DEVELOPMENT OF THE QUALITY OF NURSING CARE SCALE FOR HOSPITALIZED ACUTE RESPIRATORY INFECTION AMONG CHILDREN IN INDONESIA

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ABSTRACT

This study developed a scale to measure the quality of nursing care for hospitalized acute respiratory infection among children in Indonesia and to evaluate its reliability and validity. Following the derivation of scale items and pilot testing, the final version of the scale was administered to 807 pediatric nurses to establish its internal consistency and construct validity. The Cronbach's alpha coefficients of the overall scale and its four factors were 0.93, 0.87, 0.80, 0.77 and 0.76 respectively. Using an exploratory factor analysis, 37 items with a four-factor structure were retained to form the Quality of Nursing Care Scale. These factors illustrate physical (14 items), psychological (15 items), socio-cultural (3 items) and spiritual dimensions (5 items). The contrasted group result revealed that the mean scores of the scale were significantly different between two nurse groups having work experience of six years or more or less than six years. Though, it demonstrated to be of acceptable reliability and might claim some evidences for construct validity, items of the socio-cultural dimension was less prominent. Further study is needed to revise the items of the scale.

Keywords: Quality of Nursing Care Scale, Acute Respiratory Infection, Children of Indonesia

INTRODUCTION

Acute respiratory infection (ARI) is the leading cause of the global burden of diseases (Nair *et al.*, 2013) causing major morbidity and mortality among infants and children under-five (Goel *et al.*, 2012). One-four million deaths occur each year among children with ARI worldwide (Liu *et al.*, 2012). In Indonesia, ARI is a serious problem because it kills more and more children under-five years of age than any other illness (Yuliarti *et al.*, 2012). It was ranked second in infant and under-five years of age just after diarrhea (Faizal, 2012). Hernani *et al.*, (2009) reported that the trend of incidence rates of ARI in children under-five from 2004-2008 have decreased but it still considerably high. This is probably due to:

1) Shortage of nurses at health-care facilities,

2) Mismanagement while hiring and placement of nurses due to lack of resources (Hamid, 2010), and

3) A low quality of nurse performance (Barber *et al.*, 2007).

Indonesia's Health Minister (2010) reported that in general, quality of care is often lacking. Moreover there is no quality control and the treatment options are limited. Similar to the study of Lesa and Dixon (2007) in Nigeria, they found fault with the clinical training given to nurses in the training institutions largely because of lack of equipment, lack of continuous training and re-orientation on the job by some employers, lack of commitment on the part of the nurse professionals. Furthermore the nurses view their professional training as just a necessity for registration and licensure. Thus, this necessitates the development

of a scale to measure quality of nursing care for hospitalized ARI children.

LITERATURE REVIEW

Based on a literature review from 1990 to 2010, no known quality of nursing care scale for hospitalized ARI children was found. Other related studies were found in various populations. One study used the concept of holistic care and nursing process to evaluate the quality of nursing care in adult orthopedic units (Lee *et al*., 2007). Lynn *et al*. (2007) developed an instrument to measure nurses' evaluation quality of patient care delivery in acute care setting in the United States and found that components of quality of nursing care consisted of interaction, vigilance, individualization, advocation, work environment, unit collaboration, personal characteristics and mood.

From these previous studies, quality of nursing care was not studied in ARI children. The definition of quality of nursing care for nurses who work with ARI children has not been identified in the nursing literature. Most of the studies were conducted with the different settings and diseases, and also offered the meaning/definition of quality of nursing care based on nurses in Western countries. The complexity, subjectivity and multi-dimensional concept of quality of nursing care is difficult to be defined and measured (Hogston, 1995, Kunaviktikul *et al*., 2001). In addition, the issue related to the measurement of quality care related to pediatric nursing is usually associated with the lack of definition and evaluation of the concept of quality of care (Pelander, 2008).

