FACTORS INFLUENCING NURSE-ASSESSED QUALITY OF NURSING CARE IN CHINESE HOSPITALS

Mrs. Ying Liu

A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy Program in Nursing Science
Faculty of Nursing
Chulalongkorn University
Academic Year 2014

ปัจจัยที่มีอิทธิพลต่อคุณภาพการพยาบาลตามการประเมินของพยาบาลในโรงพยาบาลประเทศจีน

นางหยิง ลุย

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต
สาขาวิชาพยาบาลศาสตร์
คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2557

Thesis Title	FACTORS INFLUENCING NURSE-ASSESSED QUALITY OF NURSING CARE IN CHINESE HOSPITALS
By	Mrs. Ying Liu
Field of Study	Nursing Science
Thesis Advisor	Associate Professor Police Captain Yupin Aungsuroch, Ph.D.
Thesis Co-Advisor	Associate Professor Jintana Yunibhand, Ph.D.

Accepted by the Faculty of Nursing, Chulalongkorn University in Partial Fulfillment of the Requirements for the Doctoral Degree

.....Dean of the Faculty of Nursing
(Associate Professor Sureeporn Thanasilp, D.N.S.)

THESIS COMMITTEE

.....Chairman
(Associate Professor Waraporn Chaiyawat, D.N.S.)
.....Thesis Advisor
(Associate Professor Police Captain Yupin Aungsuroch, Ph.D.)
.....Thesis Co-Advisor
(Associate Professor Jintana Yunibhand, Ph.D.)
.....Examiner
(Assistant Professor Pisamai Orathai, Ph.D.)
.....Examiner
(Associate Professor Sureeporn Thanasilp, D.N.S.)
.....External Examiner
(Associate Professor Rachanee Sujijantararat, D.N.S.)

หยิง ลุย : ปัจจัยที่มีอิทธิพลต่อคุณภาพการพยาบาลตามการประเมินของพยาบาลในโรงพยาบาลประเทศจีน (FACTORS INFLUENCING NURSE-ASSESSED QUALITY OF NURSING CARE IN CHINESE HOSPITALS) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ร.ต.อ.หญิง ดร.ยุพิน อังสุโรจน์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: จินตนา ยูนิพันธุ์, 243 หน้า.

งานวิจัยเชิงสำรวจเพื่อศึกษาแบบจำลองเชิงสาเหตุนี้ มีวัตถุประสงค์เพื่อศึกษาปัจจัยของอัตรากำลังทางการพยาบาล สภาพแวดล้อมในการทำงานพยาบาล ความพึงพอใจในการปฏิบัติงาน ความเหนื่อยหน่ายในการทำงาน และความตั้งใจในการลาออกจากงาน ที่มีอิทธิพลต่อคุณภาพการพยาบาลตามการประเมินของพยาบาลในโรงพยาบาลประเทศจีน โดยใช้โมเดลเชิงสภาพแวดล้อมการทำงานพยาบาล อัตรากำลังทางการพยาบาล และผลลัพธ์ ของ Aiken (2002) และข้อมูลเชิงประจักษ์เป็นกรอบแนวคิดในการศึกษา การวิจัยครั้งนี้ใช้การสุ่มแบบหลายขั้นตอน เก็บข้อมูลระหว่างเดือนสิงหาคม 2555 ถึง มกราคม 2556 ผู้ตอบแบบสอบถามจำนวน 510 คน เป็นพยาบาลที่ทำงานในหอผู้ป่วยใน โรงพยาบาลระดับตติยภูมิจาก 4 ภาคใน 6 ภาค ของประเทศจีน ข้อคำถามมี 6 ส่วน ประกอบด้วย แบบสอบถามข้อมูลส่วนบุคคล แบบประเมินอัตรากำลังทางการพยาบาล, แบบประเมินสภาพแวดล้อมในการทำงาน, แบบประเมินความเหนื่อยหน่ายในการทำงาน, แบบวัดความตั้งใจคงอยู่ในงานของพยาบาล, แบบวัดความพึงพอใจในการปฏิบัติงานของพยาบาล และแบบประเมินคุณภาพการพยาบาลตามการประเมินของพยาบาล แบบสอบถามได้ผ่านการตรวจความตรงตามเนื้อหา ความตรงเชิงโครงสร้างและความเที่ยง ได้ค่าที่อยู่ในเกณฑ์ยอมรับได้ ความสัมพันธ์เชิงสาเหตุ โมเดลสมการโครงสร้าง (ลิสเรล 8.72) ใช้ทดสอบเส้นทางสมมติฐานของคุณภาพการพยาบาลตามการประเมินของพยาบาล

ผลการศึกษาพบว่า โมเดลสมมติฐานที่สร้างขึ้นมีความสอดคล้องกับข้อมูลเชิงประจักษ์ สามารถอธิบายความผันแปรของคุณภาพการพยาบาลตามการประเมินของพยาบาลได้ 74 เปอร์เซ็นต์ (χ^2= 175.73, df = 149, p-value = .052, GFI = .97, AGFI = .95, RMSEA = .02, SRMR = .04, CFI = 1.00) โดยพบว่า สภาพแวดล้อมในการทำงานพยาบาลมีอิทธิพลทางตรงต่อคุณภาพการพยาบาล ความพึงพอใจในการปฏิบัติงาน และความตั้งใจในการลาออกจากงาน (.50, .84, -.30, $p < .05$ ตามลำดับ) และมีอิทธิพลทางอ้อมต่อความเหนื่อยหน่ายในการทำงาน (-.56, $p < .05$) โดยผ่านความพึงพอใจในการปฏิบัติงาน และมีอิทธิพลทางอ้อมความตั้งใจในการลาออกจากงาน (-.20, $p < .05$) โดยผ่านความพึงพอใจในการปฏิบัติงานและความเหนื่อยหน่ายในการปฏิบัติงาน ส่วนการจัดอัตรากำลังทางการพยาบาลมีอิทธิพลทางตรงต่อคุณภาพการพยาบาลตามการประเมินของพยาบาลและความตั้งใจในการลาออกจากงาน (-.16, .10, $p < .05$, ตามลำดับ) ส่วนความพึงพอใจในการปฏิบัติงานมีอิทธิพลทางตรงต่อความเหนื่อยหน่ายในการทำงาน (-.67, $p < .05$) และมีอิทธิพลทางอ้อมต่อคุณภาพการพยาบาลตามการประเมินของพยาบาลโดยผ่านความเหนื่อยหน่ายในการทำงานและความตั้งใจในการลาออกจากงาน (-.42, $p < .05$) และมีอิทธิพลทางอ้อมต่อความตั้งใจในการลาออกจากงาน (-.38, $p < .05$) โดยผ่านความเหนื่อยหน่ายในการทำงาน ส่วนความเหนื่อยหน่ายในการทำงานมีอิทธิพลทางตรงต่อคุณภาพการพยาบาลตามการประเมินของพยาบาลและความตั้งใจในการลาออกจากงาน (-.67, .57, $p < .05$, ตามลำดับ)

ผลการศึกษานี้แสดงให้เห็นว่าปัจจัยที่มีอิทธิพลมากที่สุดต่อคุณภาพการพยาบาลตามการประเมินของพยาบาล คือ อิทธิพลทางตรงของความเหนื่อยหน่ายในการทำงาน อิทธิพลทางอ้อมของความพึงพอใจใจการปฏิบัติงานโดยผ่านความเหนื่อยหน่ายในการทำงานและความตั้งใจในการลาออกจากงาน และอิทธิพลทางตรงของสภาพแวดล้อมการในทำงานพยาบาลและอัตรากำลังทางการพยาบาล ดังนั้น ผู้บริหารการพยาบาลควรพิจารณาถึงการพัฒนาตัวแปรที่ทำศึกษาทั้งหมด เพื่อเพิ่มคุณภาพของการพยาบาล

สาขาวิชา พยาบาลศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2557 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

ลายมือชื่อ อ.ที่ปรึกษาร่วม .....

5577406836 : MAJOR NURSING SCIENCE
KEYWORDS: NURSE WORK ENVIRONMENT / NURSE STAFFING / NURSE JOB SATISFACTION / NURSE BURNOUT / NURSE INTENTION TO LEAVE / NURSE-ASSESSED QUALITY OF NURSING CARE

YING LIU: FACTORS INFLUENCING NURSE-ASSESSED QUALITY OF NURSING CARE IN CHINESE HOSPITALS. ADVISOR: ASSOC. PROF. POL. CAPT. YUPIN AUNGSUROCH, Ph.D., CO-ADVISOR: ASSOC. PROF. JINTANA YUNIBHAND, Ph.D., 243 pp.

This survey research design for causal modeling aimed to examine the factors of nurse staffing, nurse work environment, job satisfaction, burnout, and intention to leave influencing quality nursing care in Chinese hospitals. The conceptual framework was modified from the Aiken's Nurse Work Environment, Nurse Staffing, Outcome Model (2002) and empirical studies. A multi-stage random sampling was used for data collection, which conducted from August, 2014 to January, 2015. Five hundred and ten inpatient departments' registered nurses represented the four out of six Chinese regional tertiary general hospitals were recruited for main study. All of participants completed six questionnaires, including demographic data combining nurse staffing, work environment, burnout, anticipated turnover, nurses' job satisfaction, and nurse-assessed quality of nursing care. All questionnaires had acceptable psychometric properties, which included content validity, construct validity, and internal consistency reliability. Structural equation modeling (LISREL 8.72) was used to find out the predictors of quality of nursing care.

The results showed that the hypothesis model fit the empirical data and explained 74% of the variance about quality nursing care. (χ^2 = 175.73, df = 149, p-value = .052, GFI = .97, AGFI = .95, RMSEA = .02, SRMR = .04, and CFI = 1.00). Nurse work environment directly affected quality nursing care, job satisfaction, intention to leave (.50, .84, -.30, $p < .05$, respectively). It indirectly affected burnout (-.56, $p < .05$) through job satisfaction; and intention to leave (-.20, $p < .05$) through job satisfaction and burnout. Patient to nurse ratio directly affected quality nursing care and intention to leave (-.16, .10, $p < .05$, respectively). Job satisfaction directly affected burnout (-.67, $p < .05$), indirect affected quality nursing care through burnout and intention to leave (.42, $p < .05$), and indirect affected intention to leave (-.38, $p < .05$) through burnout. Burnout directly affected quality nursing care and intention to leave (-.67, .57, $p < .05$, respectively).

The results indicated that the highest impact factor influencing quality nursing care was the direct effect of burnout, followed by the indirect effect of job satisfaction through burnout and intention to leave and the direct effect of nurse work environment and nurse staffing. Therefore, managers should consider the improvement of all studying variables to increase quality nursing care.

Field of Study: Nursing Science
Academic Year: 2014

Student's Signature .....
Advisor's Signature .....
Co-Advisor's Signature .....

ACKNOWLEDGEMENTS

With the successful completion of my Ph.D. study, I would like to express my great appreciation for several people who have given me help, support, direction, and encouragement. First, I would like to express deep appreciation for my major advisor, Associate Professor Police Captain Yupin Aungsuroch, Ph.D. for her guidance and support throughout my graduate study. I also would like to thank my co-advisor, Associate Professor, Jintana Yunibhand, Ph.D. for her guidance.

I would like to thank all dissertation committees, Associate Professor Waraporn Chaiyawat, D.N.S., for her suggestion and motivational questions to help me develop my thinking and dissertation; Associate Professor Rachanee Sujijantararat, D. N.S., Associate Professor Sureeporn Thanasilp, D.N.S., and Assistant Professor Pissamai Oratai, Ph.D. for many helpful suggestions and kind support.

I would like to thank Chulalongkorn University for providing the Neighborhood Scholarship for my Ph.D. study and the 90th Anniversary of Chulalongkorn University, Rachadapisek Sompote Fund for my research project.

I would like to thank all of the teachers, staff, and students who have given me help, support, and motivation from the Faculty of Nursing in Chulalongkorn University for letting me successfully complete my Ph.D. study.

I would like to thank Mr. Surask Kao-Iean and Mr. Kanit Sriklaub from the department of educational research and psychology in the Faculty of Education at Chulalongkorn University for assisting with statistical analysis.

Moreover, I would like to thank my instrumental forward/backward translators and monolingual experts. I also would like to thank all of the interviewed experts and content analysis experts for their wonderful suggestions and cooperation. Additionally, I also would like to thank my research assistants for their efforts to complete data collection in the clinical settings.

Last but not least, I very much appreciate Kimberly Diane Johnson and David Taylor for checking my grammar and for helping to clearly explain my ideas. Finally, I'd like to express my deepest thanks to my parents, who always understood, supported, and encouraged me when I faced several pressures during my long studying journey.

CONTENTS

Page
THAI ABSTRACT iv
ENGLISH ABSTRACT v
ACKNOWLEDGEMENTS vi
CONTENTS vii
LIST OF TABLES ix
LIST OF FIGURES xii
Chapter I Introduction 1
Background and Significance of the Study 1
Research Questions 5
Objective of Study 6
Hypotheses with Rationales 6
Scope of the Study 8
Operational Definitions 8
Expected Benefits 12
Chapter II Literature review 13
1. Nursing Care Quality Situations in China 14
2. Conceptual Models Related to Quality of Nursing Care 27
3. Nurse-assessed Quality of Nursing Care 36
4. The Relationships among Nurse Staffing, Nurse Work Environment, Nurses' Job Satisfaction, Nurse Burnout, Nurses' Intention to Leave, and Nurse-Assessed Quality of Nursing Care 79
5. Structural Equation Model (SEM) in nursing research 94
Chapter III Methodology 100
Research Design 100
Population and Sample 100
Instrumentations 106
Protection of Human Subjects 147
Data Collection 147

Page

Data Analysis....148
CHAPTER IV RESULTS....150
Descriptive Statistics of the Variables....150
SEM Assumption Testing....155
Findings of Research Questions and Hypothesis Testing....161
Chapter V Discussion....180
Summary....180
Discussion....181
Limitation....197
Implication for Nursing....197
Recommendations for Future Research....198
REFERENCES....200
APPENDIX....219
APPENDIX A Information Sheet and Ethical Approval....220
APPENDIX B List of the Interviewed Experts....227
APPENDIX C List Experts of the Content Validity Testing....230
APPENDIX D The Permission of Anticipated Turnover Scale Usage....232
APPENDIX E List of Forward/Backward Translators and Monolingual Expert..234
APPENDIX F The Example of the Instruments....236
APPENDIX J Assumptions of Structural Equation Model....240
VITA....243

LIST OF TABLES

Table 1 The number of year requirements for promotion of the differing educational levels of Chinese nurses 23

Table 2 Nurse staffing measurement form 52

Table 3 Number of questionnaires sent out and returned back from each hospitals strata in instrument testing phase 102

Table 4 Number of questionnaires sent out and returned back from each hospitals strata in main study phase 105

Table 5 Levels of interpretation of nurses' job satisfaction 108

Table 6 The description of 40-item Chinese Nurse Job Satisfaction Scale (CNJSS) after EFA 111

Table 7 Goodness of Fit Statistics of Chinese Nurse Job Satisfaction Scale (CNJSS) Measurement Model 114

Table 8 Factor Loading and Factor Score Regression of Chinese Nurse Job Satisfaction Scale (CNJSS) 115

Table 9 Construct Reliability and Average Variance Extracted of Chinese Nurse Job Satisfaction Scale (CNJSS) 116

Table 10 Levels of interpretation of nurse-assessed quality of nursing care 120

Table 11 The description 48-item of Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS) after EFA 121

Table 12 Goodness of Fit Statistics of Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS) Measurement Model 124

Table 13 Factor Loading of Chinese Nurse-Assessed Quality of Nursing Care Scale 125

Table 14 Construct Reliability and Average Variance Extracted of Chinese Nurse Assessed Quality of Nursing Care Scale (CNAQNCS) 126

Table 15 Levels of interpretation of nurse work environment 129

Table 16 The reliability of Chinese version of the Practice Environment Scale (C-PES) from tryout 129

Table 17 Goodness of Fit Statistics of Chinese version of the Practice Environment Scale (C-PES) Measurement Model 131

Table 18 Factor Loading and Factor Score Regression of Chinese version of the Practice Environment Scale (C-PES).....132

Table 19 Construct Reliability and Average Variance Extracted of Chinese version of the Practice Environment Scale (C-PES).....133

Table 20 Levels of interpretation of nurse burnout.....134

Table 21 Goodness of Fit Statistics of Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS) Measurement Model 136

Table 22 Factor Loading and Factor Score Regression of Chinese version of Maslach Burnout Inventory-Human Service Survey 137

Table 23 Construct Reliability and Average Variance Extracted of Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS) 138

Table 24 Levels of interpretation of nurses' intention to leave.....139

Table 25 Goodness of Fit Statistics of Chinese version of Anticipated Turnover Scale (C-ATS) Measurement Model 143

Table 26 Factor Loading and Factor Score Regression of Chinese version of Anticipated Turnover Scale (C-ATS) 143

Table 27 Construct Reliability and Average Variance Extracted of Chinese version of Anticipated Turnover Scale (C-ATS) 143

Table 28 The summary of instruments' reliability and validity 146

Table 29 Demographic characteristics of participants 151

Table 30 Description of study variables and observed variables.....153

Table 31 Test of Univariate Normality and Multivariate Normality of the observed variables 156

Table 32 The observed variables Pearson correlations, Means and Stand ard Deviations 158

Table 33 Assessment for multicollinearity among the study variables.....161

Table 34 Description the score range, minimum score, maximum score, mean, and standard deviation of nurse staffing 162

Table 35 Dimensions' description of nurse work environment 162

Table 36 Dimensions' description of nurses' job satisfaction 163

Table 37 Dimensions' description of nurse burnout 163

Table 38 Dimensions' description of nurse-assessed quality of nursing care 164

Table 39 Items' description of nurse-assessed quality of nursing care 165

Table 40 Goodness of fit measures for overall model 168

Table 41 Factor loading of all observe variables 171

Table 42 Standardized path coefficients, standard error (SE), and T-value of parameters of the hypothesized model of nurse-assessed quality of nursing care 174

Table 43 Summary the total, direct, and indirect effects of causal variables on affected variables 177

Table 44 Summary of the hypotheses testing results 179

LIST OF FIGURES

Figure 1 Outcomes Model for Healthcare Research.....30

Figure 2 Quality Health Outcomes Model.....31

Figure 3 Nurse Work Environment, Nurse Staffing, and Outcomes: A conceptual model.....34

Figure 4 The conceptual framework of this study 35

Figure 5 The selected part of Aiken (2002) Nurse work environment, Nurse staffing, and Outcome Model (NWE-NS-OM) theoretical substruction.....36

Figure 6 A hypothesized causal model of factors influencing nurse-assessed quality of nursing care in Chinese hospitals.....99

Figure 7 Multi-stage random sampling method.....104

Figure 8 Measurement model of Chinese Nurse Job Satisfaction Scale (CNJSS) .117

Figure 9 Measurement model of Chinese Nurse Assessed Quality of Nursing Care Scale (CNAQNCS).....127

Figure 10 Measurement model of Chinese version of the Practice Environment Scale (C-PES).....133

Figure 11 Measurement model of Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS).....138

Figure 12 Brislin's Model of translation process.....140

Figure 13 Measurement model of Chinese Anticipated Turnover Scale (C-ATS)...144

Figure 14 Hypothesized model of factors influencing nurse-assessed quality of nursing care in Chinese hospitals 169

Figure 15 Modified model of factors influencing nurse-assessed quality of nursing care in Chinese hospitals 170

Chapter I
Introduction

Background and Significance of the Study

Quality of nursing care is the core of nursing management (Yang, Xu, & Wang, 2005). It directly influences overall quality of health care service, which is defined as nurses provide technical services and life services for patients and meet patients' all reasonable needs from nursing services (Hou, 2007). Quality of nursing care is also considered as the process of the formation of objective performance (Ding & Jiang, 2013, p. 150). The evaluation of quality of nursing care can come from statistical data from hospitals or personal perspectives.

