthcare providers (i.e., physicians, Advanced Practice Registered Nurses) or other settings (e.g., emergency or outpatient units). Further psychometric testing of the SCC scale should be done among these healthcare providers and clinical settings to accumulate evidence. In addition, about 6% of US Hospitals are Magnet® accredited (American Nurses Credentialing Center, 2016). Future studies should collect data among nurses in non-Magnet® hospitals to compare estimates and model fit indices across different types of hospitals. The nurses in the current study sample were also fairly homogenous, and future psychometric testing of the SCC scale is needed among different races, ethnicities, and gender. Future research should collect additional healthcare provider characteristics including teaching status, smoking history and current smoking status, and examine the association with the compliance to evidence-based smoking cessation counseling practice. Future studies should also consider validating the SCC scale against objective measures including smoking cessation counseling documentation in medical records or the Tobacco Treatment (TOB) measure set where such data are available and accessible. Since all of the psychometric studies of the SCC scale have used cross-sectional data, future testing should examine the reliability of the measure over time.

This study provided preliminary support for the reliability and validity of the SCC scale in measuring the latent construct of compliance with evidence-based smoking cessation counseling practice in acute care Magnet® hospitals. This expands the application of the scale to evaluate tobacco use screening and treatment activities performed by nurses in clinical practice and to

evaluate interventions that aim to improve nurse adoption and assimilation of smoking cessation counseling practice in research. By using the SCC scale, nurse managers are able to access nurses' perceived frequency of use of smoking cessation counseling practice in providing HF care. The assessment results can be helpful to identify gaps between existing practice and desirable evidence-based practice so as to promote improvement in smoking cessation counseling practice. Because the psychometric property of a measure is population dependent, further testing of the SCC scale is needed among other healthcare providers and settings to accumulate more evidence.

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Table 1. Sample Characteristics for Categorical Measures (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		
White	228	78.9
Asian, American Indian or Alaska Native, Black or African American, or Native Hawaiian or Other Pacific Islander	56	19.4
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 or Doctorate	14	4.8
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 or Doctorate	20	6.9

Note. The numbers in the cells may not add up to total N due to missing.

Table 2. Sample Characteristics for Continuous Measures (N=289)

Characteristics	Mean	SD	Range
Time for direct care, %	84.35	26.01	0 - 100
Smoking cessation counseling (SCC, 24 items)	69.15	15.67	29 - 96
Comfort in conducting smoking cessation counseling	6.34	2.40	1 - 10
Comfort in referring patients to smoking cessation resources	6.66	2.39	1 - 10
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. Model Fit Indices for the Ordinal EFA Models (n=289)

Models	**χ^2 (*df*)**	**RMSEA (90% CI)**	**CFI**	**TLI**	**SRMR**
One-Factor	1751.99***(252)	**.144***(.137, .15)**	.901	.892	.116
Two-Factor	967.47***(229)	**.106***(.099, .113)**	**.951**	.941	.079
Three-Factor	658.69***(207)	**.087***(.080, .095)**	**.970**	**.960**	.053
Four-Factor	488.16***(186)	**.075***(.067, .083)**	**.980**	**.970**	**.038**

Note. χ^2 = Chi-squared; ***p <.001; EFA = exploratory factor analysis; *df* = degrees of freedom; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standard root mean square residual. Bolded characteristics indicated that model fit indices were within the range of the model fit criteria used in the study.

Table 4. Standardized Loadings of SCC Items for the Four-factor Model

SCC items	Factor loadings			
	1	**2**	**3**	**4**
Standard care (item 1-2) (2 items)				
1. I assess my patient tobacco use	**0.851***	0.048	0.092	0.036
2. I document my patient tobacco use	**0.883***	-0.021	0.114	0.084
Basic counseling(item 3-16) (14 items)				
3. I advise tobacco users to quit	0.337*	**0.657***	0.023	-0.167
4. I ask tobacco users if they are willing to quit	0.456*	**0.570***	-0.039	-0.086
5. If tobacco users are willing to quit, I provide resources and assistance	0.346*	**0.558***	0.012	0.022
6. If tobacco users are not willing to quit, I provide resources and help patient identify barriers to quitting	0.336*	**0.560***	-0.079	0.255*
7. I advise smokers to set a quit date	0.047	**0.733***	-0.191	0.360*
8. I advise smokers to get support from family, friends, and coworkers	0.188*	**0.598***	0.091	0.120
9. I review past quit attempts– what helped, what led to relapse	-0.020	**0.814***	-0.030	0.200*
10. I help the patient anticipate challenges, particularly during the critical first few weeks	-0.070	**0.834***	0.089	0.111*
11. I help patients anticipate nicotine withdraw	-0.003	**0.693***	0.244*	-0.016
12. I identify reasons for quitting and benefits of quitting	0.096	**0.672***	0.248	-0.236*

13. I advise patients that total abstinence is essential– not even a single puff	-0.125*	**0.720***	0.196	0.037
14. I advise patients that drinking alcohol is strongly associated with relapse	-0.182*	**0.663***	0.191	0.215*
15. I advise patients that having other smokers in household hinders successful quitting	-0.084	**0.692***	0.297*	-0.043
16. I recommend use of over-the-counter nicotine patch, gum, or lozenge; or get a prescription for nasal spray, inhaler, or buproprion SR unless contraindicated	0.098	**0.462***	0.387*	-0.139*
Referral to services(item 17-19) (3 items)				
17. I provide the number for the toll-free National Quitline	0.113	0.008	0.187	**0.761***
18. I refer the patient to web resources for Agency for Healthcare Research and Quality	0.066	0.159*	0.107	**0.782***
19. I refer the patient to web resources for Tobacco Free Nurses Initiative	-0.062	-0.015	0.356	**0.703***
Advanced counseling (item 20-24) (5 items)				
20. I use cessation materials that are appropriate by age, culture, language, education, and pregnancy status	0.178*	0.050	**0.634***	-0.013
21. I provide information for follow-up visits with the patient's doctor	0.120	0.063	**0.530***	0.023
22. I advise patients if relapse occurs, they should repeat the quit attempt– it is part of the quitting process	0.023	0.063	**0.854***	0.046
23. I advise patients if relapse occurs, they should review the circumstances and learn from the experience	0.011	0.000	**0.889***	0.119
24. I advise patients that if relapse occurs, they should reassess the pharmacotherapy use and problems	-0.002	0.075	**0.782***	0.194

*P < .05. The highest standardized factor loading for each item was bolded indicating on which factor each item loaded based on the criteria of standardized factor loadings.