Furthermore, in Indonesian context, quality of nursing care in children is the main issue in a health care setting for nursing department in Indonesian hospitals. The fifth target goal of the national development plan of Indonesia is to reduce the under-five child mortality rate by two thirds from 1990 to 2015 (MDGs-Indonesia, 2008). The Indonesia under-five child mortality rate in 1990 was 57/1000 live births and by 2015, this number should be reduced to 38/1000 live births to achieve the target (Hernani *et al*., 2009). Although the under-five child mortality rate in 2005 was 38/1000 live births (Government of Indonesia, 2005), the major contributor was ARI (MDGs-Indonesia, 2008).

The quality of nursing care is the main concern in a health care setting because of its impact on safety, incidence of pneumonia, length of stay and mortality rate. Also, the two main concerns are high morbidity and mortality incidence rates of children and low nurse performance (Hennessy *et al*., 2006). Related to this matter, development and evaluation of the quality of nursing care scale is a vital key to improve quality of nursing care for hospitalized ARI children. This is necessary to decrease morbidity and mortality of ARI children, especially in Indonesia. This scale can be used as a guideline for pediatric nurses to assess the quality of nursing care for ARI children, to provide the high quality standard of ARI nursing care, and also to identify the strength and weakness in the delivery of nursing care.

AIMS

The aims of this study were to develop the Quality of Nursing Care Scale for hospitalized acute respiratory infection children in Indonesia and to evaluate its reliability and validity.

METHODS

Based on DeVellis (1991), scale development procedures the following eight steps are involved:

Step 1: Determine the Object to be Measured

Based on the literature review regarding quality of care, quality of nursing care, nursing process and holistic nursing care for ARI children and the 12 expert panel meeting; four dimensions and 79 items of the Quality of Nursing Care Scale for Hospitalized Acute Respiratory Infection Children (QNCS-HARIC) were identified. It consisted of physical, psychological, socio-cultural and spiritual dimensions.

Step 2: Generate an item pool

Identifying operational definitions of the four dimensions of the QNCS-HARIC was performed based on the literature review and expert panel suggestions. Then an item pool within the content of four QNCS-HARIC dimensions was generated.

Step 3: Determine the format for measurement

A five-point Likert scale was chosen because it produces slightly higher mean scores relative to the highest possible attainable score and offers a midpoint on a bipolar scale, indicating a neutral position which increases reliability (Krosnick and Fabrigar, 1997).

Step 4: Have the initial item pool reviewed by experts

The content validity of the QNCS-HARIC was performed by five experts. The Content Validity Index

was 0.96. Two items were deleted because they were non-relevant. One item was added. Nine items were modified because of lack of clarity. Thus, the QNCS-HARIC consisted of four dimensions and 78 items.

Step 5: Consider inclusions of validation items (pilot-testing)

After the original English version was translated into Indonesian language using the back translation technique (Brislin, 1986), the pilot study was conducted with 30 pediatric nurses who had similar qualifications as the study sample from a general hospital in western Indonesia. The Cronbach's alpha coefficients for overall scale and its four dimensions were 0.94, 0.87, 0.79 and 0.66 respectively. After deleting one item that had low item-to-total correlation, Cronbach's alpha coefficient of the last dimension was increased to 0.73.

Step 6: Administer items to the development sample
Participants

At this step, the researcher administered the Demographic Data Questionnaire, the QNCS-HARIC, and the Marlowe-Crowne Social Desirability Scale-Form (MCSDS-C) to 807 pediatric nurses at 39 pediatric wards from four regions in Indonesia. The sample size estimation for an exploratory factor analysis was based on 10 subjects per item (Munro, 2005). In this study, 77 items of the scale were established and the sample size was 770 nurses.

Data collection

After approval from the Ethics Committee at Faculty of Nursing, Prince of Songkla University, Thailand and the directors of nursing of 39 study hospitals in Indonesia, the survey packages were distributed to potential participants through the head nurse of the pediatric ward in each hospital during June and November, 2012.

Ethical considerations

Prior to the data collection, approval to conduct the study was obtained from the Ethical Committee at Faculty of Nursing, Prince of Songkla University, Thailand and the directors of nursing of 39 study hospitals in Indonesia. All participants were informed regarding the purpose and procedures of the study, the voluntary nature of participation in the study and the benefits of the findings in the nursing profession.