In clinical settings, although some indicators as patient falls or nosocomial infection (Kunaviktikul et al. 2005) were used as to report quality of nursing care, they cannot reflect the completed constructs of quality of nursing care. In addition, these indicators were also considered as the consequences of quality of nursing care (Sochalski, 2001; MacDavitt, 2008; Lucero, 2008). Therefore, they are not appropriate to be used to assess quality of nursing care.

The evaluation of quality of nursing care from personal perspectives including patients, hospital administrators, and nurses. Patients receive nursing care, their perceptions only focus on outcome audits that do not examine the structure or nursing process (Taylor & Haussmann, 1988). Since most of the patients do not have medical education background, it limits their awareness of many of the activities and problems that accompany the service delivery process (Mangold & Babakus, 1991). In addition, according to Tian, Yang, Shao, and Liu (2008) explanation, the evaluation of quality of nursing care from hospital administrators was too formal to be effective. However, Cline, Rosenberg, Kovner, and Brewer (2011) stated that the perspective of bedside RNs was essential to guide quality improvement. Nurses make the significant contribution by assessing, planning, and evaluating patient needs, delivering treatments and medications, advocating patients, and assuring their comfort (Burhans & Alligood, 2010). Their self-evaluation of quality of nursing care can make them know a right way to provide qualified nursing service in order to improve their personal quality and level

(Ding & Jiang, 2013, p. 169). Therefore, it is important to study quality of nursing care from nurses' perspective (Tafreshi, Pazargadi, & Saeedi, 2007).

The importance of nurse-assessed quality of nursing care considered as essential to patient outcomes (injury, nosocomial infections, medication errors, patient falls, and patient adverse event) and organizational outcomes (mortality and length of stay). When nurses reported higher quality of nursing care, the aforementioned negative patient outcomes would be reduced. In addition, patient mortality rate and length of stay increase when nurse-assessed quality of nursing care rated as higher. For example, Sochalski (2001) found that poor nurse-assessed quality of nursing care significantly negatively influenced patient falls with injury, nosocomial infections, and medication errors. MacDavitt (2008) also explained that nurse-assessed quality of nursing care was a negative predictor of patient falls and medication errors. Lucero (2008) found that unmet nursing care needs were the significant negative predictor of wrong medication or dose, nosocomial infection, and patient falls. Mallidou, Cummings, Estabrooks, and Giovannetti (2011) represented that the nurse-assessed quality of nursing care was the significant negative predictor of adverse patient events. McHugh and Stimpfel (2012) also reported nurse-assessed quality of nursing care negatively influencing surgical patients' failure to rescue. Moreover, at the organizational level, nurse-assessed higher quality of nursing care can also reduce mortality (Lucero, 2008; McHugh & Stimpfel, 2012) and shorten the length of stay (Lucero, 2008).

However, it has been found that several issues are related to nurse-assessed quality of nursing care in China. You et al. (2013) reported that nurse-assessed quality of nursing care as poor or fair was 29% among 181 Chinese hospitals. This percentage was higher than those reported in Germany, Thailand, USA, UK, and New Zealand as poor or fair. They accounted for 20%, 19%, 13.1%, 14%, and 12%, respectively (Aiken, Clarke, Sloane, Lake, & Cheney, 2008). In addition, the particular problems related to nurse-assessed quality of nursing care in China have been reported by the following researchers. Zhao (2006) conducted a study in one Chinese tertiary general hospital. The results showed that nurses were lack of updated knowledge, practical skills and enough time to provide patients care. Xue et al. (2010) also found the same problem as Zhao (2006) in one Chinese tertiary general hospital and the item of "nurses help patients to relieve the anxiety of medical care fee" received the lowest score. Gong, Qi,

and Wang (2013) conducted a study across three tertiary general hospitals in Beijing. The result showed that cost of nursing service received the lowest score, followed by the nurses that provided basic nursing care. Moreover, in You et al. (2013) survey, it was found that 46.3% of nurses were uncertain about whether their patients could manage their own care well when they were discharged from the hospitals. Since many problems relate to nurses-assessed quality of nursing care, it is essential to determine what are influencing factors.

A review of literature found that commonly used outcome model in nursing research is Aiken (2002) Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM). NWE-NS-OM's main idea explains that nurse staffing and nurse work environment can significantly affect outcomes, which is defined as the end results, or the results from some actions or events (Lang & Marek, 1990). Those outcomes included both nurses and patients outcomes (Aiken, 2002). Nurse outcomes can be identified as nurses' reactions to their work (Hinto, Partanen, & Vehviläinen-Julkunen, 2012). Aiken (2002, p.70) identified nurse outcomes as nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care. Johnson, Maas, and Moorhead (2000) stated that the description of patient outcomes is expected to change by the intervention and the recipient of care. It was included but not limited to patient satisfaction and patient mortality as written by Aiken (2002, p.71). Although the empirical evidence revealed bivariate relationship between the nurse to patient ratio, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care, it was not well understood how these predicating factors direct or indirect influence nurse-assessed quality of nursing care. In addition, which predictor is the most significant one influencing nurse-assessed quality of nursing care has not reported yet. Therefore, a theory based hypothesis causal model should be established in order to explain how predicating factors influencing nurse-assessed quality of nursing care. The following parts provide the empirical evidence of factors influencing nurse-assessed quality of nursing care in bivariate correlations for further setting the hypothesis causal model.

One factor influencing nurse-assessed quality of nursing care is the patient to nurse ratio. It is one indicator to measure nurse staffing (Nantsupawat, 2010). The literature review supported that the nurse-assessed quality of nursing care was

significantly negatively influenced by the patient to nurse ratio (Cho et al., 2009; You et al., 2013). Additionally, patient to nurse ratio was found positively affected nurses' job dissatisfaction, nurse burnout, and nurses' intention to leave (Aiken et al., 2012).

Another factor that has been found to affect nurse-assessed quality of nursing care is nurse work environment. The empirical evidence support that nurse work environment is a significant positive predictor of nurse-assessed quality of nursing care (Van Bogaert, Clarke, Vermeyen, Meulemans, & Heyning, 2009; You et al., 2013). Moreover, nurse work environment has also been found positively influenced nurses' job satisfaction (Liu et al., 2012; Manojlovich, 2005a; Manojlovich & Laschinger, 2007) and negatively influenced nurse burnout (Liu et al., 2012; Rochefort & Clarke, 2010) and nurses' intention to leave (Aiken et al., 2008).

Nurses' job satisfaction was the positive predictor of nurse-assessed quality of nursing care (MacDavitt, 2008; Redfern, Hannan, Norman, & Martin, 2002). Moreover, nurses' job satisfaction has been found to negatively influence nurse burnout (Chen, 2005; Kalliath & Morris, 2002) and nurses' intention to leave (Larrabee et al., 2003; Liu et al., 2012).

Burnout, which is a syndrome of feelings of emotional exhaustion, depersonalization, and reduced personal accomplishment, can occur among individuals who do people work (Maslach, Jackson, & Leiter, 1996). It was a significant negative predictors of nurse-assessed quality of nursing care (MacDavitt, 2008). In addition, nurse burnout was also found being positively associated with nurses' intention to leave (Bartram, Casimir, Djurkovic, Leggat, & Stanton, 2012).

According to Hinshaw and Atwood (1985) explanation, nurses' intention to leave is the individual's perception or opinions about the possibility of voluntarily leaving the present job. MacDavitt (2008) provided the empirical evidence of nurses' intention to leave was a negative predictor of nurse-assessed quality of nursing care.

From the above explanations, the impact of patient to nurse ratio and nurse work environment on nurse outcomes has been studied in the United States of America (U.S.A.), Canada, Australia, Europe, Thailand or China. However, only one study conducted in the U.S.A. was found to have studied the prediction of nurse-assessed quality of nursing care by the factors of nurses' job satisfaction, nurse burnout, and nurses' intention to leave (MacDavitt, 2008). In addition, most of the studies provide

the bivariate relationship between selected study variables. While RNs are under a complex work environment, their assessed quality of nursing care can be affected by many factors. Their job satisfaction, burnout, and intention to leave can significantly affect their performance to provide nursing care to patients. In addition, nurses' emotion, such as satisfaction, burnout, or intention to leave can also be influenced by staffing level and their work environment. However, these factors' direct and indirect relationship to nurse-assessed quality of nursing care has not been well understood. Thus, it is important to establish a causal model about factors that affect nurse-assessed quality of nursing care in order to provide better understanding of both direct and indirect factors influencing nurse-assessed quality of nursing care in Chinese tertiary general hospitals. The tertiary general hospitals were selected because they admit patients with more serious and more variety of illness or conditions than primary and secondary hospitals. It will be more challenging for nurses to delivery good nursing care to patients in tertiary general hospitals. From the casual model, if the most significant predictors and causal relationships can be found by using a structural equation model (SEM), it will give the hospital administrators more useful information regarding what the most important factors influence nurse-assessed quality of nursing care. Thus, this model can provide theoretic support for conducting an intervention study in the future or implement certain policy formulation in order to enhance nurse-assessed quality of nursing care. In addition, the improvement of nurse-assessed quality of nursing care can also enhance good patient outcomes and organization outcomes. Therefore, to fill this gap of knowledge, this study is aimed at developing a causal model to explain the relationships among factors influencing nurse-assessed quality of nursing care.

Research Questions

1. What are the average levels of nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care in Chinese hospitals?

2. How nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, and nurses' intention to leave influence nurse-assessed quality of nursing care in Chinese hospitals?

Objective of Study

1. To explore the average levels of nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave and nurse-assessed quality of nursing care in Chinese hospitals.

2. To examine how nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, and nurses' intention to leave influence nurse-assessed quality of nursing care in Chinese hospitals.

Hypotheses with Rationales

This hypothesized model is developed based on Aiken (2002) Nurse Work Environment, Nurse staffing and Outcome Model (NWE-NS-OM) and supported by literature review.

1. When the number of patients admitted to a hospital increases, if there are not enough RNs, one RN should bear more workload. Therefore, the higher patient to nurse ratio can make RNs feel more exhausted, less satisfied with their job, and they would be more likely to leave their job (Aiken et al., 2012; You et al., 2013). In addition, the higher patient to nurse ratio can also make RNs provide less qualified nursing service to the patients, because RNs will not have enough time to perform their services (Cho et al., 2009). Those explanations are also supported by Aiken (2002) NWE-NS-OM that lower patient to nurse ratio can significantly increase nurses' job satisfaction, nurse-assessed quality of nursing care and reduce nurse burnout and nurses' intention to leave. In addition, when nurses have the negative emotional response from higher workload, those negative emotions will further impact their performance, so they will assess lower score for their nursing service (MacDavitt, 2008). Moreover, it can be logically presumed that when one nurse should take care more patients, the effects diffused their job dissatisfaction, higher burnout and intention to leave, which will further influence their performance to provide nursing service. Based on the above explanations, the hypothesis 1 is presented as follows.

Hypothesis 1: The patient to nurse ratio has a negative direct effect on nurse-assessed quality of nursing care and nurses' job satisfaction, and a positive direct effect on nurse burnout and nurses' intention to leave. Further, patient to nurse ratio has a

negative indirect effect on nurse-assessed quality of nursing care through nurses' job satisfaction. Patient to nurse ratio has a positive indirect effect on nurse-assessed quality of nursing care through nurse burnout and nurses' intention to leave.

2. When RNs work in a place that awards the delivery of their good nursing care, they feel happier, with less burnout and intention to leave their jobs (Zhang et al., 2014). In addition, RNs will also achieve higher score of their assessed quality of nursing care, when they work at the place that encourage the delivery of good nursing care. (You et al., 2013). Aiken (2002) NWE-NS-OM also supports that good nurse work environment can increase nurses' job satisfaction or nurse-assessed quality of nursing care and decrease nurse burnout or nurses' intention to leave. Moreover, when nurses have a positive response from their working place, those positive feelings will further impact on their performance. Thus, they assess higher score for their nursing care service (MacDavitt, 2008). Therefore, the hypothesis 2 provides as follows.

Hypothesis 2: A good nurse work environment has a positive direct effect on nurse-assessed quality of nursing care and job satisfaction, while a good nurse work environment has a negative direct effect on nurse burnout and nurses' intention to leave. Further, a good nurse work environment has a positive indirect effect on nurse-assessed quality of nursing care through nurses' job satisfaction, nurse burnout, and nurses' intention to leave.

3. When nurses feel more satisfied with their work, their negative emotion, such as burnout (Chen, 2005; Kalliath & Morris, 2002) and intention to leave (Chi, 2006; Huang, Li, Peng, Wu, & Jiang, 2008) will be reduced. In addition, when nurses are more satisfied with their work, they will provide good care to the patient. Thus the nurse-assessed quality of nursing care will be increased as well (Redfern et al., 2002). Moreover, it is logical to expect that when nurses are satisfied with their jobs, the decrease of nurses' burnout and intention to leave will further influence their performance to provide nursing services. Based on the above explanations, hypothesis 3 is presented as shows.

Hypothesis 3: Nurse's job satisfaction has a positive direct effect on nurse-assessed quality of nursing care. Nurse's job satisfaction has a negative direct effect on nurse burnout and nurses' intention to leave. In addition, nurses' job satisfaction can

positively influence nurse-assessed quality of nursing care indirectly through nurse burnout and nurses' intention to leave.

4. When nurses experience higher burnout condition in their workplace, they will increasingly think about leaving their current job because of frustrated work (Chen, Yang, & Xian, 2014; Estryn-Behar et al., 2007). In addition, when nurses experience more burnout and intend to leave, it will influence their performance. So they will further assess lower score for their nursing service (MacDavitt, 2008). Therefore, this research describes the hypothesis 4 as following.

Hypothesis 4: Nurse burnout has a positive direct effect on nurses' intention to leave and negative direct effect on nurse-assessed quality of nursing care. In addition, nurse burnout has a negative indirect effect on nurse-assessed quality of nursing care due to their intention to leave.

5. When nurse intent to leave their workplace, their behavior in providing nursing care is influenced by their emotions (Fishbein & Ajzen, 1975). For example, when nurses have a higher intention to leave their job, they will not have a good performance at work. Therefore, they will assess quality of nursing care to be poor (MacDavitt, 2008). It is related to hypothesis 5 that described below.

Hypothesis 5: Intention to leave has a negative direct effect on nurse-assessed quality of nursing care.

Scope of the Study

This study describes and explores a model of predicting factors influencing the dependent variable of nurse-assessed quality of nursing care in Chinese hospitals. The potential factors are nurse staffing, nurse work environment, nurses' job satisfaction, burnout, and nurses' intention to leave, which are independent variables. The study was carried out among RNs worked in Chinese tertiary general hospitals and were willing to participate in this study.

Operational Definitions

1. Nurse-assessed quality of nursing care refers to Chinese nurses' perception about the degree of excellence on the standard nursing services they provide with their

expectation to meet patients' needs and to satisfy patients' demands. It was measured by the Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS) that was developed by the researchers containing six dimensions: task orientated activities, staff characteristic, physical environment, human orientated activities, precondition, and patient outcomes. Each dimension's definition is explained as follows.

1.1 ***Task orientated activities*** are defined as Chinese nurses' perception about the degree of excellence on provision of information and communication, physical care, and health education to meet patients' demands.

1.2 ***Staff characteristic*** is defined as Chinese nurses' perception about the degree of excellence on their cautiousness, carefulness, friendliness, team spirit, and patient to provide nursing service to meet patients' demands.

1.3 ***Physical environment*** is defined as Chinese nurses' perception about the degree of excellence on providing a clean, comfortable, safe, and quiet ward environment to meet patients' demands.

1.4 ***Human orientated activities*** are defined as Chinese nurses' perception about the degree of excellence on providing empathetic, respective, encouraging, and psychologically supportive services to meet patients' demands.

1.5 ***Precondition*** is defined as Chinese RNs' perception about the degree of excellence on having up-to-date knowledge, practice skill, experience, participation, and readiness to provide nursing service to meet patients' demands.

1.6 ***Patient outcome*** is defined as Chinese nurses' perception about the degree of excellence on patients' safety and satisfaction as a result of the nursing services delivered.

2. Nurse staffing is the average number of patients cared for by one Chinese nurse in a nursing unit in each shift (e.g., day, evening, or night) in his or her past one month of work. This instrument was modified from Aiken, Clarke, and Sloane (2002) nurse staffing measurement by the researchers.

3. Nurse work environment is defined as an organizational characteristic at the work settings that encourage Chinese nurses control over the delivery of nursing care. It was measured by the Chinese version of the Practice Environment Scale (C-PES), which was translated and adapted by Wang and Li (2011). C-PES includes five dimensions: nurse participation in the hospital affair; nursing foundations for quality of

care; nurse manager ability, leadership, and support of nurses; resource adequacy; and collegial nurse-physician relations. The definitions of those dimensions are described as follows.

3.1 ***Nurse participation in hospital affairs*** refers to an organizational characteristic that encourages Chinese nurses to participate in policy making, involvement of hospital governance, and contributions to nursing committees in the hospitals.

3.2 ***Nursing foundations for quality of care*** refers to an organizational characteristic that encourages the nursing foundations for a high standard of patient care, including a pervasive nursing philosophy, a nursing rather than a medical model of care, and Chinese nurses' clinical competence in the nursing work settings.

3.3 ***Nurse manager's ability, leadership, and support of nurses*** refers to an organizational characteristic that focuses on the critical role of the Chinese nurse manager, key qualities of the Chinese nurse manager, and the ways that the Chinese nurse manager supports Chinese RNs' nursing services in the work settings.

3.4 ***Resource adequacy*** refers to an organizational characteristic that has adequate Chinese nurses and supporting resources to provide quality patient care in the work settings.

3.5 ***Collegial nurse-physician relations*** refers to an organizational characteristic that is characterized by the equality of working relationship between Chinese RNs and physicians in the work settings.

4. Job satisfaction refers to Chinese nurses' positive feelings in response to the work conditions that support their desired needs as the result of their evaluation of the value or equity in their work experience. It was measured by Chinese Nurse Job Satisfaction Scale (CNJSS). This instrument was developed by the researchers and contained seven dimensions, including recognition and responsibility, administration, salary and fringe benefits, promotion and individual growth, work conditions, family and work balance, and interaction. Each dimension's definition is explained as follows.

4.1 ***Recognition*** **and responsibility** refers to Chinese nurses' positive feelings of their work results in acceptance by the colleagues, patients or patients' family members, society, and themselves.

4.2 ***Administration*** refers to Chinese nurses' positive feelings on their managers' leadership style.

4.3 ***Salary and fringe benefits*** refers to Chinese nurses' positive feelings of their received salary, fringe benefits, projected increase of their salary, and the equality of pay between contract and permanent nurses.

4.4 ***Promotion and individual growth*** refers to Chinese nurses' positive feelings on their personal promotion, in-service training, participate in research and opportunity or equality of career development.

4.5 ***Work conditions*** refers to Chinese nurses' positive feelings on their work shifts, work hours, and job environments.

4.6 ***Family and work balance*** refers to Chinese nurses' positive feelings on the balance between family life and work.

4.7 ***Interaction*** refers to Chinese nurses' positive feelings on the fulfillment of interpersonal contact with patients, nurses and co-workers during working hours.

5. Burnout refers to the syndrome of feelings of emotional exhaustion, depersonalization and reduced personal accomplishment by Chinese nurses through their working experience. It was measured by the Chinese version of the Maslash Burnout Inventory-Human Service Survey (C-MBI-HSS) translated from MBI-HSS by Li and Liu (2000). C-MBI-HSS consists of three dimensions, as emotional exhaustion, depersonalization, and personal accomplishment. Those three dimensions of burnout are illustrated as follows.

5.1 ***Emotional exhaustion*** is defined as the syndrome of being emotionally overextended and drained by others as perceived by Chinese nurses' through their working experience.

5.2 ***Depersonalization*** is defined as the syndrome of a callous response toward patients who are recipients of Chinese nurses' services, care, treatment, or instructions.

5.3 ***Personal accomplishment*** is defined as feelings of competence and achievement in Chinese nurses' work with people.

6. Intention to leave is defined as Chinese nurses' perception or opinion of the possibility of voluntarily terminating of their current positions. It was measured by the

Chinese version of Anticipated Turnover Scale (C-ATS), which was translated and adapted from ATS by the researchers after getting the permission of developer, Hinshaw and Atwood (1985).

Expected Benefits

1. The result of this study provides the evidence that problems related to nurse-assessed quality of nursing care in Chinese hospitals is specific to physical environment and patient outcomes. Thus, clinical nurses can pay attention to these problems when they provide nursing services.

2. The predicting factors found in this study can guide other researchers to conduct effective interventions to improve nurse-assessed quality of nursing care. These predicting factors included nurse burnout, nurse work environment, nurse staffing, nurses' job satisfaction, and nurses' intention to leave.

3. The result of this study provides valuable information for health policy makers to frame nurse staffing plan and adjust hospital policies to support nurses' practice. The result of policy formulation would further attract and retain nurses and improve the quality of nursing care.

4. The specific problems determined in this study are expected to be recognized by nursing educators. Then the specific teaching objectives to solving these problems can be considered through designing curriculum or course objectives.

Chapter II
Literature review

This chapter describes the integrative literature review about nursing care in the following fields: the nursing care quality situations in China, theoretical models, study concepts, empirical evidence of studying variables relationships, and structural equation model (SEM) in nursing care. The review of topics provided is as follows.

1. The nursing care quality situations in China
    - 1.1 The health care system and hospital situations in China
    - 1.2 Quality of nursing care in China
2. Theoretical models related to quality of nursing care
    - 2.1 Donabedian's Structure, Process, and Outcome Model (D-SPOM)
    - 2.2 Outcomes Model for Health Care Research (OMHCR)
    - 2.3 Quality Health Outcomes Model (QHOM)
    - 2.4 Aiken's Nurse Work Environment, Nurse Staffing, Outcome Model
3. Nurse-assessed Quality of Nursing Care
    - 3.1 Definitions of nurse-assessed quality of nursing care
    - 3.2 Components of nurse-assessed quality of nursing care
    - 3.3 Measurements of nurse-assessed quality of nursing care
    - 3.4 Consequences of nurse-assessed quality of nursing care
    - 3.5 Factors influencing nurse-assessed quality of nursing care
        - 3.5.1 Nurse staffing
            - Definitions of nurse staffing
            - Measurements of nurse staffing
            - Nurse staffing form development
        - 3.5.2 Nurse work environment
            - Definitions of nurse work environment
            - Definitions of nurse work environment
            - Components of nurse work environment
            - Measurement of nurse work environment
        - 3.5.3 Nurses' job satisfaction

Definitions of nurses' job satisfaction

Components of nurses' job satisfaction

Measurements of nurses' job satisfaction

3.5.4 Nurse burnout

Definitions of nurse burnout

Components of nurse burnout

Measurements of nurse burnout

3.5.5 Nurses' intention to leave

Definitions of nurses' intention to leave

Measurements of nurses' intention to leave

4. The relationships among nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care

5. Structural Equation Model (SEM) in nursing research

5.1 SEM basics

5.2 First order and second order of confirmatory factor analysis

5.3 Assessing the overall goodness-of-fit of the hypothesized model

1. Nursing Care Quality Situations in China

1.1 Healthcare system and hospital situations in China

China started to make the transition from a planned economy to a market economy since 1990. This process has led to rapid changes in all aspects of the society, including the delivery of health care. The healthcare delivery system has been grappling with market regulations, structural reorganization, and the necessary public services (Ministry of Health of the People's Republic of China, 1994). Under the "Get Rich First" policy introduced by the leading economic reformer, Deng Xiaoping, this philosophy of economic reform has influenced healthcare services as well. Although this philosophy pushed the Chinese economy to develop quickly, it also brought in several negative effects to the society and healthcare system. For example, greater financial autonomy in the healthcare system led hospitals to carry out market-oriented financing strategies. As a result, health providers have to reduce the provision of preventive services, drive up costs, and move resources away from the poor (Wang, 2005).

In addition, as the healthcare reform deepened and the demand for healthcare expanded, most of the nurses' employment statuses changed from permanent to contract due to the fact that permanent positions were not increased by the Chinese government. Therefore, in hospital settings, two kinds of employment statuses for nurses exist at the same time. One group is called permanent nurses and the other group is called contract nurses. Permanent nurses have a working relationship with the Chinese government. Contract nurses have a working relationship only with the employee's hospital. Traditionally, with the planned economy, work positions for each level of graduate students were established by the country national plan. Every graduate student was assigned to work in a certain setting, holding a permanent position. They did not have the autonomy to select their preferred working place. However, because of development in the society and an economic system change to a market economy, the government has not assigned the permanent working position for each graduate student. The permanent work positions were designed by individual hospitals according to each hospital situation and the annual government policy. In general, the graduates who had a degree higher than a bachelor degree had the opportunity to be employed as permanent nurses with a formal employment examination. However, technical or diploma graduates did not have this opportunity. Additionally, different areas of China and different hospitals have different policies to give nurses opportunity to change their employment status. For instance, some hospitals allowed all RNs to take a government arranged examination in order to obtain the permanent positions. Other hospitals only gave the opportunity to recently graduated nurses.

When looking at the difference between permanent nurses and contract nurses, the primary differences are related to fringe benefits and career development. For the salary, the two types of nurses differ at the beginning of the first year of work. As the span of years working lengthens, this difference between the two types of nurses' salaries will be reduced. Furthermore, under the current Chinese retirement payment system, there is a big difference between permanent nurses and contract nurses. In addition, since it's easier for contract nurses to leave their working positions than permanent nurses, this may influence career development during one's working years.

Moreover, market-oriented financing strategies also bring about national problems like expensive and difficult to obtain medical care. The problem of expensive

medical care is often related to payment mechanisms and healthcare financing, while the problem of difficult to obtain medical care is often related to difficult access to the system of healthcare and services delivery (Pan, Qin, Li, Messina, & Delamater, 2015). Therefore, in 2006, the Chinese Government initiated an ambitious healthcare system reform to solve these problems. Recently, Chinese healthcare reform programs have successfully widened the availability of health care services, such as extending health insurance coverage among the general Chinese population (Yip et al., 2012). However, promoting health care quality and reducing health care costs are still challenges to deepening the healthcare reforms in China.

In order to enhance the quality of health care, the Ministry of Health of the People's Republic of China (2011) implemented Tertiary General Hospital Accreditation Standards (2011 edition) to continually improve health care quality, ensure medical safety, and improve health care services. These accreditation standards included six chapters: hospitals' adherence to the public welfare, hospital services, patients' safety, quality and safety of health care management and continuous improvement, nursing management and continuous quality improvement, and hospital management. Based on Hong and Yatsushiro (2003), the Chinese healthcare system divided the hospitals' levels into primary (< 100 beds), secondary (100-500 beds) and tertiary (> 500 beds) levels. At each level, hospitals are classified into three grade A/B/C, which were decided by the government according to the hospital accreditation score that they received from their services. Hospitals can rise to a higher grade through the improvement of their services.

Moreover, the Ministry of Health of People's Republic of China (2014) devised the Tertiary Care Hospital Competency Standards (General Hospital) in order to further clarify the functional positioning of tertiary general hospitals. These standards consists of six chapters, covering tertiary general hospitals basic setup, operation performance, clinical specialist service capabilities; medical departments and services capabilities, list of single disease clinical path about the length of stay; and diseases/operating coverage. In these standards, "tertiary general hospitals" is defined as the medical institutions across districts, cities and provinces that provide health care services. These include medical treatments, teaching, research, public health services, and other functions. It should have a basic setup, including bed sizes, medical subjects, medical

equipment and a reasonable structure of health technicians to meet the tertiary hospital services' technical standards and management requirements. The hospital must have treatment departments including preventive care, internal medicine, surgery, obstetrics and gynecology, pediatrics, ophthalmology, otorhinolaryngology, dentistry, dermatology, psychiatry, epidemiology, oncology, emergency, rehabilitation, anesthesiology, critical care, a medical laboratory, pathology, medical imaging and traditional Chinese medicine departments.

Quality of nursing care is considered as an important part of quality of care. Enhancing quality of nursing care can track back to 1994 when holistic nursing care was first implement in China. Since that time, nurses have increasingly paid attention to the quality of their services. In addition, currently, several quality control methods have been used in clinical settings such as the Plan-Do-Check-Action (PDCA), the Three Level Quality Control of Nursing Care, and the Quality Control Circle (QCC). Moreover, the Ministry of Health of the People's Republic of China (2010) implemented a national Good Nursing Care program with the purpose of further improving the quality of nursing care.

However, in the clinical setting, one significant problem that influences the quality of nursing care is the shortage of nurses. According to the long-term development planning for medical and health personnel (year 2011-2020) (Ministry of Health of People's Republic of China, 2011), 2,860,000 RNs are needed by the end of 2015 and 4,450,000 RNs are needed by the end of 2020, due to an increased demand from the population. Until the end of 2013, there were only 2,783,000 RNs in China. Thus, 1,667,000 more RNs are needed to achieve the minimum required number of RNs, which does not include the replacement of RNs. This data proves that the shortage of nurses in China is a significant issue. Therefore, nursing schools have a responsibility to recruit more nursing students. Nursing programs in China, at the present time, have included both undergraduate and graduate nursing programs. They are introduced in detail as follows.

As for undergraduate programs, there are four types of programs: certification programs, diploma degree programs, baccalaureate degree programs, and continuing or adult nursing education programs.

(1) Health schools provide certificate programs and foster technical nurses who

have dominated the hospital workforce in China throughout the past several decades. Technical nurses used to account for 95% of all practicing nurses in China ten years ago. This program recruits students who have graduated from middle school and trained them in hospital-affiliated health schools (Shin, Shin, & Li, 2002). It is a three-year program. The major courses include English, foundations of computer application, anatomy, physiology, histology, embryology, physiology, biological science, microbiology, pharmacology, and pathology. Nursing courses include fundamental nursing, surgical and medical nursing, obstetrical and gynecological nursing, pediatric nursing, psychological nursing, geriatric nursing, and psychological nursing (Dalian Medical University Health School, 2013). Graduates are required to take the registered nurse license examination in order to provide direct care to patients at the general hospitals, convalescent hospitals or community hospitals.

(2) The diploma degree program is available in the medical college and requires three years to complete (Anders & Harrigan, 2002). The nursing school programs in colleges are designed to educate students who will give patient-centered nursing care in hospitals as general duty or as the staff nurses. The courses include basic professional nursing courses, special clinical nursing courses, public health nursing courses, humanity science, and others (including courses of administration, education, and research). Graduates of these programs are expected to function with intelligence and skill in the more predictable or recurring patient care situations that require more specific knowledge.

(3) The baccalaureate degree program is available in universities. This program requires four years to complete. The course's components are similar to the diploma degree program mentioned above. They are built on the knowledge gained from science and humanity so that the baccalaureate graduates achieve a broad understanding of nursing and related sciences as well as the basic nursing skills. The baccalaureate prepared graduates are expected to have the ability to provide good quality nursing care to patients and their families (Li, 2001).

(4) Continuing nursing education programs (CANEP) recruit students who already have work experience. There are two levels of adult nursing education. Level one is a diploma degree with the certification education background. This means that students enrolled in this program have finished their certification education. After three

years studying in this program, they can receive the diploma degree. Level two is a bachelor degree with the certification education background (5 years to complete) or diploma education background (3 years to complete). The certification education background for level two means that if students enroll in the program with a certification education degree, they can receive a bachelor degree with five years of studying. The diploma education background for level two means that if students enroll in the program with a diploma educational degree, they can receive a bachelor degree with three years of studying (College of Continuing Education of Dalian Medical University, 2012).

Nowadays, both master and doctoral level degrees in nursing education are provided/or available in China. Master's nursing programs require 2 to 3 years to complete. These programs are generally divided into two sections. The first section, nursing professional and professional basic courses are required to finish in the first year. Students are required to complete the second section with a thesis, clinical practice and educational practice within the programs' studying years. The master level nurses should have a teaching role, leadership role, and a management role in order to provide services in hospitals (Li, 2001).

The doctoral level nursing program requires three years to complete, which focuses on conducting research with the certification of Ph.D. The major courses include political theory, English, advanced statistics, and nursing and health protection management. The doctoral programs emphasize the development of students' professional value, professional development ability, professional human spirit, international communication, and research skills (Ma & Liu, 2009). The graduates are expected to have teaching, leadership, and management roles in the academic field.

There were 1537 undergraduate nursing programs, 73 master's nursing programs, and 16 doctoral nursing programs including all nursing programs around the country by 2012 (You, Ke, Zheng, & Wan, 2015). Although most of the undergraduate and master level nursing graduates worked in hospitals, they still took the same RN license examination, because nurses cannot work at the clinical settings without RN license. Furthermore, the responsibilities of RNs are different based on their working positions.

Nurse working positions in Chinese tertiary general hospital included staff

nurses, head nurses, nurse supervisors, and nurse directors. In this study, only staff nurses were recruited. Thus, staff nurses' different kinds of responsibilities were presented as follows. According to staff nurses' responsibilities, they were named as primary nurses (zhe ren hu shi), transcription nurses (Wei ji hu shi), office nurses (ban gong shi hu shi), administrative nurses (zhu ban hu shi), dressing room nurses (huan yao shi hu shi), therapeutic nurses (zhi liao ban hu shi), half evening shift nurses (xiao ye ban hu shi), and whole evening shift nurses (da ye ban hu shi).

Primary nurses have the following responsibilities: (1) participating in nurse shift change meetings, (2) carrying out patients' morning nursing care, (3) carrying out patients' basic nursing care, (4) carrying out patients' general and special treatments, (5) arranging additional physical examinations, (6) observing patients' conditions change, (7) rescue, admonition and discharge of patients, (8) writing nursing care records, (9) providing patients' education, and (10) teaching junior nurses.

Nurses for transcription (Wei ji hu shi), office nurses (ban gong shi hu shi), or administrative nurses (zhu ban hu shi), have the same responsibilities. The above were given different names related to their utilization in different hospitals. The above group of nurses hold these responsibilities: (1) reading shift reports and critically ill patients' nursing records, (2) participating in nursing shift change meetings, (3) checking operating status of rescue medicine and rescue equipment, (4) checking night shift doctors' prescriptions, (5) carrying out doctors' prescriptions, (6) admitting new patients, providing admission assessment and admission education, (7) providing pre-operational preparation and pre-operational education, (8) preparing related procedure of admission, discharge, transfer to other departments, and transfer to other hospitals, (9) observing all ward patients' dynamic change condition, participating in critically ill patients' rescues, and writing shift reports and various records, (10) checking doctors' prescriptions, (10) checking, inventory, and prevention the loss of medical records, and (11) keeping nurse station clean and neat.

Dressing room nurses (huan yao shi hu shi) and therapeutic nurses (zhi liao ban hu shi) have the following responsibilities: (1) registration, sorting, wiping therapeutic substance, (2) preparing and monitoring disinfectants, (2) participating in nurse shift change meeting, (3) preparing medication for treatment, (4) receiving medication from the pharmacy and preparing for each patient, (5) assisting the computer response nurses'

work, (6) managing the therapeutic room, keeping it clean and neat, (7) cleaning, disinfecting, and preparing nursing care products, (8) receiving, adding, and managing liquid and solid medication, and (9) checking, inventory, and disinfection of sterile goods.

Half evening shift nurses (xiao ye ban hu shi), who have the 8-hour night shift work, have the following responsibilities: (1) inventory shift with substances, (2) providing all wards' patients with treatments, nursing care, and safety, (3) admitting new patients, carrying out doctor prescriptions, and carrying out special checks, (4) observing the ward and mastering patients' change of conditions, (5) monitoring patients' temperature, pulse, respiration, and blood pressure, (6) assisting caregivers for evening nursing care, (7) writing shift change reports and fill up nursing records, and (8) keeping nurse office and treatment room clean.

Whole evening shift nurses (da ye ban hu shi), who have a 16-hour night work shift, have the following responsibilities: (1) inventory shift with substance, (2) observing the patients' rooms according to the level of nursing care, (3) finishing new admission patients' work on time, (4) monitoring patients' temperature, pulse, respiration, and blood pressure, (5) turning off light on time and urging the visitors to leave rooms, (6) writing shift reports, nursing care reports and daily reports, (7) collecting various samples, (8) carrying out and checking night shift doctors' prescriptions, and (9) cleaning nurse office and treatment room.

In this study, only staff nurses that have the responsibility to directly deliver nursing care to patients were recruited. Thus, the nurses that were selected in this study are those who have the responsibilities as the primary nurses, half-evening shift nurses, and whole-evening shift nurses. However, the working shifts for those selected nurses vary in working departments and hospitals. In general, nurse work rotations can be designated as follows: (1) day shift (8 hours), whole evening shift (16 hours), and 1 day vacation, (2) day shift (8 hours), half evening shift (8 hours), whole evening shift (16 hours), and 1 day vacation, (3) five days' day shift (one day work at weekend), (4) day shift (12 hours), whole evening shift (12 hours), and 1 day vacation, (5) day shift (8 hours), afternoon shift (8 hours), night shift (8 hours), and 1 day vacation.

Although nursing graduates with different educational backgrounds have the same responsibility in their work setting, their professional titles and promotion

processes are different. The professional titles for clinical nurses in China include the registered nurse (Hu shi), senior nurse (Hu shi), supervisor nurse (Zhu guan hu shi), associate professor nurse (Fu zhu ren hu shi), and professor nurse (Zhu ren hu shi). According to human resource management center stipulations (Human Resource Management Center, 2014),

(1) ‘Registered Nurse’ was a title given to those at the initial professional level.

(2) ‘Senior Nurse’ was a title given to those at an assistant professional level.

(3) 'Supervisor Nurse' was a title given to those in the middle professional level.

(4) ‘Associate Professor Nurse’ was a title given to those in the sub-senior professional level.

(5) ‘Professor Nurse’ was a title given to those in senior professional level. Generally, nurses with different backgrounds required different years of experience for promotion, as shown in Table 1. In addition, nurses are required to take an examination related to nursing knowledge for each level promotion. One type of model computer examination was required for moving from assistant professional level to middle professional level, and two additional model types were required for moving from middle professional level to sub-senior professional level. The English examination was required for moving from middle professional level to sub-senior professional level. Continuing nursing education credits were also required. Moreover, special cases are considered for people with excellent personal contributions such as being rewarded for research improvement, urgently needed special abilities, or more than one year abroad of academic experience.

In conclusion, the above sections give a brief introduction of the Chinese healthcare system, hospital accreditation, nurses’ employment status, the programs of nurse education, nurses’ responsibilities, and the nurses’ profession titles and promotion. This information will help readers to better understand the Chinese healthcare system. It can also aid readers in understanding the discussion part of this dissertation.