Step 7: Evaluate the items

At this step, the data from the development sample was analyzed for reliability and construct validity.

Determination of the reliability of the scale

The internal consistency of the QNCS-HARIC was performed using Cronbach's alpha coefficient as minimal acceptable at least 0.70 (Nunnally & Bernstein, 1994) or higher considered necessary for a claim that a test has internal consistency and is thus reliable (Hair *et al.*, 1998). The stability was performed using the test-retest reliability measured at a gap of two weeks. The acceptable correlation coefficients in this study is at least 0.70 or above (Nunnally & Bernstein, 1994).

Determination of the construct validity of the scale

Determination of the construct validity of the scale was performed using an exploratory factor analysis (EFA), a contrasted group approach and a social desirability testing. Principal axis factoring (PAF) with varimax rotation was performed with the 77 item QNCS-HARIC (Hair *et al.*, 1998). Interpretation of the factors included :

1) Factor loading of each item greater than 0.30 (Hair *et al.*, 1998),
2) Eigen values should be ⩾1 (Hair *et al.*, 1998),
3) Data points of the scree plot should be above the break (Tabachnick & Fidell, 2007),
4) Total variance explained at least 40% or more (Scherer *et al.*, 1988),
5) Variance explained of each factor should be ⩾5% (Hair *et al.*, 1998),
6) Factor loading at least 0.30 (Hair *et al.*, 1998),
7) Reliability coefficient of each factor at least 0.70 (DeVellis, 1991),
8) Item-total correlation at least 0.30 (Nunnally & Bernstein, 1994), and
9) Having theoretical interpretability (Hair *et al.*, 1998).

The contrasted-group approach was performed with 271 pediatric nurses having work experience with ARI children less than six years and 508 pediatric nurses having work experience six years or more in 39 hospitals. In this study, the reseacher used the same data as for doing EFA. Independent *t*-test was used to determine whether there would be significant differences in quality of nursing care for ARI children between these two nurse groups.

The social desirability test was performed using the MCSDS-C to determine the degree of social desirability to the participants answer (true or false) to a set of socially desirable but improbable statements (Huang *et al*., 1998). If the Pearson Product Moment Correlation coefficient is not statistically significant, it means that social desirability is not a factor affecting the participants' response to the QNCS-HARIC (Crowne and Marlowe, 1960).

Step 8: Optimize Scale Length

Based on step 7, the optimal length of the QNCS-HARIC final version was established.

RESULTS

After testing the assumptions for EFA, 779 participants were retained for further analysis. The characteristics of the participants are presented in Table 1.

Table 1. Demographic variables of the participants (N=779)

Variables	Frequency	%
Gender		
Male	71	9.1
Female	708	90.9
Age (years)		
< 30	100	12.8
30 -40	345	44.3
> 40	334	42.9
M 36.67 *SD* 6.96 *Md* 35.00 *QD* 6.00 Min -Max 25 -48		
Skewness value 1.17 Kurtosis value 7.31		
Religion		
Muslim	575	73.8
Christian	198	25.4
Catholic	6	0.8
Marital Status		
Single	166	21.3
Married	613	78.7
Nursing Education		
Bachelor degree	779	100
Nursing Experience (years)		
< 6	104	13.4
Equal 6	203	26.0
> 6	472	60.6
M 11.67 *SD* 6.81 *Md* 10.00 *QD* 6.00 Min -Max 1 -23		
Skewness value 1.98 Kurtosis value 7.48		
Working experience with acute respiratory infection in children (years)		
< 6	271	34.8
Equal 6	182	23.4
> 6	326	41.8
M 8.04 *SD* 5.22 *Md* 6 .00 *QD* 3.50 Min -Max 1 -23		
Skewness value 10.78 Kurtosis value 0.97		
Number of acute respiratory infection children under your care (cases/month)		
< 10	173	22.2
Equal 10	286	36.7
> 10	320	41.1
M 12.08 *SD* 4.94 *Md* 10.00 *QD* 3.00 Min -Max 3 -25		
Skewness value 5.91 Kurtosis value 2.42		

CONSTRUCT VALIDITY

Results from exploratory factor analysis

To test for the construct validity of the QNCS-HARIC, the distributions and Pearson correlation coefficients between the variables were first examined. The descriptive statistics indicated the absence of highly skewed distribution and kurtosis. The results of the correlational analysis showed that no pairs of variables were highly correlated based on Munro's criteria (Munro, 2005). The scatter plots showed a positive linear relationship with all linear correlation. Outliers were assessed using boxplots and Mahalanobis distance. Using a criterion of p-values equals to 0.001 with *df* 77, critical X^2 equaled 121.11, 25 outliers were deleted. Therefore, 779 participants were retained.