Table 1 The number of year requirements for promotion with the differing educational levels of Chinese nurses

Education	Initial level (registered nurses)	Assistant level (senior nurse)	Middle level (supervisor nurses)	Sub-senior level (associate professor nurses)	Senior level (professor nurses)
Doctorate degree			When graduate (confirm)	Work in middle level more than two years.	Work in sub-senior level more than five years (only for bachelor, master, or doctorate degree holder)
Master degree		When graduate (confirm)	After two years working as assistant level, it can be applied; after three years working as assistant level, it can be determined by an assessment.	Work in middle level more than five years.	
Bachelor degrees (with two discipline certificates)		When graduate (confirm)	Work in assistant level more than three years	Work in middle level more than five years.	
Bachelor degree		One year after graduate (confirm)	Work in assistant level more than four years	Work in middle level more than five years.	
Associate degree	One year after graduate (confirm)	Work in initial level more than 2 years (confirm)	Work in assistant level more than four years		
Technical nurses	One year after graduate (confirm)	More than four years work in initial level (confirm)			

1.2 Quality of nursing care in China

Chinese researcher Tian et al. (2008) studied about clinical problems related to quality of nursing care and suggestions for solving these problems. According to this research, it was stated that quality of nursing care evaluated by nurse administers was too formal to be effective. Although documentation, sanitation or work process problems could be solved through quality evaluations, it has little effect on the improvement and upgrading of the true quality of nursing care. In addition, nurse administers do not work at the first line clinical ward. Therefore, their reports may miss out on some significant information related to quality of nursing care problems due to the fact that they do not directly deliver nursing services to patients. Moreover, Hu (2012) studied about problems related to Chinese quality of nursing care and methods used to evaluate quality of nursing care. The result suggested that it was better to assess quality of nursing care from a clinical nurse's perspective.

A literature review showed that nurses reported quality of nursing care survey has been conducted in Chinese hospitals by You et al. (2013). The purpose of this research was to determine the extent to which variation in features of nurse staffing and nurse work environment were associated with quality and safety of care, patients' care experiences, and nurse workforce factors such as job satisfaction and job-related burnout. This research group surveyed 181 Chinese hospitals in 9 provinces, 29% of nurses reported quality of nursing care on their unit as poor or fair. Approximately half of participants were uncertain that their patients could manage their self-care well when they were discharged from the hospital. Zhu et al. (2012) studied the relationship between nurse staffing and patient outcomes in hospitals among 7,802 nurses and 5,430 patients from 600 medical and surgical units in mainland China. The results showed that 30.39% of nurses perceived quality of nursing care as fair or poor and 43.74% of them lacked confidence regarding their patients' self-care ability when they were discharged. Furthermore, the nurse-assessed quality of nursing care as poor or fair was higher than Germany (20%), Thailand (19%), U.S.A. (13.1%), U.K. (14%), and New Zealand (12%) that nurse-assessed quality of nursing care as poor or fair (Aiken et al., 2008). This data showed that nurses-assessed quality of nursing care has significant problems among most Chinese hospitals. Therefore, it is important for nurse administrators to know what the problems are and what kinds of factors influence

nurse-assessed quality of nursing care in order to better control these factors. In the future, it would be beneficial to conduct the intervention study or implement a hospital policy in order to enhance nurse-assessed quality of nursing care. Moreover, it will also benefit patients by helping them receive good nursing care. The following parts provide the essential clinical situations in China that have influenced nurse-assessed quality of nursing care.

Although several quality of nursing care models have been reviewed, such as Donabedian's Structure, Process, and Outcome (D-SPO) (Donabedian, 1988), Outcomes Model for Health Care Research (OMHCR) (Holzemer, 1994; Holzemer, 1996), Quality Health Outcomes Model (QHOM) (Mitchell, Ferketich, & Jennings, 1998), and Nurse Work Environment, Nurse Staffing, Outcome Model (NWE-NS-OM) (Aiken, 2002). Aiken's NWE-NS-OM model was selected for this study. This is because the NWE-NS-OM model can explain much interesting phenomena relating to this study. Based on the NWE-NS-OM model, the selected factors that influence nurse-assessed quality of nursing care are nurse staffing, nurse work environment, nurse job satisfaction, nurse burnout, and nurse's intention to leave. The problems related to these factors are presented as follows.

One common factor that influenced nurse-assessed quality of nursing care was an insufficient number of nurses providing nursing care (Aiken, Clarke, & Sloane, 2002; Williams, 1998). For instance, according to Guo (2008), who surveyed 696 tertiary general Chinese hospitals, nurses took care of 10 to 14 patients on their work shift. Some took care of more than 30 patients on their work shift. Moreover, 65.2% of RNs work more than 10 hours per day, which is longer than the average of 8 hours per day. Since hours of care per patient day (HPPD) was also used to measure nurse staffing in the western healthcare system, the long work hours also reflect the lack of RNs in Chinese hospitals.

Another factor that influenced nurse-assessed quality of nursing care was nurse work environments (Aiken, Sloane, Bruyneel, Van den Heede, & Sermeus, 2013). In China, You et al. (2013) measured nurse work environment in 181 hospitals. Sixty-one percent of nurses described their work environments as poor or fair.

Moreover, nurses' reactions to their work, including nurses' job satisfaction, nurse burnout, and nurses' intention to leave, have also been reported to influence

nurse-assessed quality of nursing care (MacDavitt, 2008). The problems related to these aspects were also significant among Chinese RNs. For example, several studies indicated that the level of nurses' job satisfaction among RNs was low (He, 2006; Tang, Zhang, & Chen, 2007; You et al., 2013). For example, He (2006) investigated nurses' job satisfaction and its influencing factors among 891 nurses in 10 general hospitals above the secondary level of Taiyuan city, China. Nurses' job satisfaction was measured by McCloskey/Mueller Satisfaction Scale (MMSS). The results showed that nurses' job satisfaction was low (M = 2.89, SD = .61). Similarity, Tang et al. (2007) studied nurses' job satisfaction among 606 nurses in one general hospital in Gongzhou city, China. Nurses' job satisfaction was measured by MMSS as well. The results showed that nurses' job satisfaction was low (M = 2.95, SD = .49). In the study by You et al. (2013), 45% of Chinese nurses were dissatisfied with their jobs.

When looking at nurse burnout in China, it also found that RNs suffered from a high workload. A moderate level of nurse burnout was reported by Wang (2007), who studied about the relationship between work empowerment and nurse burnout among 385 nurses in one tertiary general hospital in Harbin city, China. Nurses' burnout was measured by the Chinese version of Maslach's Burnout Inventory-Human Service Survey (C-MBI-HSS). The emotional exhaustion dimension of burnout was at a moderate level (M = 24.72, SD = 10.51). Depersonalization dimension of burnout was at a moderate level (M = 6.88, SD = 6.21). Personal accomplishment dimension of burnout was at a moderate level (M = 32.06, SD = 8.63). In addition, Wang, Ding, Gao, and Li (2014) studied the relationship between intention to stay and professional burnout among 458 nurses among three tertiary general hospitals in Dalian city, China. The results showed a moderate to high level of nurse burnout. The emotional exhaustion dimension was at a high level (M = 27.80, SD = 11.44). The depersonalization dimension was at a moderate level (M = 8.05, SD = 6.40). The personal accomplishment dimension was at a moderate level (M = 35.81, SD = 8.24). In a study by You et al. (2013), 38% of nurses in China experienced high levels of burnout.

The problem of a high number of nurses intending to leave Chinese hospitals is also significant. Zheng and Zhu (2007) explored the turnover intention among 515 clinical nurses in 12 hospitals in Changcha city with the Turnover Intention Questionnaire (TIQ). The results showed that the total score of turnover intention was

15.45 (SD = 3.58) with the value of index 64.37%. Among three dimensions, turnover intention III got the highest score of 5.87 (SD = 1.21) with the value of index 73.34%, followed by turnover intention II (M = 4.85, SD = 1.53) with the value of index 60.63%. Turnover intention I got the lowest score of 4.72 (SD = 1.63) with the value of index 59.00%. In addition, Ge and Zhao (2014) studied the nurse' turnover intention and influencing factors among 272 nurses in three tertiary level A hospitals in Ningxia city, China by TIQ. The results showed that the total score of nurses' turnover intention was 17.52 (SD = 2.23). The total turnover intention score of more than or equal to 17 accounted for 40.4%, which indicated a relatively high level of turnover intention.

After an extensive literature review, except for the problems related to the influencing factors reported above, it was found that only three studies investigated predicting factors pertaining to nurse-assessed quality of nursing care in China. You et al. (2013) reported that nurse staffing and nurse work environment influenced nurse-assessed quality of nursing care, respectively. Zhu et al. (2012) revealed that nurse work environment influenced nurse-assessed quality of nursing care. In addition, Xue et al. (2010) investigated nurses' cognition of high-quality care and compared nurses' report of quality of nursing care with different education background, year of work, and professional title among 108 nurses in one tertiary general hospital in China.

All of those studies use a regression analysis in order to found out the predictors of nurse-assessed quality of nursing care. However, factors such as nurses' job satisfaction, nurse burnout, and nurses' intention to leave, which greatly influence nurse-assessed quality of nursing care, are not studied in China. In addition, the indirect impacts of nurse staffing and the nurse work environment through nurses' job satisfaction, burnout, and nurses' intention to leave on nurse-assessed quality of nursing care are not well understood.

2. Conceptual Models Related to Quality of Nursing Care

Appropriate conceptual models are important to assess factors influencing quality of nursing care. Without a conceptual model, the relationships among variables that influence the quality of nursing care cannot be determined. A review of literature found that Donabedian's Structure, Process, and Outcome Model (D-SPO) (Donabedian, 1988), Outcomes Model for Health Care Research (OMHCR) (Holzemer,

1994; Holzemer, 1996), Quality Health Outcomes Model (QHOM) (Mitchell et al., 1998), and Aiken's Nurse Work Environment, Nurse Staffing, and Outcomes Model (NEW-NS-OM) (Aiken, 2002) have provided a conceptual framework related to quality of care. The content and critiques of these conceptual models are provided as follows.

2.1 Donabedian's Structure, Process, and Outcome Model (D-SPOM)

Donabedian (1988) was a pioneer in formulating the "structure-process-outcome" model for quality of care assessment. It was widely recognized in discussions of modern medical quality assurance. This model emphasized three factors, including structures, processes, and outcomes. The structures were defined as broad, organizational, and administrative features. It can be explained in terms like nursing experience, skill mix, organization structure, organizational climate, size, range of services, and technology. Processes referred to aspects of clinical management, decision making, and clinical intervention. Outcomes involved the specific clinical end results of patient care. The utilization of D-SPOM can be used as a conceptual framework to either develop an instrument or conduct research related to quality of care. For instance, Kunaviktikul et al. (2001) developed a Thailand quality of nursing care indicator based on D-SPOM. In addition, Chitpakdee (2006) conducted research to investigate relationships between nurse staffing, nurses' job satisfaction and selected patient outcomes as well as to identify the predicting models of patient outcomes derived from nurse staffing variables among 98 medical and surgical nursing units of 15 hospitals located in the northern region of Thailand. The conceptual framework of this study was also based on D-SPOM.

Critique of D-SPOM

D-SPOM represents a traditional linear model of relationships among structures, processes, and outcomes to evaluate quality assessment. The major weakness of this model is that it only emphasizes on one dimension of the relationships among structure, process, and outcome. It assumed that structures affected processes, which in turn, affected outcomes. However, in the clinical setting, quality of nursing care is influenced by many factors, which are non-linear in their nature. Thus, this model could not illustrate the impacts of the interaction among factors that influence quality of care.

2.2 Outcomes Model for Health Care Research (OMHCR)

Based on D-SPOM, Holzemer (1994) constructed OMHCR. The OMHCR composed inputs, processes, and outcomes based on Donabedian's model at a horizontal axis and clients, providers and settings at a vertical axis. This three-by-three matrix of nine cells is shown in Figure 1. It can be used to explain the impacts that multiple factors have on quality of care. The following is an explanation of each of the nine cells.

The cell of clients/inputs is related to patient characteristics, culture value and belief, social support, problems, and health-related quality of life.

The cell of providers/inputs is related to the technical ability and competency of RNs and trained nurse assistants (UAPs).

The cell of settings/inputs is related to a health care organization's value and philosophy, hospital stay, equipment, discharge plan, and nurse to doctor ratio.

The cell of clients/processes is related to intervention to improve patient outcomes.

The cell of providers/processes is related to being better able to deliver the health care with UAPs help.

The cell of settings/processes is related to the utilization of UAP, total quality improvement principles, patient-focused care plans, critical paths and care planning.

The cell of clients/outcomes is related to physiological status, psychosocial status, functional status, behavior, knowledge, and symptom control.

The cell of providers/outcomes is related to nurse to patient ratio, nurses' quality of work life, and turnover.

The cell of settings/outcomes is related to cost-effectiveness, patient outcomes, patient falls, medication errors, and the increase or decrease of patient incidences.

	Inputs	Processes	Outcomes
Client			
Provider			
Setting			

Figure 1 Outcomes Model for Healthcare Research. Adapted from "The impact of multiskilling on quality of care" by W. L. Holzemer, 1996, International Nursing Review, 43(1), p. 22. Copyright 1999-2015 by John Wiley & Sons Inc.

Critique of the OMHCR

The OMHCR emphasizes that there are multiple relationships among factors that influence quality of care. It provides a clear and understandable method to evaluate quality of care among multiple levels, which include both an individual and organization level. In addition, the impacts of patients' beliefs and values on patient outcomes are also illustrated in this model. Moreover, the linkages among the nine cells of the OMHCR could increase the power of the model's explanation of how selected factors influence quality of care. However, the limitation of OMHCR is that researchers must carefully consider which important factors should be included in the hypothesized model testing, due to the fact that all related variables to health care outcomes are integrated in the nine cells.

2.3 Quality Health Outcomes Model (QHOM)

Mitchell et al. (1998) developed Quality Health Outcomes Model (QHOM) by extending D-SPOM and OMHCR combined with the authors' experiences in quality of care practice and research. QHOM moved the linear structure-process-outcome model into a dynamic model, which included four components: system characteristics, interventions, client characteristics, and outcomes (Figure 2). This model proposes that interventions are affected by and affect both system characteristics and client characteristics in the impact of outcomes. In addition, the model illustrated that feedback can occur among clients characteristics and system characteristics. The impact of an intervention on the outcome is mediated by client characteristics and system characteristics, but is thought to have no independent direct effect on the outcomes. A description of the four components is presented as follows.

The system characteristics component of the model refers to an organized agency, such as hospital or provider network, size, ownership, skill mix, client demographics, and technology. It can be assessed at individual, organizational or group levels.

The interventions component of the model refers to direct and indirect interventions and related activities by which health care providers are delivered.

The client characteristics component of the model refers to the state of the client's health, demographics, and disease risk factors. It can be assessed at an individual, family, or community level.

The outcome component of the model refers to the result of treatment interventions or technology assessment, such as the achievement of appropriate self-care, health-related quality of life, symptom management, perception of being well cared for, or demonstration of health-promoting behaviors.

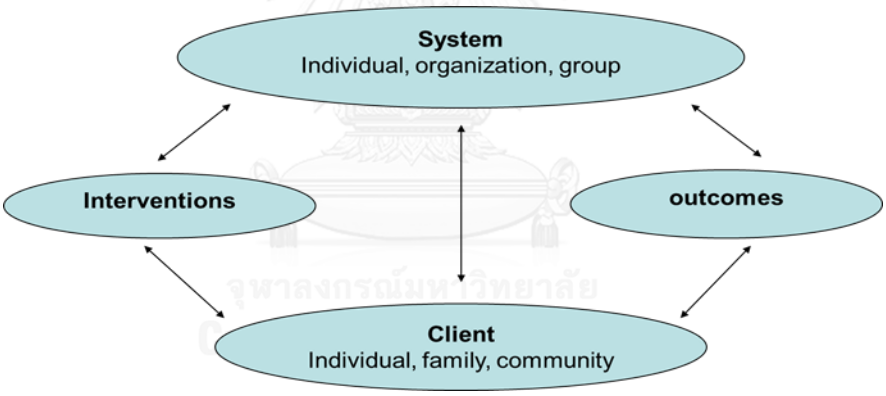


Figure 2 Quality Health Outcomes Model. Adapted from "Quality Health Outcomes Model" by P. H. Mitchell, S. Ferketich, B. M. Jennings, 1998. Image: Journal of Nursing Scholarship, 50(1), p. 44. Copyright 1999-2015 by John Wiley & Sons Inc.

Critique of the QHOM

The QHOM presents relationships among four main components in a dynamic model. It provides sufficient information for researchers to develop quality improvement or outcomes management programs, to select the variables for clinical intervention, and to provide the conceptual framework for outcomes research. However, the QHOM also has some limitations. Since the QHOM has illustrated reversal relationships among four components, it is unable to establish a cause-effect relationship in SEM. In addition, variable relationships are very complex in the QHOM. Therefore, it is important for the validity of the model to be able to demonstrate linkages among the four components through empirical evidence.

2.4 Aiken's Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM)

The Aiken (2002) NWE-NS-OM was established by Aiken research groups through conducting several studies to examine the influence of hospital organization on outcomes (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken et al., 2012; Aiken, Xue, Clarke, & Sloane, 2007). All the components of NWE-NS-OM included hospital priorities/policies, nurse work environment, nurse staffing (RN to patient ratio, skill mix), process of care, nurse outcomes, and patient outcomes as shown in Figure 3. NWE-NS-OM assumes that hospital priorities/policies influence nurse staffing and nurse work environment. Nurse staffing can influence nurse work environment. Both nurse work environment and nurse staffing can influence the process of care, which further influences both nurse outcomes and patient outcomes. In addition, it was assumed that nurse outcomes further influence patient outcomes.

In Aiken (2002) NWE-NS-OM, nurse staffing can be measured by RN to patient ratio and skill mix. In China, there are only RNs working in clinical settings. Without RN license, nurses cannot work in a clinical setting. There are no licensed practice nurses (LPNs). Thus, it is not appropriate to use a skill mix indicator to measure nurse staffing. Only RN to patient ratio will be selected to measure nurse staffing (You et al., 2013).

In addition, Aiken (2002) conceptual model also explains that people who work in the hospital work environment that is magnet-designated often bring about good outcomes, which include higher level of nurses' job satisfaction (Aiken, Havens, & Sloane, 2000), lower level of nurse burnout (Aiken et al., 2000), lower level of nurses' intention to leave (Aiken et al., 2012), and higher nurse-assessed quality of nursing care (Aiken et al., 2008; Van Bogaert et al., 2009; Van Bogaert et al., 2010). In Aiken (2002) model, nurse work environment is clarified into three categories: resource adequacy, nurse-physician relations, and administrative support. After clearly studying the magnet hospital nurse practice environment, Lake (2002) used the term "nursing practice environment" to describe 'organizational characteristics of a work setting that facilitates or constrains the professional nursing practice'. It was ground into five key domains by using factor analysis, which are (1) nurse participation in hospital affairs, (2) nursing foundations for quality of care, (3) nurse manager ability, leadership and support of nurses, (4) staffing and resource adequacy, and (5) collegial nurse-physician relations. In China, Wang and Li (2011) translated and adapted Lake (2002) PES-NWI to measure nurse work environment.

In Aiken (2002) model, nurse outcome is identified as nurses' reactions to their work (Hinto et al., 2012), which include nurses' job satisfaction, nurse burnout, nurses' intention to leave and nurse-assessed quality of nursing care. Job satisfaction was defined as the nurses' overall satisfaction about their job (Aiken, Clarke, & Sloane, 2002). Burnout is defined as the syndrome of emotional exhaustion, depersonalization, and a lack of personal accomplishment perceived by nurses in their working environment (Aiken, Clarke, & Sloane, 2002). Intention to leave was defined as nurses' intention to or not to leave their job in the next year (Aiken et al., 2012). Nurse-assessed quality of nursing care was described as the degree of nurses reported quality of nursing care delivered to patients in their units with designations such as excellent, good, fair, or poor (Aiken, Clarke, & Sloane, 2002). The measurements of nurses' job satisfaction and nurses' intention to leave were used as a single item questionnaire in Aiken (2002) NWE-NS-OM. According to DeVellis (2012), a single item questionnaire did not describe concept construct and it also lacked validity and reliability. Thus, Chinese Nurse Job Satisfaction Scale (CNJSS) and Chinese version of Anticipated Turnover Scale (C-ATS) were used in this study to measure nurses' job satisfaction and nurses'

intention to leave. Nurse burnout was measured by Maslach Burnout Inventory-Human Service Scale (MBI-HSS) in Aiken (2002) NWE-NS-OM. MBI-HSS has been translated and used in Chinese hospitals. Therefore, the Chinese version of C-MBI-HSS was used in this study to measure nurse burnout. However, the relationships among nurses' job satisfaction, nurse burnout, nurses' intention to leave are not explained in Aiken (2002) NWE-NS-OM.

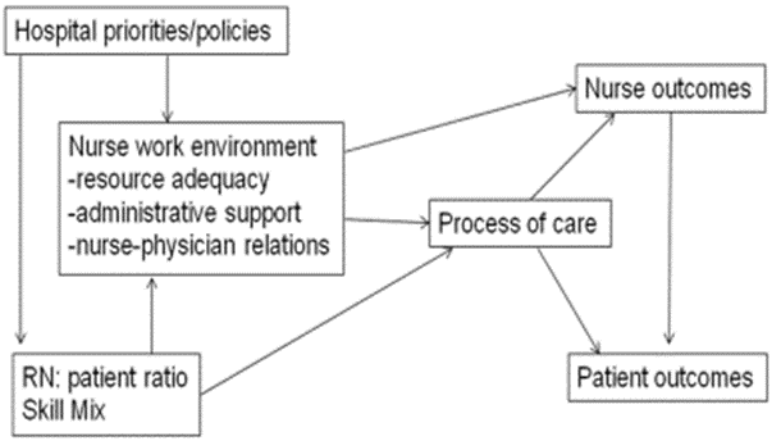


Figure 3 Nurse Work Environment, Nurse Staffing, and Outcomes: A conceptual model. Adapted from "Superior Outcomes for Magnet Hospitals: The Evidence Base" by L. H. Aiken, In M. McClure & A. Hinshaw (Eds.), Magnet hospitals revisited: Attraction and retention of professional nurses, p.63. Copyright American Nurses Association.

Critique of the NWE-NS-OM

The strength of NWE-NS-OM is that it was developed based on the phenomena that nurse resources and practice environment can significantly influence outcomes. In addition, interactions among concepts are also described in this model. However, definitions related to concepts are not provided in the model. Moreover, regarding nurse outcomes and patient outcomes, researchers could define them based on their own studies' purposes. Furthermore, only some of the relationships among the concepts that draw on the NWE-NS-OM can be supported by empirical studies.

The model selected for this research

To guide this study, the conceptual framework is built on a modified version of Aiken's (2002) NWE-NS-OM. This is because Aiken (2002) NWE-NS-OM includes

variable nurse staffing and nurse work environment, which are believed to have an impact on nurse outcomes (job satisfaction, burnout, intention to leave, and quality of nursing care). In addition, Aiken's research group has shown particular interest in contributing to an improved understanding of the link between organization and outcomes (Aiken, Clarke, & Sloane, 2002). Moreover, most of the studies focus on how nurse staffing and nurse work environment have a direct impact on outcomes (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2012). Although the Aiken (2002) model also included another two concepts, hospital policies and process of care, that were supposed to influence outcomes, no empirical evidence has been found to study those two variables along with nurse staffing, nurse work environment, and outcome together in one model. In addition, the purpose of this study was to identify the factors related to nurse-assessed quality of care, which was clarified as one of the nurse outcomes (Aiken, 2002). Thus, patient outcomes are not the current stage to be studied in this research.

Moreover, the establishment of a conceptual framework in this study was also based on the reviewing of literature. Several researches had been found to display the effects among the nurse outcomes. For example, MacDavitt (2008) identified nurses' job satisfaction had a positive effect on nurse-assessed quality of nursing care. Nurse burnout and nurses' intention to leave had a negative effect on nurse-assessed quality of nursing care. In summary, the conceptual framework of this study is presented in Figure 4.

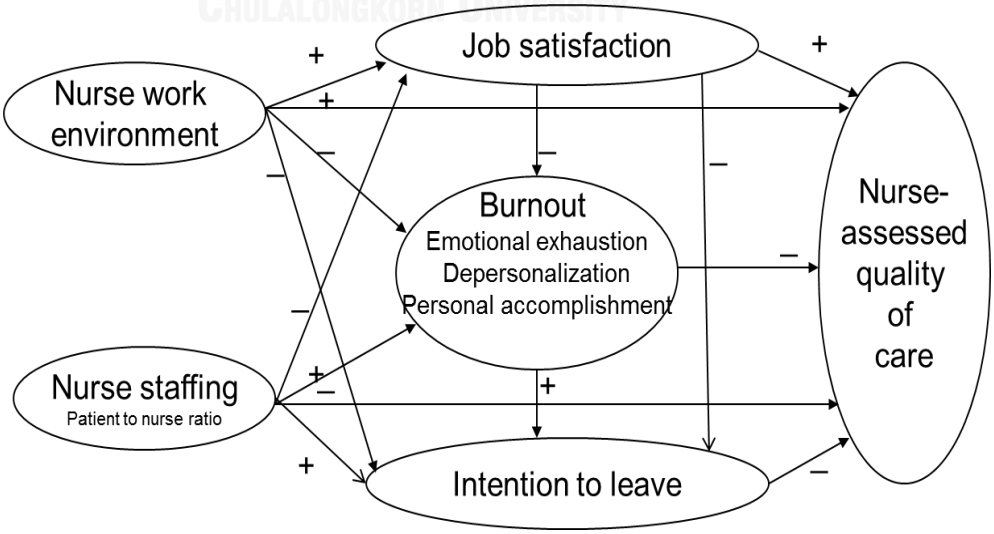


Figure 4 The conceptual framework of this study

Theory substruction from NWE-NS-OM to study variables

As mentioned before, the concepts selected to create this study were patient to nurse ratio, nurse work environment, and nurses' job satisfaction, nurse burnout, and nurses' intention to leave. The substruction of the theoretical level concepts to measurements of variables is presented in Figure 5.

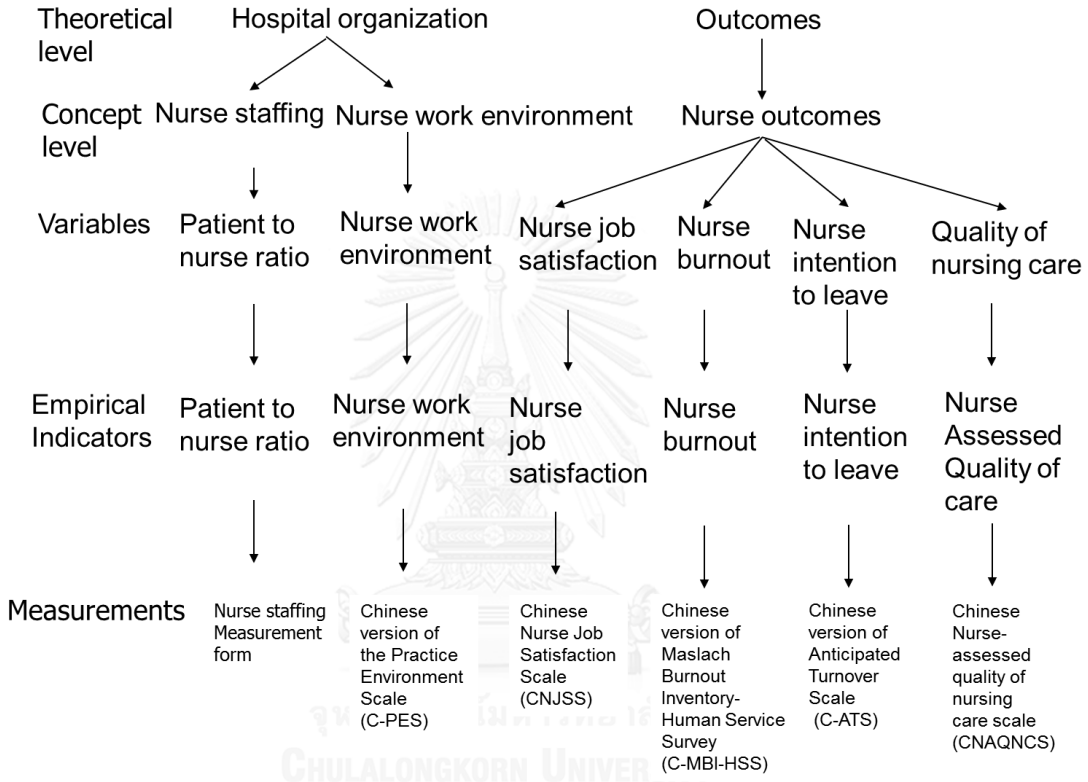


Figure 5 The selected part of Aiken (2002) Nurse work environment, Nurse staffing, and Outcome Model (NWE-NS-OM) theoretical substruction

3. Nurse-assessed Quality of Nursing Care

3.1 Definitions of nurse-assessed quality of nursing care

Quality of nursing care means that nurses provide the technical and life services to patients in order to meet their needs (Hou, 2007). Although quality of nursing care has been defined through various different perceptions, nurse-assessed quality of nursing care has been increasingly used in nurse workforce literature (MacDavitt, 2008). Many experts in the field of nursing have defined nurse-assessed quality of nursing care

using their own philosophies and beliefs.

Leino-Kilpi (1990) conducted a qualitative study to develop a concept apparatus for the description of good nursing care based on the views of professional nurses, including practical nurses, nurse educators, nurse students, as well as on the researcher's observations of those people. Through comparison of data analysis categories that were based on the views of professional nurses and nurse educators in Finland, good nursing care was defined in a larger scope as "doing something to or on behalf of the patient".

Hogston (1995) performed unstructured interviews among 18 nurses to explore practicing nurses' perceptions of quality nursing care from a large hospital in the south of England. Even though the nature of quality in nursing is intricate, data analysis revealed three categories to describe quality of care as structure (human resources), process (being competent), and outcome (patient satisfaction and meeting patient needs). This supports previous work on evaluating quality care by using structure-process-outcome as a framework for defining quality.

Williams (1998) conducted a grounded theory study by interviewing 10 RNs purposely selected from four surgical specialty wards of an acute-care public hospital located in Perth, West Australia. The result showed that quality nursing care was defined as therapeutically effective care that occurred when physical, psychological and any extra needs of the clients were met.

Kunaviktikul et al. (2001) conducted a descriptive study to develop a definition of quality of nursing care and to determine how it is measured in Thailand in two phases. The first phase used individual interviews (four hospital directors, four directors of nursing service, four supervisor nurses, eight head nurses, 24 staff nurses and six patients) and focus group discussions (two focus groups, 12 staff nurses in each focus group). The second phase included consultation with 31 qualified nursing care experts. The result described quality nursing care as nurses meeting the physical, psychological, emotional, social and spiritual needs of patients, so that the patients were treated and able to live normal lives, which in turn, gives satisfaction to both nurses and patients.

Aiken et al. (2002) conducted a multi-site cross-sectional survey among 10,319 nurses working on medical and surgical units in 303 acute care hospitals across the U.S.A., Canada, England, and Scotland. In this survey, nurse-assessed quality of care

was defined as the degree of which nurses reported the quality of nursing care delivered to their patients as excellent, good, fair, or poor.

Zhao (2006) preformed a descriptive, comparative study with 221 nurses and 383 patients among 18 non-ICU inpatient nursing units in one Chinese tertiary general hospital located in Harbin, China. The result showed that researchers defined quality of nursing care by using clinical nurses' perspectives as to the degree of excellence in nursing care delivery for patients, which included care-related activities, staff characteristics, progress of the nursing process, preconditions for care, physical environment, and cooperation with relatives from RNs' perspectives.

Tafreshi et al. (2007, p. 324) conducted a qualitative study to define and describe quality from the perspective of nursing experts and clinical nurses. The result defined quality of nursing care as "the delivery of safety care based on nursing standards which eventuates patient satisfaction".

Nantsupawat (2010) conducted secondary data analysis among 5,247 RNs from 39 hospitals in Thailand. The results defined quality of nursing care as the nurses' perceptions of the quality of nursing care that they deliver to patients.

Burhans and Alligood (2010, p. 1689) conducted a hermeneutic phenomenology study to describe "What is the lived meaning of quality nursing care for practicing nurses?' Twelve nurses working at medical or surgical adult units in an acute care hospitals in the United States of America were interviewed. The result defined the meaning of quality nursing care from practicing nurses' perspectives as "meeting human needs through caring, empathetic, respectful interactions within which responsibility, intentionality, and advocacy form an essential, integral foundation".

In conclusion, in the literature, the term nurse-assessed quality of care (Aiken, 2002; Faller, Gates, Georges, & Connelly, 2011), nurse perception quality of care (MacDavitt, 2008), nurse reported quality of care (Aiken et al., 2002), or quality of nursing care (El-Jardali et al., 2011; Nantsupawat, 2010; Sochalski, 2001) were used interchangeable as having similar meaning to measure nurse-assessed quality of nursing care. In this study, the term "nurse-assessed quality of nursing care" was used. In addition, from the above explanations, it was found that the definitions of quality of nursing care from nurse perspectives were unclear in existing literature. Therefore, based on the above statements, the research synthesized the attributes of nurse-assessed

quality of nursing care as (1) excellence of nursing care (Aiken et al., 2002; Zhao, 2006), (2) fitness for purpose and conformance to standards (Hogston, 1995; Leino-Kilpi, 1990; Nantsupawat, 2010; Tafreshi et al., 2007; Williams, 1998), (3) the ability to meet patient needs (Burhans & Alligood, 2010; Hogston, 1995; Kunaviktikul et al., 2001; Williams, 1998) and (4) the ability to fulfill patient satisfaction (Hogston, 1995; Kunaviktikul et al., 2001; Tafreshi et al., 2007). Moreover, based on the above attributes, the theoretical definition of nurse-assessed quality of nursing care is defined as nurses' perception about the degree of excellence on the standard nursing services they provide with their expectation to meet patients' needs and to satisfy patients' demands.

3.2 Dimensions of nurse-assessed quality of nursing care

Quality of nursing care is a multidimensional concept. The dimensions that are related to the quality of nursing care, from the perspective of nurses, are described as the following.

Leino-Kilpi (1990) conducted a qualitative study and synthesized five main categories of good nursing care, including the characteristics of a good nurse, the activities of a good nurse, the nature of activities, the preconditions for good nursing care, and the aims of good nursing care.

Hogston (1995) derived the essential attributes of nurse-assessed quality of care using qualitative methods. The results of this qualitative study grouped the quality of nursing care attributes into three categories, including (1) structure: workload, staffing levels, skill mix, and time; (2) process: being competent, values and beliefs, multi-disciplinary teamwork, holistic care, team dynamics; and (3) outcome: patient needs and patient satisfaction.

Williams (1998) suggested that the primary component of quality nursing care are patients' needs, which were identified as physical needs or psychosocial needs. The physical needs were related to a lack of personal independence in the physical daily functional activities of the person. Psychosocial needs required the nurses to assume a supportive role for the patients, such as specific ways of communicating, providing information, caring and advocating for the patients, patients' family, and patients' social life.

Idvall and Rooke (1998) defined quality of nursing care from the perspective of surgical ward nurses by using focus group discussion. The results included 15

categories of nursing care quality. Those categories were grouped into two dimensions: prerequisites and elements of performance. For example, prerequisites included routines, staffing, and attitudes. Elements of performance included detecting, acting on behalf of the patients, and acting on signs and symptoms.

McKenna et al. (2006) used the nominal group and Delphi techniques to explore healthcare staff perceptions of the quality of hospital care provided in the United Kingdom (U.K.) compared with a tool from the United States (U.S.). The results showed that most components of U.K.-Perceptions of Unit Quality (UK-PUQ) scale and the U.S. scale are same. These were related particularly to competency, communication, confidentiality, and dignity of patients, cleanliness and hygiene, expertise and judgment, safety, discharge procedures, information and education, staff morale, and continuity of care. Areas of significant difference between the two scales were related to leadership, infection rates, resources, and waiting lists.

Yam and Rossiter (2000) conducted a qualitative study by interviewing ten registered nurses in Hong Kong to determine the meaning of quality nursing care from nurses' perspectives. The content analysis results showed that nine categories emerged from the data, and these were contained within the three headings: nurses' perceptions of caring behaviours (trying one's best in meeting clients' needs, demonstrating effective communication and interpersonal skills, providing a supportive environment), barriers to caring (human barriers, barriers created by the culture of nursing, administrative and resource barriers), and ways to overcome the barriers (improving personal and professional self, ensuring colleague support, and enhancing a healthy working environment).

Leinonen, Leino-Kilpi, Sthlberg, and Lertola (2003) compared nurses' and patients' perceptions of perioperative quality care using the Good Nursing Care Model. In five operating departments, nurses (n = 874) and patients (n=143) had statistically different perceptions of perioperative care quality in five categories including staff characteristics, nursing activities, preconditions, the progress of nursing process, and environment.

Kunaviktikul et al. (2005) did a descriptive study to define quality of nursing care and its indicators. The results showed that there were different views of quality of nursing care from different research subjects. While combining the options from the

perspectives of the hospital directors, nurse managers, staff nurses and patients, the research group categorized nine indictors to measure quality of nursing care, including nurse and other nursing personnel ratio, nursing hours, skin integrity, nurse satisfaction, nosocomial infection, falls, patients' satisfaction with health education, patients' satisfaction with pain management, and patients' satisfaction with general nursing.

Zhao (2006) modified The Good Perioperative Nursing Care Scale (GPNCS) and determined six dimensions of Perception of Quality Nursing Care Scale (PQNCS) for both nurses and patients. These dimensions included staff characteristics, care-related activities, preconditions for care, physical environment, progress of nursing process and cooperation with relatives.

Lee and Yom (2007) performed a study to compare the nursing service quality as perceived by nurses and patients. Based on Parasuraman, Zeithaml, and Berry (1988), it initially developed five factors of service quality (SERVQUAL). The five factors that were used to describe the nursing service quality construct are tangibility, reliability, responsiveness, assurance and empathy.

Tafreshi et al. (2007)'s content analysis of qualitative data results showed that standard care, patient satisfaction, and participation in care were the major themes from the interview data. The data collection was carried out in two groups: ten individual interviews and five focus group discussions. A total of 44 clinical nurses and ten nursing experts participated into this study. For the theme of "standard care" both groups put an emphasis on "minimum optimized care" and "safe care for patients". For the theme of "patient satisfaction" based on participants' perspectives, it was found to be an important outcome to assess quality of nursing care. For the theme of "participation in care" all of the participants emphasized that "teamwork" is important for quality care.

Burhans and Alligood (2010) used a qualitative hermeneutic phenomenological research approach to analyze, interpret, and synthesize the interviewed data from twelve nurses. The results showed that six essential themes of quality nursing care were determined from the participants, including advocacy, caring, empathy, respect, and responsibility.