At first, an EFA was performed with the 77 item QNCS-HAIRC. Unfortunately, the model was unfit. Thus, an item analysis was conducted. The results showed that 28 items had low item-total correlations, ranging from 0.02 to 0.29 indicating that the items might be less consistent and less reliable to reflect the construct when compared with other items in the 77 item QNCS-HARIC. Therefore, nine items were eliminated from 77 item QNCS-HARIC. However, based on theoretically interpretation, 19 of 28 items were retained. Thus, 68 items were used to further perform the EFA and finally resulting in the 37 items.

The model fit interpretation

In this study, EFA was performed several times with the QNCS-HARIC. The final model consisted of 37 items. Before interpretation of the results, the model fit of the 77 and 37 items QNCS-HARIC were identified (Hair *et al.*, 1998). Kaiser-Meyer-Olkin indices of both models were satisfactory (0.85-0.86). Bartlett's tests of sphericity were significant. The Eigen values showed in 4 to 22 factors and scree test showed 3-4 factors. The percentages of total variance explained and variance explained for each factor were acceptable only for the model of 37 item QNCS-HARIC (total 40.92%, each factor varied from 22.31-5.55%). The Eigen values of the 37 item QNCS-HARIC ranged from 8.25 to 2.05 and it communalities ranged from 0.25 to 0.74.

Table 2. Items, Factor Loadings, and Cronbach's Alpha of the 37 Items QNCS-HARIC (N=779)

Factors/Items (Cronbach'sAlpha)	Factor loadings
Factor 1:The physical dimension of ARI children (α = .87)	
Assess for signs of inadequate oxygen	0.35
Assess vital signs	0.79
Assess for signs of dehydration when the child had severe ARI	0.45
Assess type/amounts/frequency food intake	0.76
Assess the child's response to activity intolerance	0.78
Assess signs of ARI	0.76
Do pre conference regarding plan for performing nursing care to meet the physical needs of ARI children	0.40
Administer oxygen correctly as prescribed	0.42
Perform chest physiotherapy	0.52
Teach parents how to maintain their child's hydration	0.50
Cluster activities or minimize stimulation to provide rest periods	0.37
Teach parents to wash hands before and after contact with the child	0.46
Administer medicines as prescribed	0.43
Teach parents to observe danger signs of ARI that need to take the child to the hospital urgently	0.33

Table 2 (Continued)

Factors/Items (Cronbach's Alpha)	Factor loadings
Factor 2: The psychological dimension of ARI children and family (α = 0.80)	
Establish trusting relationship with the child or parents	0.31
Assess for contributing factors of anxiety, fear or pain only for the child aged between 3-5 years old	0.41
Assess the child's pain	0.38
Evaluate the child's response to anxiety, fear or pain	0.43
Plan for performing nursing care to meet the psychological needs of ARI children and family	0.55
Inform parents	0.49
Encourage parents to participate in the child care	0.39
Maintain a calm manner while interacting with the child or parents	0.42
Assist the parents in developing anxiety-reducing skills	0.54
Provide psychological support to the child and parents to decrease anxiety or fear	0.33
Avoid painful procedures	0.46
Eliminate additional stressors or sources of discomfort whenever possible	0.41
Explain causes of pain or discomfort to the parents	0.54
Encourage parents to touch/cuddle/comfort/or be with the child during procedures	0.48
Evaluate nursing care to meet the psychological needs of ARI and family	0.37