In conclusion, from the above literature review, the dimensions of quality of nursing care from nurses' perspectives can be concluded into eight components. They are "nurse staffing" (skill mix, staffing levels, or staffing and nursing resources)

(Hogston, 1995; McKenna et al., 2006; Yam & Rossiter, 2000), "physical environments" (tangibility, environment, or facilities and budget) (Donmez & Ozbayır, 2011; Lee & Yom, 2007; Leinonen et al., 2003; McKenna et al., 2006; Yam & Rossiter, 2000; Zhao, 2006), "staff characteristics" (Donmez & Ozbayır, 2011; Leino-Kilpi, 1990; Leinonen et al., 2003; McKenna et al., 2006; Yam & Rossiter, 2000; Zhao, 2006), "preconditions" (assurance or competency) (Lee & Yom, 2007; Leino-Kilpi, 1990; Leinonen et al., 2003; McKenna et al., 2006; Yam & Rossiter, 2000; Zhao, 2006), "timeless activities" (responsibility, responsiveness, or vigilance) (Burhans & Alligood, 2010; Lee & Yom, 2007; Williams, 1998); "task orientated activities" (physical care, give information, health education) (Burhans & Alligood, 2010; Donmez & Ozbayır, 2011; Lee & Yom, 2007; Leino-Kilpi, 1990; Leinonen et al., 2003; McKenna et al., 2006; Tafreshi et al., 2007; Williams, 1998; Yam & Rossiter, 2000; Zhao, 2006), "human orientated activities" (empathetic, respect, and psychological support) (Lee & Yom, 2007; Leino-Kilpi, 1990; Leinonen et al., 2003; McKenna et al., 2006; Williams, 1998; Yam & Rossiter, 2000; Zhao, 2006), and "patient outcomes" (patient needs, patient satisfaction, patient safety) (Hogston, 1995; Leino-Kilpi, 1990; McKenna et al., 2006; Tafreshi et al., 2007; Yam & Rossiter, 2000).

3.3 Measurements of nurse-assessed quality of nursing care

The measurement of quality care is not new in nursing practice and concern about quality nursing care has been documented since the days of Nightingale (Ott, 1987). Measurement of quality nursing care can come from patient perspective (Lee, Hsu, & Chang, 2007; Lanka, Senarath & Gunawardena, 2011), nurse perspective (Aiken et al., 2002; Lee & Yom, 2007; Lynn, McMillen, & Sidani, 2007) or both nurse and patient perspective (Donmez & Ozbayır, 2011; Kunaviktikul et al., 2005; Leinonen et al., 2003; Pazargadi, Tafreshi, Abedsaeedi, Majd, & Lankshear, 2008; Zhao, 2006). Since this study aims to measure nurse-assessed quality of nursing care, the instruments related to nurse perception were reported here.

Nurse reports of quality of hospital care questionnaire (NRQHCQ) was developed by Aiken et al. (2002) to measure nurses reports of quality of hospital care on their unit. NRQHCQ is a four-point Likert Scale. The scores ranged as 1= *excellent,* 2 = *good,* 3 = *fair,* 4 = *poor*. The item related to quality of nursing care was "How would you describe the quality of nursing care delivered on your last shift?" However,

this single item may not reflect the construct of quality nursing care (DeVellis, 2012).

The Good Perioperative Nursing Care Scale (GPNCS) was developed based on the Leino-Kilpi (1990) Good Nursing Care Model. Leinonen et al. (2003) used GPNCS to compare patient and nurse perceptions of perioperative care quality in five hospital operating departments in Finland. It is a five-point Likert Scale. The score ranged from 1 = *fully disagree* to 5 = *fully agree*. In addition "0" represents the choice "I cannot evaluate this aspect". Five main categories with 12 subcategories were classified, including staff characteristics, activities (physical, educational, supporting initiative, respect, caring, advocacy, encouragement), preconditions, progress of nursing process, and environment (physical and social). The Cronbach alpha coefficients ranged from .50 to .84 for nurses; .14 to .86 for patients. This instrument's internal consistency reliability can be acceptable for nurses. However, the construct validity of GPNCS was not reported. In addition, GPNCS was used in operating departments. It may not be appropriate to be used in inpatient departments in this research.

Quality of nursing care indicator in Thailand (QNCI-T) was developed and categorized into nine indictors by Kunaviktikul et al. (2005). Indicator 1: nurse and other nursing personnel ratio, Indicator 2: nursing hours, Indicator 3: skin integrity, Indicator 4: nurse satisfaction, Indicator 5: nosocomial infection, Indicator 6: falls, Indicator 7: patient satisfaction with health education, Indicator 8: patient satisfaction with pain management, and Indicator 9: patient satisfaction with general nursing. Nine experts participated in evaluating the content validity of nurse quality care indicators. The Content Validity Index (CVI) for each indicator was .78, 1.00, .78, .89, .78, .90, .89, 1.00, and 1.00, respectively. The Cronbach alpha coefficients for each indicator ranged from .71 to .91. However, this instrument was developed in a Thai context and it may not be suitable for use in a Chinese context. In addition, the construct validity of the quality of nursing care indicators has not been tested yet.

Perception of Quality Nursing Care Scale (PQNCS) of nurses and patients was modified from the GPNCS by Zhao (2006). This instrument was used to explore and compare quality nursing care as perceived by nurses and patients in medical and surgical departments in a Chinese tertiary general hospital. It is a five-point Likert scale. The score ranged from 1 = *fully disagree* to *5 = fully agree*. An alternative one was with the answer 0 = *don't know*. The total of 63 items was divided into six categories

as staff characteristics (10 items), care-related activities (25 items), preconditions for care (8 items), physical environment (7 items), progress of nursing process (5 items), and cooperation with relatives (8 items).The content validity index (CVI) for PQNCS of nurses was .93 and .91 for patients. The Cronbach's alpha coefficient for PQNCS of nurses and patients were .84, and .81, respectively. However, the construct validity was not tested by the Zhao (2006) Perceptions of Quality Nursing Care Scale.

In addition, Lynn, McMillen, and Sidani (2007) interviewed southeastern United States acute care nurses, formatted items, and administered a survey of 'nurse-assessed quality of nursing care' to 1272 nurses from seven acute care hospitals to test psychometric properties of Assessment of Quality Scale — Acute Care Version (AQS-ACV). It is a five-point Likert Scale. The score ranged from 1 = *strongly disagree* to *5 = strongly agree.* By exploratory factor analysis, 77 items were obtained with eight factors throughout three sections. In section 1, four factors were extracted, including interaction (19 items), vigilance (10 items), individualization (6 items), and advocate (10 items). In section 2, two factors were extracted, including work environment (12 items) and unit collaboration (9 items). In section 3, two factors were extracted, including personal characteristics (7 items) and mood (4 items). However, when the three sections are put together, the construct validity of the instrument cannot be established.

Moreover, Parasuraman et al. (1988) initially developed the 22-item instrument of SERVQUAL to assess customers' perceptions of service quality in service and retail organizations. Through factor analysis, five factors were extracted with factor loading more than .35, labeled tangibility, reliability, responsiveness, assurance, and empathy. Later, Mangold and Babakus (1991) applied SERVQUAL to measure service quality from nurse perspectives. Based on the construction of SERVQUAL, Lee and Yom (2007) modified items in order to make this instrument appropriate for use in hospitals from nurses' perspectives. It is a five-point Likert scale. The score ranged from 1 = *disagree very strongly* to *5 = agree very strongly*. Five factors were extracted from factor analysis, with factor loading more than .5. They were named as tangibility, reliability, responsiveness, assurance, and empathy. The total Cronbach's alpha coefficient was .97. The subscales' Cronbach's alpha coefficient were .85 for tangibility, .90 for reliability, .87 for responsiveness, .91 for assurance, and .92 for

empathy, respectively. However, since this instrument initially was not developed in the field of nursing, it may not be appropriately used to measure the constructs of quality of nursing care.

Pazargadi et al. (2008) conducted a descriptive exploratory study among 161 nurses, 119 nurse managers from teaching hospitals, and 42 nurse experts from nursing schools among seven provinces in Iran to determine performance quality indicators (PQI) in nursing care. Finally, 97 indicators (items) in seven dimensions were assessed by experts. Three categories with 34 indicators were labeled in the Donabedian structure dimension: 'Management and organizational leadership', 'Staffing and Nursing Resources' and 'Facilities and Budget'. Two categories with 21 indicators were labelled in the process dimension: 'Time and Quality of care' and 'Nurse Satisfaction and Working Conditions'. Furthermore, two categories with 15 indicators were labelled in the outcome dimension: 'Patient Satisfaction' and 'Complications and Adverse Events'. It is a three-point Likert scale. The score ranged from low to high, which represented 1 = *not important*, 2 = *important, but not so much* and 3 = *very important*. However, researchers did not report the psychometric property testing for their developed instrument.

Donmez and Ozbayır (2011) conducted a cross-sectional survey to test the validity and reliability of the Turkish version of GPNCS (T-GPNCS) for both nurses and patients. The subject included 346 patients who had surgery and 159 operating room nurses who worked in 11 hospitals. It is a five-point Likert scale. The score ranged from 1 = *I completely disagree* to 5 = *I completely agree*. A score of 0 was marked for "I can't evaluate this aspect". The exploratory factor analysis was used to analyze the Construct Validity of the T-GPNCS. Finally, seven factors with 32-items were extracted for nurses, labeled as physical care, giving information, support, respect, personnel characteristics, environment, and nursing process. The factor loading ranged from .39 to .83 for nurses. The seven factors explained a total of 66.98% of the variance for nurses. In addition, the same seven factors with 32-items were also obtained in the basic components for patients. The factor loading ranged from .50 to .89 for patients. The seven factors explained a total of 68.94% of the variance for patients. The Cronbach's alpha coefficient of the T-GPNCS for nurses was .94 and for patient was .93, respectively. The item-to-total correlation coefficients of T-GPNCS for both nurses and

patients were more than .3. Although T-GPNCS had good psychometric properties, it measured quality nursing care in a Turkish context. Thus, it may not be appropriately used in a Chinese context. Moreover, T-GPNCS was tested among nurses and patients in operation rooms. In this case, the researchers conducted the research in inpatient developments without operation rooms. Thus, T-GPNCS was not selected.

In conclusion, there are several problems related to the existing instruments for nurse-assessed quality of nursing care. For example, NRQHCQ was single item, which cannot reflect the reliability and validity of quality of nursing care. Some of instruments lacked construct validity, such as GPNCS, QNCI-T, PQNCS, AQS-ACV, and PQI. Thus this researcher is not sure it can be used to measure the quality of nursing care. In addition, SERVAUAL initially was not developed in nursing population. The items written in SERVUAL may not reflect nurses' services that provide to patients. Moreover, although T-GPNCS has a good psychometric property, it was developed for operating room nurses. In this study, the operating rooms were excluded. Therefore, it is necessary to develop a new quality of nursing care instrument from the nurses' perspective that can be used in the Chinese inpatient departments' context. Additionally, since the constructs of nurse-assessed quality of nursing were vaguely described in previous studies, this researcher should clarify the clearly description of its constructs.

3.4 Consequences of nurse-assessed quality of nursing care

Nurse-assessed quality of nursing care is related to patient outcomes, such as medication errors, nosocomial infections, and patient falls. In addition, it also influences organizational outcomes, such as mortality and length of stay in the hospital.

Sochalski (2001) examined the variation of nurse reported quality of nursing care in each hospital and determined what variables were associated with quality of nursing care among 80,500 staff registered nurses who worked in medical-surgical departments in acute care hospitals in Pennsylvania. The results showed that nurse-assessed quality of nursing care was a significant predictor of patient falls with injury, nosocomial infections, and medication errors. When the quality of nursing care from nurse perspective was rated from excellent to poor, the mean score of patient falls with injury, nosocomial infections, and medication errors were increased from 1.48 to 2.71, 1.98 to 2.96, and 1.60 to 2.56, respectively.

MacDavitt (2008) conducted a secondary data analysis as part of a large study

to compare the effects of nursing shift length on system outcomes, nurse outcomes, and patient outcomes among 705 RNs and 224 nurse units in 13 New York city hospitals. The purpose of this study was to determine the relationships between nurse outcomes and patient outcomes, and the nurse reported quality of other patient outcomes. The results showed that nurse-assessed quality of nursing care was a predictor of patient falls and medication errors. When patient falls occurred, quality of nursing care on nurses' last shifts and in general, perceived by nurses as excellent, were reduced 46% and 41%, respectively (OR = 0.54, $p < .01$; OR = 0.59, $p < .01$). When medication errors occurred, quality of nursing care in the last shift and in general, perceived by nurses as excellent, were reduced 39% and 35%, respectively (OR = 0.61, $p < .05$; OR = 0.65,$p < .05$).

Lucero (2008) examined the relationship between quality of nursing care, which was measured by 10184 nurses reported unmet nursing care need and outcomes for 232,342 of general, orthopedic, and vascular surgery patients among 168 hospitals in the U.S. The results showed that unmet nursing care needs were a significant predictor of incorrect medication or dose, nosocomial infection, and patient falls (b = .06, .13, .13, $p < .001$, respectively).

Mallidou et al. (2011) conducted a secondary data analysis to explore the causal relationships of how nursing specialty subcultures affected nurses' job satisfaction, quality of nursing care, and adverse patient occurrences. International Hospital Outcomes Study data set was used for data analysis, which included more than 43,000 Canadian patients and over 17,000 RNs. Researchers came from Canada (Alberta, British Columbia, and Ontario), England, Germany, Scotland, and the United States to participate in this study. The results illustrated that quality of nursing care was a significant predictor of adverse patient events among medical, surgical, intensive care units (ICU), and emergency room (ER) (b = -.14, -.11, -.20, -.30, $p < .05$.).

McHugh and Stimpfel (2012) explored nurses' reports of quality care correspond with outcomes measures of quality, such as failure to rescue among 16,241 nurses in 396 adults, non-federal acute care hospitals around the U.S. The results showed that each 10% increment in the proportion of nurses in the hospital reporting that the quality of nursing care in their unit as excellent was associated with 5% lower odds of failure to rescue for surgical patients.

Moreover, nurse-assessed quality of nursing care also impacts organization outcomes. An increment of ten percent in the proportion of nurses in the hospitals reporting that the quality of nursing care in their unit as excellent was associated with 5% lower odds of mortality, as reported by McHugh and Stimpfel (2012).

Lucero (2008) also illustrated that unmet nursing care needs were a significant predictor of 30-day mortality (OR = 1.18, $p < .05$) and length of stay (OR = 1.13, $p < .001$), respectively.

In conclusion, the improvements of nurse-assessed quality of nursing are important to prevent medication errors, nosocomial infections, patient falls, mortality and to reduce patients' length of stay in the hospitals.

3.5 Factors Influencing Nurse-assessed Quality of Nursing Care

3.5.1 Nurse staffing

3.5.1.1 Definitions of nurse staffing

Nurse staffing is a process of determining and allocating an appropriate amount and mix of nursing personal to fulfill positions in nursing organizations and units (Douglass, 1988; Sullivan & Decker, 1997). Similarity, Yoder-Wise (2003) mentioned nurse staffing as "the function of planning for hiring and allocation qualified nurses' resources to meet the needs of patients for care and services". In addition, Nantsupawat (2010) defined nurse staffing as the number of patients cared for by one nurses in a nursing unit. Therefore, the final goal of nurse staffing is to provide suitable numbers and categories of nurses in order to make nursing care efficient and effective (Sullivan & Decker, 2005). In this study, the theoretical definition of nurse staffing was considered as the number of patients cared for reporting by one RN in a nursing unit.

3.5.1.2 Measurements of nurse staffing

In the published articles, the nurse to patient ratio or patient to nurse ratio, nursing working hours per patient day, skill mix ratio, and registered nurse staff qualification are reviewed as indicators to measure nurse staffing.

1) Nurse to patient ratio

The nurse to patient ratio defined as number of patients cared for by one nurse is typically specified by job category, such as RN, Licensed Vocational Nurses (LVN) or Licensed Practical Nurse (LPN), and Nurse Assistant (NA) (Kane, Shamlian, Mueller, Duval, & Wilt, 2007).

2) Nursing working hours per patient day

Nursing working hours per patient day measures the total number of productive hours worked by the nursing staff (RN, LVN, LPN) with direct patient care responsibilities on acute care units per patient day (American Association of Colleges of Nursing, 2009).

3) Skill mix

Skill mix has been defined as the proportion of staff qualification, levels of competence, abilities, knowledge and experience that are necessary to achieve an agreed standard of care for a given level of demand (Cahill, 1995). Skill mix ratio reflects the percentage of total hours used by each of the major personal skills. This relationship of skill hours to total hours can be effectively used to ensure staffing patterns which are compatible with nursing objectives (Rowland & Rowland, 1992). Skill mix ratio provides one simple way to express the relationship of RN hours to LVN/LPN, or NA. For example, if 120 hours were worked on a nursing unit, including 30 RN hours, 60 LVN hours, 30 NA; then, the skill mix ratio would be 25%-50%-25%.

4) Registered nurse staff qualifications

Registered nurse staff experience and registered nurses staff education can be used as two indicators for measuring nurse staffing qualifications. The registered nurse staff experience is the ratio of the total number of RN years of experience to the total number on staff (Sasichay, 2001). The registered nurse staff education is the distribution of educational preparation among RN staff, typically expressed as the percentage of nursing staff with a certain educational attainment, such as MSN, BSN and associate degree or diploma (Sasichay, 2001).

3.5.1.3 Nurse staffing measurement form development

From the literature review, nurse to patient ratio or patient to nurse ratio (Aiken et al., 2002), nurse to bed ratio (Guo, 2008), nursing work hours per patient day (Chitpakdee, 2006), skill mix ratio (Chitpakdee, 2006), and registered nurse staff qualification (Sasichay, 2001) are viewed as indicators to measure nurse staffing. In China, the general nurse staffing indicator is nurse to bed ratio, which is used in accrediting hospitals. Since 1978, the average nurse to bed ratio is 0.4:1 for general hospitals (Guo, 2008). However, it is lower than the United States, where the average nurse to bed ratio is 1.6:1, as reported in 2001(Hu, 2007). Currently, the nurse to bed

ratio has increased due to the twelfth Chinese Five-Year Plan. According to Ministry of Health of People's Republic of China (2011) , the tertiary hospital nurse to bed ratio is designed as 0.6:1 for the in-patient department, and 0.8:1 for total hospital nurses and beds. Moreover, China became a member of International Nursing Council in 2013. In order to enhance international communication, other nurse staffing indicators, such as nurse to patient ratio were used by the Chinese Ministry of Public Health for hospital accreditation or guideline for nursing management. For example, Ministry of Health of the People's Republic of China (2012) provides guideline for hospital nurse positions management. It described nurse staffing level by using both nurse to bed ratio and nurse to patient ratio. In addition, Ministry of Health of the People's Republic of China (2011) provided guideline for national nursing career development from 2011 to 2015. It also described nurse staffing by using both nurse to bed ratio and nurse to patient ratio. These two guidelines point out that in the general inpatient departments, the nurse to bed ratio should more than 0.4:1, and one 'primary nurse' should take care of eight or less than eight patients.

Consistent with Aiken (2002) NWE-NS-OM theory subtraction to this study, nurse to patient ratio was selected for measuring nurse staffing in Chinese hospitals. When considering the duration of nurse to patient ratio, last shift (Aiken et al., 2002; Kelly, McHugh, & Aiken, 2011; Nantsupawat et al., 2011; Rafferty et al., 2007; You et al., 2013), seven days (Cho et al., 2009), or 30 days (Khumyu, 2002) were found after reviewing literature. Based on the work shift of Chinese nurses, Chinese nurses may have only one or two day shifts, and one or two night shifts in the last shift or the shift in the past 7 days. Therefore, it may not reflect the general number of patients that one nurse takes care of. Since Chinese nurses' work schedules were normally designed by one month, it was appropriate to ask the average number of patients per shift per day that they had taken care of in the past month. Therefore, it was designed to report nurse staffing in this study as showed in Table 2 Column 3.

Moreover, in China, the number of nurses in the unit has been arranged by the nursing division department. However, the patient condition may be different in different units or different periods of time in the same unit. Therefore, the flexible work schedule was designed by the head nurse. For example, if there are 50 patients in the day shift and 5 RNs provide the direct nursing care, each of nurses should directly take

care of 10 patients. While if one patient has a serious illness, she or he need one nurse, given the special care necessary. The left four nurses should take care of 12-13 patients per person. Therefore, the maximum and minimum number of patients per shift per day to take care of patients were included in the table in order to know nurses' highest and lowest workload in each shift in the past one month, which may be used for the results' discussion of this study as showed in Table 2 column 4 and 5.

Furthermore, since the shortage of nurses affects Chinese nurse staffing, as well, there are different working shifts in different hospitals. One hospital may also have different working shifts in different departments. In order to know what kinds of work shifts exist in Chinese hospitals, when five Chinese clinical experts were interviewed to develop Chinese nurses' job satisfaction and nurse-assessed quality of nursing care instruments, they were also interviewed for nursing work shift in their hospital settings. Those five nurse experts (1 head nurse, 1 vice nurse directors, and 3 nurse directors) came from a variety of regional hospital settings (northeast, southwest and south central) and experienced different kinds of nursing shifts based on the clinical situation in their workplace. All of the selected interviewed experts met the qualification of (1) professional title: at least associate professor; (2) work experience: work at the clinical setting more than 20 years; (3) background: engaged in nursing administration position; (4) social service: such as nurse association. The interview question was "What kinds of nurse shifts are in your hospital?" The interview findings showed that nurses could work an 8-hour day shift, combined with a 16-hour night shift; or 8-hour day shift, 8-hour evening shift, and 8-hour night shift; or 12-hour day shift and 12-hour night shift. In addition, the smaller, 8-hour night shift, 8-hours morning combined with the evening shift were also implemented due to busy times in some units. Therefore, in the nurse staffing measurement form, more than one line was designed for nurses to fill their different shifts as shown in Table 2.

Based on literature review and the situation in China as mentioned above, the operational definition of nurse staffing was defined as the average number of patients cared for by one Chinese RN in a nursing unit in each shift (e.g., day, evening, or night) in his or her past one month of work. This instrument was developed by the researchers from the modification of Aiken, Clarke, and Sloane (2002) nurse staffing measurement. The form that designed to measure nurse staffing was showed in Table 2. The number

used to represent nurse staffing was calculated in two steps. Step 1: sum all kinds of shifts of “The average number of patients per shift per day to provide care”. Step 2: calculate the average of summed number of patients.

Table 2 Nurse staffing measurement form

During the past one month, the number of patients per shift per day you take care (According to your current situation at the department)

Shift name	Shift time	The average number of patients per shift per day to provide care	The maximum number of patients per shift per day to provide care	The minimum number of patients per shift per day to provide care

3.5.2 Nurse work environment

3.5.2.1 Definitions of nurse work environment

From reviewing literature, a variety of phrases, such as professional nurse practice environment, nurse work environment, professional practice environment, or nursing practice environment were used interchangeably to describe organization features for nursing discipline (Sleutel, 2000). For instance, Hoffart and Woods (1996) referred professional nurse practice environment to "a system that supports RNs control over the delivery of nursing care and the environment in which care is delivered". Based on Hoffart and Woods (1996) Professional Practice Model, Lake (2002) deconstructed nursing practice environment model and referred it to "the organizational characteristics of a work setting that facilitate or constrain professional nursing practice". The American Association of Colleges of Nursing (AACN) (2002) defined professional practice environment as "a comprehensive set of characteristics that permit nurses to practice their full potential". While in Aiken (2002) NWE-NS-OM, the term of nurse work environment was used. Since NWE-NS-OM was used to formulate the conceptual framework for this study, the term of nurse work environment was selected to be used.

In conclusion, the theoretical definition of nurses work environment was defined as an organizational characteristic at the work settings that encourage RNs control over the delivery of nursing care in this study.

3.5.2.2 Components of nurse work environment

Throughout the 1980s, with the publication of the original magnet hospital study, nursing leaders began to have a greater understanding of factors that helped to attract and retain professional nurses in the national healthcare system (McClure, Poulin, Sovie, & Wandelt, 1983). The practice environment was explored to better understand and influence nurses' job satisfaction and turnover (Hinshaw & Atwood, 1984). In 1983, research conducted by the American Academy of Nursing found that hospitals that did not experience problems with recruitment and retention of nurses shared a common set of work environment characteristics that promoted a professional practice environment for nurses (McClure et al., 1983). These work environment characteristics were referred to as magnet attributes because of their ability to attract and retain nurses (Gardner, Fogg, Thomas-Hawkins, & Latham, 2007). The initial

research study presented the research findings of Magnet hospitals ranging from 1982 to 1983 began with three major categories: 1) leadership attributes of the nursing administrators; 2) professional attributes of the staff nurses; and 3) the environment that supported professional practice (Scott, Sochalski, & Aiken, 1999).The subsequent research studies conducted in the magnet hospitals not only focused on these three categories, but also described specific attributes of the nurse leaders and staff members that created the "magnet hospital" environment in the current healthcare setting.

According to Sovie (1984), through interviewing nurse executives and staff nurses in 41 hospitals, the common magnet hospital characteristics included having adequate staffing levels; flexible scheduling; strong, supportive, and visible nurse leadership; recognition for excellence in practice; participative management with open communication; good relationships with physicians; salaried rather than hourly compensation for nurses, professional development; and career advancement opportunities.

In the 1990s, the attention of practice environment shifted from attract and retain nurses to explain quality of care and patient outcomes (Mitchell & Shortell, 1997). According to Scott et al. (1999), in their review of the original magnet hospital research as well as other descriptive studies, the essential attributes of professional nursing practice used in the magnet hospital framework included 1) the ability of the nurse to establish and maintain therapeutic relationships with patients (usually through a primary nursing delivery model), 2) nursing autonomy and control over the practice environment, and 3) collaborative relationships with physicians at the nursing-unit level. Then, Aiken and colleagues later conceptualized autonomy, control over the practice environment, and nurse–physician collaboration as magnet hospital components (Aiken, Havens, & Sloane, 2000).

More currently, Lake (2002) developed the practice environment scale of nursing work index (PES-NWI) to measure the hospital nursing practice environment by using 1985-1986 data from 16 magnet-designated hospitals. In this instrument, professional nurse practice environment was clarified into five key components, which included nurse participation in hospital affairs (policy involvement), nursing foundations for quality of care(nursing model of care), nurse manager ability,

leadership and support of nurses(leadership), staffing and resource adequacy(staffing adequacy), and collegial nurse-physician relations(RN/MD relationship).

In addition, according to the American Association of Colleges of Nursing (2002), hallmarks of the Professional Practice Environment are a comprehensive set of characteristics that permit "nurses to practice to their full potential. The eight hallmarks are 1) manifest a philosophy of clinical care emphasizing quality, safety, interdisciplinary collaboration, continuity of care, and professional accountability; 2) recognize contributions of nurses' knowledge and expertise to clinical care quality and outcomes; 3) promote executive-level nursing leadership; 4) empower nurses' participation in clinical and organizational decisions; 5) maintain clinical advancement programs based on education, certification, and advanced preparation; 6) support nurses' professional development; 7) create collaborative relationships within the health care provider team; and 8) use technological advances in clinical care and information systems.

Through the review literature, Erickson et al. (2004) conceptualized the professional practice environment should include the eight characteristics: leadership and autonomy over practice, clinician-physician relationships, control over practice, communication about patients, teamwork, conflict management using a problem-solving approach, internal work motivation and cultural sensitivity.

In China, Chiang and Lin (2009) translated and revised Lake (2002) PES-NWI. After conducting factor analysis among 842 Chinese Taiwanese RNs, Chiang and Lin identified five components for measuring the Chinese nursing practice environment. They are management and leadership, nursing professional development, nursing quality, staffing and resource adequacy, and participation in hospital affairs. Similarity, Wang and Li (2011)valuated the reliability and validity of Chinese version of the Practice Environment Scale(C-PES) among 858 nurses in nine hospitals in Changsha city. By using exploratory factor analysis method, six factors were determined, including management and leadership; nursing professional development; participation in hospital affairs (policy involvement); nursing foundations for quality of care (nursing model of care); nurse manager ability, leadership and support of nurses(leadership); resource adequacy (staffing adequacy); and collegial nurse-physician relations (RN/MD relationship).

In conclusion, the components of the nurse work environment from the literature reviewer included leadership and management (flexible scheduling, maintain clinical advancement programs), supportive environment (professional development, practice, career advancement, information system, technology, autonomy), adequate resources, collaborative relationships within the health care provider team (relationships with physicians), nurse manager ability, nursing foundations for quality of care, and participation in hospital affairs.

3.5.2.3 Measurements of nurse work environment

The instrument used for measuring nursing practicing work environment, which started with Nursing Work Index (NWI) (Kramer & Hafner, 1989). Then, Nursing Work Environment Revision (NWI-R) (Aiken & Patrician, 2000) and Nursing Work Index-Practice Environment Scale (NWI-PES) (Lake, 2002) were popularly used in nursing research. More currently, Chinese version of Nursing Work Index-Practice Environment Scale (C-NPES) was used to measure nursing practice environment for Chinese Taiwanese RNs (Chiang & Lin, 2009). Chinese version of the Practice Environment Scale (C-PES) was used to measure nursing practice environment for Chinese Mainland RNs (Wang & Li, 2011).

1) Nursing Work Index (NWI)

The first measurement of the professional practice environment was the Nursing Work Index (NWI), developed by Kramer and Hafner (1989). This 65-item scale allowed measurement of those organizational traits reported by the original magnet hospital staff nurses as characteristic of their professional work environments. This instrument was designed to measure the following four variables: work values related to job satisfaction, work values related to perceived productivity, staff nurse job satisfaction, and staff nurse perception of an environment conducive to quality nursing care. Each item was placed on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Nurses were asked to respond to three statements “this is important to my job satisfaction”, “this is important to my being able to give quality patient care”, and “this factor is present in my current job situation” (Kramer & Hafner, 1989).

However, comparing with the NWI-R, NWI focus on whether staff nurses, clinical nurse experts, and head nurses shared similar values about job satisfaction and

perceived productivity rather than the presence of specific organizational traits, such as "the nurses manager is a good manger and leader".

2) Nursing Work Environment Revision (NWI-R)

Aiken and Patrician (2000) re-examined the NWI and stated that, with some modification, it could be a measure of components of a professional practice environment in addition to measuring nurses' job satisfaction and perceived quality of care. After examining the conceptual nature of the NWI items, they selected 55 items from the original 65 NWI that they deemed relevant to today's professional practice environment with one item slightly modified and one item added. Three of the organizational attributes noted in the literature as components supporting a good professional practice environment: nurse autonomy, control over the work environment, and relationships with physicians. Then, NWI-R scores were formed by summing the items for each subscale to create an individual's score, followed by summing the individual scores for unit scores or hospital scores, depending on the unit of analysis. The overall Cronbach's alpha for the entire NWI-R was .96. The alpha for individual level data for each subscale was .75 for autonomy, .79 for control, and .76 for relationships with physicians. After aggregation of individual nurses' scores within units, the alphas for each subscale were .85 for autonomy, .91 for control, .84 for relationship with physicians. Content, criterion-related and construct validity for the NWI-R were evaluated. Firstly, the content validity of the original instrument was evidenced by the magnet hospital researchers. Secondly, criterion-related validity that was supported by NWI-R scores are correlated with certain organizational forms, which in turn are associated with better outcomes. Finally, using magnet hospitals as "know groups", the NWI-R does a remarkable job of differentiating magnet hospitals from control hospitals and dedicated AIDS units from scattered bed units, even within the same hospital (Aiken & Sloane, 1997a, 1997b). However, the factor analysis technical for confirming the construct validity of this instrument is not conducted by researcher. Therefore, the components of this instrument may lack of construct validity.

3) Nursing Work Index-Practice Environment Scale (NWI-PES)

In order to develop a parsimonious, psychometrically sound scale with empirically derived subscales, Lake (2002) revised the original NWI and produced the

Practice Environment Scale (PES). She conceptualizes the nursing practice environment as those organizational characteristics of a work setting that facilitates or constrains professional nursing practice. Lake selected a subset of 48 items from the original 65-item NWI that best reflected this definition. Then, she used the 1985-1986 magnet hospital nurse data to do exploratory factor analysis. Applying principal axis factoring with varimax rotation, 31 of the 48 items defined five factors indicating key domains in the hospital environment that support professional nursing practice: nurse participation in hospital affairs (nine items), nursing foundations for quality care (10 items), nurse manager ability, leadership, and support of nurses (five items), staffing and resource adequacy (four items), and collegial nurse-physician relations (three items). All factor loadings were .40 or higher, and subscale internal consistency coefficients have ranged from .71 to .84, with an overall Cronbach's alpha coefficient reported as .82 (Lake, 2002). It is four-point Likert scale. The score ranged from 1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, to 4 = *strongly disagree*. The category of score was explained as:

(a) Favorable: subscale values greater than or equal to 2.5 on four or five subscales.

(b) Mixed: subscale values greater than or equal to 2.5 on two or three subscales.

(c) Unfavorable: subscale values greater than or equal to 2.5 on zero or one subscale.

Compared with other nursing practice environment instruments, NWI-PES's content is equivalent and length is superior to other existing instruments (Lake, 2007). Moreover, the PES-NWI factor structure has been confirmed with 1998 data from 8,597 nurses from Ontario and Alberta (Leiter & Laschinger, 2006), 1999 data from staff nurses throughout Pennsylvania (Lake, 2002), with 2001 data from 243 nurses in a Quebec hospital (McCusker, Dendukuri, Cardinal, Laplante, & Bambonye, 2004), and with 2004 data from 2,900 nurses in 14 hospitals in Texas (Peterson, Krebs, & Erspamer, 2004). In 2006, the National Database of Nursing Quality Indicators began to offer the option of the PES-NWI as part of the annual nurse survey (Lake, 2007). Therefore, it can be seen that NWI-PES is a validly and widely used instrument for evaluating nursing practice environment in western health care system. However,

whether the NWI-PES can be used in the Chinese context is not yet known.

4) Chinese version of Nursing Work Index-Practice Environment Scale (C-NPES)

The C-NPES was translated and revised from the PES-NWI by Chiang and Lin (2009). After obtaining the 31-item PES-NWI author's permission, forward (English to Chinese) and backward (Chinese to English) translation was applied. First, the PES-NWI was translated into Chinese and then reviewed by a bilingual Taiwanese nurse with a PhD in nursing. Considering cultural equivalence, terminology modification was applied such as 'Nurse manager' being translated into 'Head nurse (Chinese)'and 'Chief nurse officer' translated into 'Director of nursing department (Chinese)'. Additionally, on account of cultural relevance, adding clinical examples to reflect some items' statements were used. Secondly, two bilingual Taiwanese translators with Master's degrees in English undertook back-translation. The translators separately translated odd and even items and then independently cross-examined the back-translated versions (i.e. odd items and even items) and compared these items with the original PES-NWI.

The content validity index was calculated by five nursing experts with Master's or Ph.D. degrees. The experts rated each item of the C-NPES on a four-point scale from 1 = *not relevant* to 4 = *very relevant*. The CVI of C-NPES was .94.

The construct validity was established by exploratory factor analysis using a principal component analysis method with Varimax rotation. A five-factor solution containing 30 items explained 47.89% of the variance in nurse practicing environment among Taiwanese hospital nurses. Item 31 with a low factor loading less than .40 was eliminated because it did not load on any factors. Compared to the factorial structure of the PES-NWI, four of five factors related to administration management and leadership, nursing quality assurance, staffing and supportive resource and participation in hospital affairs were nearly identical by PES-NWI. The only differences appeared in the factors of nursing professional development (C-NPES) and collegial nurse-physician relation (in PES-NWI). The Taiwanese nurses considered professional development as a major construct of practice environment.

The Cronbach's alpha coefficient for the total scale was .90. All corrected item-total correlations for the total scale were positive (range from .31 to .64) within the

recommended .30 – .70 range (DeVellis, 2012). It was a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree).

Although C-NPES was used in a Chinese population, cultural background or society development for Taiwanese nurses are different from Mainland Chinese nurses. Thus, C-NPES may not appropriated to be used in Mainland Chinese RNs population.

5) Chinese version of the Practice Environment Scale (C-PES)

In Mainland China, the C-PES was translated and adapted from the Lake (2002) PES-NWI by Chinese researcher Wang and Li (2011). After the translation and back translation process, five experts evaluated the content validity of C-PES. These five nurse administration experts worked as nursing division directors or vice directors. Four of them were professors and one of them was an associate professor. The content validity was .94. According Wang and Li (2011), the Cronbach's Alpha of C-PES was .91 and the Cronbach's of each subscale ranged from .67 to .79. The test-retest reliability was .84. The correlations between each subscale and total scale were ranged from .62 to .88. Before conducting the exploratory factor analysis (EFA), Kaiser-Meyer-Olkin (KMO) and Bartlett's were tested. KMO was .9 and Bartlett's test was significant ($\chi^2 = 4072.87$, $p < .01$). The principal component analysis with varimax rotation method was used for EFA. The cutoff points of factor loading was .4. Six factors with 28 items were extracted by factor analysis and explained 53.36% of the total variance, including individual personnel development; nurse participation in hospital affair; nursing foundations for quality of care; nurse manager's ability, leadership, and support of nurses; resource adequacy; and collegial nurse-physician relations. Each factors' Eigenvalues of each factor was more than 1. In addition, each factor included at least 3 items. The detail meaning of each dimension was demonstrated as following:

(1) Individual personnel development refers to nurse's career development, personal promotion, in- service training and continuing education.

(2) Nurse participation in hospital affairs refers to the participatory role and valued status of nurses in a broad hospital context. Nurses were involved in hospital and nursing department affairs such as internal governance, policy decisions, and committees.

(3) Nursing foundations for quality of care emphasizes the nursing foundations for a high standard of patient care, such as a pervasive nursing philosophy, a nursing rather than a medical model of care, and nurses' clinical competence.

(4) Nurse manager's ability, leadership and support of nurses focus on the critical role of the nurse manager and key qualities of the nurse manager and ways the nurse manager supports the nurse.

(5) Resource adequacy describe having adequate staff and support resources to provide quality patient care.

(6) Nurse-physician relations are characterized by the equality working relationships between nurses and physicians. This dimension was named to recognize nurses' desire for collegial relationships with physicians.

In this study, this instrument was selected to measure nurse work environment because of three reasons. First, this instrument was modified based on Chinese culture. Secondly, this instrument's reliability and validity were acceptable. Third, it was an instrument popularly used among the nursing population.

However, the constructs of C-PES extracted from EFA among Mainland Chinese RNs were not consistent with the original PES-NWI, which has been used in several counties. The constructs of C-PES were not even consistent with C-NPES. In addition, the dimension of individual personnel development overlapped with one dimension of nurses' job satisfaction (promotion and individual growth). Therefore, the original constructs of the PES-NWI were decided on to be used in this study.