Factors/Items	Factor loadings
Factor 3: The socio-cultural dimension of ARI children and family (α = 0.77)	
Assess inadequate economic resources	0.33
Assess cultural beliefs or practices of the child or parents that affect the child's illness or treatment	0.56
Prioritize nursing diagnoses regarding the socio-cultural needs of ARI and family	0.50

Table 2 (Continued)

Factors/Items (Cronbach's Alpha)	Factor loadings
Factor 4: The spiritual dimension of ARI children and family (α = 0.76)	
Explore whether parents desire to engage in an allowable religious or spiritual practice or ritual	0.56
Plan for performing nursing care to meet the spiritual needs of ARI children and family	0.54
Inform the place for spiritual or religious practices nearby	0.54
Encourage parents to pray or read holy books such as Al-Qur'an, Bible	0.59
Evaluate nursing care to meet the spiritual needs of ARI children and family	0.75

Factors, items and factor loadings

Factors, items and factor loadings interpreted only 37 items QNCS-HARIC because it had a model fit. Based on Table 2, the 37 items of QNCS-HARIC consisted of four factors. The factor loadings of :-

Factor 1 (the physical dimension of ARI children, 14 items, varied from 0.33 to 0.79, $p = 0.000$),

Factor 2 (the psychological dimension of ARI children and family, 15 items, varied from 0.33 to 0.79, $p = 0.000$),

Factor 3 (the socio-cultural dimension of ARI children and family, 3 items, varied from 0.33 to 0.55, $p = .000$) and

Factor 4 (the spiritual dimension of ARI children and family, 5 items, varied from 0.54 to 0.75, $p = 0.000$) were acceptable and significant.

Contrasted group approach result

The results revealed that the mean scores of 77 and 37 items QNCS-HARIC of nurses (n = 508) having work experience of six years or more were significantly higher than those of inexperienced nurses (n = 271) having work experience with ARI children less than six years ($M = 4.25$, $SD = 0.17$ vs. $M = 3.94$, $SD = 0.18$; $t = 23.75$, $p = 0.000$; $M = 4.29$, $SD = 0.20$ vs. $M = 3.94$, $SD = 0.22$; $t = 22.91$, $p = 0.000$, respectively).

Reliability

The instrument had sufficient internal consistency and stability. The Cronbach's alpha coefficients of total 77 and 37 items QNCS-HARIC were excellent (0.92, 0.93, respectively). Cronbach's alpha coefficients of each dimension of the 77 items QNCS-HARIC were 0.85, 0.79, 0.77, 0.76 respectively. Whereas those of each dimension of the 37 items QNCS-HARIC were 0.86, 0.81, 0.77 and 0.76, respectively. The test-retest results revealed that the mean score of the overall 77 items QNCS-HARIC and its dimensions measured at Time 1 were positively significant and highly correlated with those of measured at Time 2 ($r = 0.75$, 0.78, 0.77, 0.73, 0.81 respectively).

Social Desirability

The overall mean scores of the 77 items of the QNCS-HARIC was not significant and positively correlated with that of the social desirability ($r = 0.07$, $p = 0.06$), whereas the overall mean scores of the 37 items of the QNCS-HARIC significantly and positively correlated with that of the social desirability ($r = .08$, $p = .02$). For each dimension of the 77 items QNCS-HARIC, the mean scores of the physical, psychological and spiritual dimensions did not significantly correlate with that of the social desirability ($r = 0.06$, $p = 0.12$; $r = 0.07$, $p = 0.07$; $r = 0.04$, $p = 0.33$, respectively) whereas the mean score of the socio-cultural dimension significantly correlated with that of the social desirability ($r = 0.07$, $p = 0.05$). For each dimension of the 37 items of the QNCS-HARIC, the mean scores of the physical and spiritual dimensions did not significantly correlate with that of the social desirability ($r = 0.01$, $p = 0.75$; $r = 0.02$, $p = 0.61$ respectively), whereas the mean scores of the

psychological and socio-cultural dimensions significantly correlated with that of the social desirability ($r = 0.10, p = 0.01, r = 0.17, p = 0.00$ respectively).

Discussion

The Development and Components of the QNCS-HARIC

Many of the criteria considered in developing of the QNCS-HARIC were based on three suppositions:

1) The complex, subjective and multi-dimensional concept of quality of nursing care make it difficult to be defined and measured (Kunaviktikul *et al.*, 2001),

2) There is a the lack of definition and evaluation of the concept of quality of nursing care among children (Pelander, 2008), and

3) ARI is the major cause of childhood mortality (MDGs-Indonesia, 2008).

The components of quality of nursing care for nurses who work with ARI children, have not been identified in the nursing literature. Thus, development of components of quality of nursing care for ARI children was based on an extensive review of the literature regarding quality of nursing care as previously mentioned. This study used DeVellis's Theory of Scale Development (DeVellis, 1991) as the guideline to develop the QNCS-HARIC. It helps the researcher to describe basic measurement concepts and contains sufficient practical guidance to support construction of a working scale development.

The QNCS-HARIC was developed based on the quality of nursing care, holistic care, nursing process and holistic nursing care for ARI children. The philosophy of holism emphasizes a sensitive balance between art and science, analytic and intuitive skills, self-care and ability to care for patients using the interconnectedness of body, mind and spirit. Use of the holistic nursing care is believed to help pediatric nurses provide nursing care as a whole, designed to meet the needs of the person. Whole care consists of four dimensions: physical, psychological, socio-cultural and spiritual (Dossey, 1997).

Construct Validity

Although the 37 items in QNCS-HARIC model were acceptable, it was less representative especially in the socio-cultural perspective because it consisted of only 3 from 10 items and these three items were represented in the assessment process of nursing which could not measure the complete dimension of the socio-cultural aspect and nursing process. Based on the conceptual framework, the researcher expected that the quality of nursing care for ARI children consisted of four dimensions. However, few items of the socio-cultural dimension, were loaded on Factor 3, probably due to an unequal number of initial items between Factor 3 and the others remaining factors. According to Mroch and Bolt (2003), the number of items per dimension is manipulated such that a test contains either the same number of items per dimension, or varying numbers of items per dimension. If there are an equal number of items per dimension, each dimension will have an equal proportion. Thus, further study is needed to revise and balance the items in each dimension of the QNCS-HARIC.

When performing the contrasted group analysis, it was found that the mean scores of the two versions of the QNCS-HARIC were significantly different between two nurse groups. This indicated that the construct measured by the QNCS-HARIC could be distinguished between groups with extremely different characteristics. Therefore, the researcher may claim some evidence for construct validity i.e the instrument measures the attribute of interest (Waltz *et al.*, 2005).

Reliability

The internal consistency of total 77 and 37 items in QNCS-HARIC and its four dimensions were acceptable. A strong Cronbach's alpha coefficient scale provides useful information about the internal structure of the scale. The study indicated that the items in the scale are quite correlated with each other (Worthington and Whittaker, 2006). For the test-retest of the 77 items of the QNCS-HARIC, total mean scores from administering the QNCS-HARIC on two separate occasions gave a correlation coefficient equaled to 0.75 indicating that the instrument is stable over the time (DeVon *et al.*, 2007).

Social Desirability

Unfortunately, the overall mean score and some dimensions of the QNCS-HARIC significantly correlated with those of the social desirability. A significant correlation indicates that social desirability which is a factor that affects the participants' response to the instrument (Kassam *et al.*, 2012). These findings were similar to the study of Sriratanaprapat *et al.,* (2012) which was developed for the determination of the psychometric properties of the Job Satisfaction Scale for Thai Nurses. Although it was significant results but it had low correlation. This is probably due to large number of subjects (N= 779).

CONCLUSIONS

The study may claim some evidences for construct validity of the 37 items in QNCS-HARIC with four factors. However, the socio-cultural dimension is not representative and did not capture the whole concept of the socio-cultural aspect. Further study is needed to revise the items of the scale. Pediatric nurses can use the other three dimensions of the 37 items of QNCS-HARIC to evaluate the quality of nursing care that they provide to ARI children and family. Based on the quality of nursing care results, pediatric nurses may find a unified understanding of quality of nursing care, especially in Indonesian context.

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