3.5.3 Nurses' job satisfaction

3.5.3.1 Definitions of nurses' job satisfaction

Since job satisfaction was a multifaceted and complex concept, it was defined in a variety of ways by various authors. Worf (1970) based his definition on Maslow's human need theory and defined job satisfaction as need fulfillment, which means whether or not employee's physical and psychological needs could be met under work condition.

With the movement of theory development, the study of job satisfaction was related to Herzberg (1959) Two-Factor Theory, which paid more attention to employees' motivations. Based on Herzberg's theory, Smith, Kendall, and Hulin (1969) referred to job satisfaction as feeling or affective responses that employees experienced in different

areas of his or her work. Price (2001) referred job satisfaction to as affective orientation that employees present in their work.

Both Maslow's (1954) Human Needs Theory and Herzberg's (1959) Two-Factor Theory are classified into content motivation theories, which offer ways to analyze how individuals identify their needs and motivations. Later on, in order to understand the cognitive processes of human needs that influence human behavior — how people make choices to work hard — (Schermerhorn, 1999), the process approach of motivation theory was developed.

Based on the process approach of motivation theory, Locke (1969) defined job satisfaction as "the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values." Later on, Locke (1976) defined job satisfaction as the positive or pleasurable feeling that an employee feels due to the appraisal of his or her job or job experience. These job experience can be evaluated by employees' feeling of being equitably treated at their working settings. Moreover, Locke and Henne (1986) wrote that achievements accomplished during work resulted in the pleasurable, emotional state known as job satisfaction. Thus, from the process approach of the motivation theory's perception, job satisfaction can be broadly defined as the positive emotional response that an employee has achievement to his or her job value or equity.

Based on the above explanation, the attributes of nurses' job satisfaction were synthesized as (1) fulfillment of desired needs within the work settings, (2) happiness or gratifying emotional responses towards working conditions, and (3) job value or equity. Therefore, the theoretical definition of nurses' job satisfaction was defined as "nurses' positive feeling in response to the work conditions that support their desired needs as the result of their evaluation of the value or equity in their work experience."

3.5.3.2 Components of nurses' job satisfaction

Dawis, England, and Lofquist (1964) developed the Minnesota Satisfaction Questionnaire (MSQ) based on the Work Adjustment Theory (Weiss & Dawis, 1967), 1967). The short-form MSQ is composed of three components, which includes intrinsic satisfaction, extrinsic satisfaction, and general satisfaction.

Smith et al. (1969) developed the Job Descriptive Index (JDI) and Job in General Scale (JIG) for measuring employees' job satisfaction in the general

population, based on the process approach of motivation theory. The components of JDI include five distinct aspects of jobs: the type of work itself, pay, promotional opportunities, supervision, and coworkers.

Spector (1985) developed the Job Satisfaction Survey (JSS), based on process approach of motivation theory as well. The JSS was designed to measure employees' job satisfaction in a social service organization. By doing the factor analysis among 3148 subjects, nine components are yielded, which include salary, promotion, supervision, fringe benefits, contingent rewards, operating procedures, co-workers, work and communication.

In nursing discipline, Stamps and Piedmonte (1986) developed the Index of Work Satisfaction (IWS) by conceptualizing satisfaction and dissatisfaction based on Herzberg's Two Factors Theory. The IWS is composed of six job components, which include pay, autonomy, professional status, interaction, task requirements, and organizational policies.

By adapting Stamps and Piedmonte (1986) Index of Work Satisfaction (IWS), Finn (2001) studied about the components for nurses' job satisfaction in Brisbane teaching hospital in Australia. Finn found that autonomy is an important component for nurses' job satisfaction, which was followed by interaction, task requirements, professional status, and organizational policies.

Thunton et al. (2004) modified Stamps and Piedmonte (1986) work satisfaction index and developed the NDNQI-Adapted Index of Work Satisfaction instrument in order to measure work satisfaction at the patient care unit level. This instrument is composed of seven components of nurse job satisfaction, which include task requirements, nurse-nurse interaction, nurse-physician interaction, organizational policies, autonomy, professional status and pay.

Mueller and McCloskey (1990) developed another multidimensional questionnaire specific for measuring the hospital staff nurses' job satisfaction. Maslow's Human Need Theory (Maslow, 1954) and Burns' Motivation Theory (Burns, 1969) were guided for developing this instrument. By doing the factor analysis, eight components were yielded. Those were extrinsic rewards (salary, vacation), scheduling satisfaction (e.g. flexible work hours), family/work balance, co-workers, interaction,

professional opportunities (e.g. write and publish, participate in research), praise/recognition, and control/responsibility.

In China, Cao (1998) developed Nurses Job Satisfaction Scale (NJSS). The development of NJSS was based on Maslow's Human Need Theory, Herzeberg's Two-Factors Theory, and literature review. NJSS has nine components including individual/professional development opportunities, recognition and praise, achievements and responsibilities, salary and compensation, scheduling and working conditions, work itself, supervision and hospital policy, interpersonal relationships, and balancing of family and work.

Moreover, Lu, While, and Barriball (2005) performed a literature review about job satisfaction among nurses based on Maslow (1954) Human Needs Theory, Herzberg (1959) Two-Factor Theory and process approach of motivation theory. They conclude that there are nine common components related to nurses' job satisfaction. These include work conditions, interaction, work itself, remuneration, self-growth and promotion, praise and recognition, control and responsibility, job security, and leadership styles and organizational policies.

Hu (2007) developed Nurse Job Satisfaction Scale in Chinese among 1185 nurses from 13 general hospitals in Shanghai city. Through EFA, eight factors were extracted, including administration, workloads, relationships with colleagues, work itself, salary and fringe benefit, professional opportunities, recognition, and balance between family and work.

In conclusion, the components of job satisfaction from the nursing literature include professional development, work itself, recognition and praise, responsibility, and control, remuneration (salary, vocation, fringe benefits), work condition, administration and organizational policies, interaction, family and work balance. However, each component has been assigned a different level of importance depending on the setting and time period.

3.5.3.3 Measurements of nurses' job satisfaction

Job satisfaction can be measured by either unidimensional or multidimensional instruments. Porter and Lawler (1968) conceptualized job satisfaction as a unidimensional construct meaning that people are generally satisfied or dissatisfied with their jobs. In contrast, Smith et al. (1969) argue that job satisfaction is

multidimensional; people may be more or less satisfied with their job, supervisor, pay and workplace. As a result of this controversy, the reviewed instruments can be divided into two groups: unidimensional and multidimensional measurement groups.

1) The Unidimensional Job Satisfaction Measurement

The unidimensional instruments are designed to derive a single score for job satisfaction or job dissatisfaction. The valid and reliable instruments ever used in working populations include the Job in General Scale (JIG) (Ironson, Smith, Brannick, Gibson, & Paul, 1989) and Andrew and Withey Job Satisfaction Questionnaire (Rentsch & Steel, 1992). In nursing work force studies, one popularly used unidimensional job satisfaction scale is Aiken et al. (2002) single items' measurement.

(a) The Job in General Scale (JIG)

The JIG was a global job satisfaction instrument (Ironson et al., 1989) and is part of the Job Descriptive Index (JDI). The JIG had eighteen items. The response scaling was a three-response choice: a person agrees (yes), a person is not sure (?), or a person does not agree (no). Internal consistency of JIG was .91. Convergent validity correlations ranged from .67 to .80 with four other general scales of job satisfaction. JIG had been shown to predict intentions to quit beyond the 5 facets of the JDI. However, the JIG was coupled with the JDI, and the two were distributed together.

(b) The Andrew and Withey Job Satisfaction Questionnaire (AWJSQ)

The AWJSQ was a five item unidimensional questionnaire that measures global job satisfaction (Rentsch & Steel, 1992). Responses were given on a seven-point Likert scale ranging from delighted (1) to terrible (7). The internal consistency was .81 and construct validity was .70.

(c) Single Item Nurse Job Satisfaction Questionnaire (ST-NJQ)

Aiken et al. (2002) designed ST-NJS to measure nurses' job satisfaction. It was measured by "Nurses rated their satisfaction with their current jobs" on a four-point scale ranging from 1 = *very dissatisfied* to 4 = *very satisfied.*

The JIG and AWJSQ are developed for the working population, not specifically for measuring nurses' job satisfaction. Although ST-NJS was developed in the nursing

population, the single item questionnaire did not describe concept construct and it also lacked reliability and validity (DeVellis, 2012, p. 70). Thus, this was considered as the limitation of using these instruments for measuring job satisfaction among the nurse population.

2) The Multidimensional Job Satisfaction Measurement

From the literature review, multidimensional valid and reliable job satisfaction instruments were used for the working population including the Minnesota Satisfaction Questionnaire (MSQ) (Weiss & Dawis, 1967), Job Descriptive Index (JDI) (Smith et al., 1969), and Job Satisfaction Survey (JSS) (Spector, 1985). Currently, there were several developed job satisfaction instruments specifically targeted towards the nursing population, such as the Index of Work Satisfaction (IWS) (Stamps & Piedmonte, 1986), National Database of Nursing Quality Indicators (NDNQI)-Adapted Index of Work Satisfaction (Thunton et al., 2004), McCloskey/Mueller Satisfaction Scale (MMSS) (Mueller & McCloskey, 1990), Nurse Job Satisfaction Scale (NJSS) (Cao, 1998), Nurse Job Satisfaction Scale in Chinese (NJSS-C) (Hu, 2007).

(a) Minnesota Satisfaction Questionnaire (MSQ)

One of the most well received questionnaires for measuring multidimensional job satisfaction was MSQ. The MSQ made work feasible to obtain a more individualized picture of worker satisfaction. MSQ was designed to measure satisfaction with several specific aspects of work and work environments. MSQ was developed by Weiss and Dawis (1967), which is based on the Work Adjustment Theory. There were two forms MSQ including long and short forms. The five-point Likert scale was presented for each item namely 1 = *very dissatisfied*, 2 = *dissatisfied*, 3 = *neither (dissatisfied nor satisfied),* 4 = *satisfied*, 5 = *very satisfied*. The long-form MSQ consisted of 100 items. The internal consistency reliability ranged from .93 for advancement and recognition to .78 for responsibility. The one-week interval, stability coefficients ranged from .66 for co-workers to .91 for working conditions. The short-form MSQ was composed of the twenty items and consisted of three scales: intrinsic satisfaction, extrinsic satisfaction, and general satisfaction. Internal consistency reliability coefficients were .86 for intrinsic satisfaction, .80 for extrinsic satisfaction, and 0.90 for general satisfaction.

(b) The Job Descriptive Index (JDI)

JDI was another famous questionnaire for measuring multidimensional job satisfaction. The first version of the JDI was developed in 1969 by Smith et al. (1969). It consisted of 72 items with five distinct aspects of jobs, including the type of work itself, pay, promotional opportunities, supervision, and coworkers. The response scaling to the adjective checklist from three perspectives: the present job, the best job, and the worst job. The internal consistency reliabilities of JDI were .73, .67, .75, .77, and .78 for work, pay, promotion, supervision, and co-worker respectively by using the split half method. While the JDI was one of the most psychometrically sound measures of job satisfaction, when used in combination with other scales its length was sometimes a detractor. In response to this concern, the JDI Research Group developed an abridged version of the JDI. In the AJDI, each facet contained 5 items. Therefore, there were total 25 items in the AJDI and the response scaling was the same as the JDI.

(c) Job Satisfaction Survey (JSS)

The JSS is a multidimensional instrument that was originally developed for social service organization (Spector, 1985). The development of the JSS was predicated on the theoretical position that job satisfaction represented affective or attitudinal reaction to a job, which derived from a process approach of motivation theory. The response format is a five-point Likert scale, ranging from 1 = *disagree very much* to 5 = *agree very much*. The JSS had 36 items and included nine sub-scales: salary, promotion, supervision, fringe benefits, contingent rewards, operating procedures, co-workers, work and communication. Internal consistency was .91 and test-retest reliability correlation was .71 by eighteen months internal. The convergent validity was established by the multi-trait-multi-method with the Job Diagnostic Survey ranging from .61 to .80.The discriminant validity among the sub-scales ranged from .19 – .59.

However, the aforementioned instruments, such as MSQ, JDI, and JSS are initially developed for the working population, which are not specifically for the nursing population. In the nursing population, the following instruments were developed including IWS, NDNQI-Adapted Index of Work Satisfaction, MMSS, NJSS, and NJSS-C.

(d) Index of Work Satisfaction (IWS)

In nursing populations, there were several developed multidimensional instruments for measuring nurse satisfaction. Stamps and Piedmonte (1986) developed the tool of Index of Work Satisfaction (IWS) to examine nurses' job satisfaction based on an extensive review of theories of work satisfaction, which included both the content and process approach of motivation theories. This tool included six job components, which involved pay, autonomy, professional status, interaction, task requirements, and organizational policies. The tool was divided into two distinct parts. The first part was concerned with rating the importance of the job components by paired comparison. Each job component was ranked according to the frequency with which the nurses prefer one job component more than the other in each pair combination of job components. The second part of the tool measured the actual level of satisfaction with the job components. Nurses measured their level of satisfaction on a seven-point Likert scale to 44 attitude statements relating to the job components, of which half were worded positively and half were worded negatively. Validity of the tool was demonstrated by the original developers through varimax rotation factor analysis (Stamps & Piedmonte, 1986). Cronbach's Alpha was used to test the internal consistency reliability of the tool, and the values between .52 and .81 were accepted as reliable.

Finn (2001) studied about the components for nurses' job satisfaction in Brisbane, Australia teaching hospital using the revised version of IWS. As registered nurses' pay rates in Queensland were set according to Industrial Relations Awards and do not alter from hospital to hospital, the pay component was excluded from the study. The reliability of the revised version of IWS was tested using Cronbach's Alpha. The Cronbach's Alpha for overall job satisfaction was .88.

(e) NDNQI-Adapted Index of Work Satisfaction

Thunton et al. (2004) modified Stamps and Piedmonte (1986) work satisfaction index and developed the NDNQI-Adapted Index of Work Satisfaction measurement for measuring nurses' job satisfaction in nursing units. The questionnaire consisted of 46 items with 7 dimensions of sub-scale: task requirements, nurse-nurse interaction, nurse-physician interaction, organizational policies, autonomy, professional status, and pay. The reliability of the composite was .91 and the respective sub-scales were acceptable

with Cronbach's Alpha ranging from .74 to .91. McCloskey/Mueller Satisfaction Scale (MMSS)

McCloskey/Mueller Satisfaction Scale (MMSS) was a multidimensional questionnaire designed specifically for hospital staff nurses (Mueller & McCloskey, 1990). Tourangeau, McGillis Hall, Doran, and Petch (2006) argued that the theoretical position of the initial scale was grounded in Maslow's Human Need Theory (Maslow, 1954) and Burns' Motivation Theory (Burns, 1969). Exploratory factor analysis was completed and yielded eight distinct factors with 31 items that were conceptualized as satisfaction. Those were extrinsic rewards (salary, vacation), scheduling satisfaction (e.g. flexible work hours), family/work balance, co-workers, interaction, professional opportunities (e.g. write and publish, participate in research), praise/recognition, and control/responsibility. The response format was a five-point Likert scale ranging from 1 = *very dissatisfied* to 5 = *very satisfied*. The internal consistency reliability of MMSS was .89 reported by Mueller and McCloskey (1990).

Although IWS, NDNQI-Adapted Index of Work Satisfaction, and MMSS are developed for the nursing population, they were developed in a western country. This may lack sensitivity for using them to measure Chinese nurses' job satisfaction. The following part provided two instruments that were developed in Chinese context to measure Chinese nurses' job satisfaction among Chinese RNs, which including NJSS and NJSSC.

(f) Nurse Job Satisfaction Scale (NJSS)

Based on Maslow's Human Need Theory, and Herzberg's Two-Factors Theory, Cao (1998) developed NJSS. It included 62 items with nine subscales: 1) individual/professional development opportunities, 2) recognition and praise, 3) achievement and responsibility, 4) salary and compensation, 5) scheduling and working condition, 6) work itself, 7) supervision and hospital policy, 8) interpersonal relationship, and 9) balance of family and work. It was a 5-point Likert scale from 1= *very dissatisfied* to 5 = *very satisfied*. Possible scores for job satisfaction ranged from 62 to 310. The English version of the instrument was validated by the five Thai experts. Then it was translated into a Chinese version by a Chinese bilingual expert. This instrument obtained a reliable Cronbach's Alpha of .98.

NJSS was developed in Chinese context, the components of this instrument cover broad aspects of job satisfaction characteristics. However, the construct validity of NJSS has not yet been studied. In addition, the 62-item questionnaire was too long to complete. Therefore, this instrument may not be appropriate to measure nurses' job satisfaction.

(g) Nurse Job Satisfaction Scale in Chinese (NJSS-C)

NJSS-C was developed by Hu (2007) in the Chinese language. It was composed of eight dimensions (administration, workloads, relationships with colleagues, work itself, salary and fringe benefit, professional opportunities, recognition, balance between family and work) with 38 items. The psychometric properties were tested by internal consistency, test-retest reliability, and construct validity. The coefficient alpha of internal consistency for total and subscale were .82, .81, .80, .78, .78, .74, .79, .73, and .77, respectively. The correlation coefficient of test-retest reliability for total score was .85. The subscale's test-retest reliability ranged from .70 to .82. The construct validity of Eigenvalues was 55.90%. The factor loading for each item was more than .30. It was a five-point Likert scale. The score ranged from 1 = *very agree* to 5 = *very disagree*. However, this instrument was developed in only one Shanghai city, it may not be appropriately used to measure nurses' job satisfaction at the national level. In addition, the theoretical underpinning of NJSS-C did not included process of motivation theories. It may not be appropriately used to measure nurses' job satisfaction under contemporary work environment.

In conclusion, the existing instruments for measuring nurses' job satisfaction have several limitations. For example, some of nurses' job satisfaction instruments are only single item (ST-NJQ) or one dimension questionnaire (JIG, AWJSQ), which may not reflect multidimensional nurses' job satisfaction constructs. However, some instruments are too long to complete, such as NJSS with 60 items. In addition, some instruments were not initially developed for the nursing population (JSS、JDI、MSQ) or did not include components of nurses' job value or equity (NJSS-C). Moreover, some instruments were developed based on a western culture, such as MMSS, IWS, NDNQI-Adapted Index of Work Satisfaction. It may not reflect the culture of Chinese nurses, especially under current hospital work environment. Furthermore, some instruments'

construct validity were not tested, such as NJSS. Therefore, under contemporary hospital work environment in China, it is necessary to develop the Chinese Nurse Job Satisfaction Scale in this study.

3.5.4 Burnout

3.5.4.1 Definitions of burnout

Freudenberger was the first person to describe burnout as the phenomena of experienced exhaustion, loss of motivation and responsibility. Freudenberger (1974) referred to burnout as “a state of fatigue or frustration that resulted from professional relationships that failed to produce the expected rewards”.

Since then, several authors have defined burnout in various ways. For instance, Cherniss (1980, p. 5) described burnout as “a process in which the professional attitudes and behavior change in negative ways in response to job strain”.

Pines, Aronson, and Kafry (1981, p. 202) referred to burnout simply as "physical, emotional and mental exhaustion".

Maslach (1982) defined burnout as a psychological syndrome expressed reduced personal accomplishment, emotional exhaustion, and depersonalization that could happen among different professions in their challenging work setting.

Maslach and Schaufeli (1993) described burnout as “a specific kind of occupational stress-reaction among human service professionals, as a result of the demanding and emotionally charged relationships between caregivers and their recipients”.

More recently, Maslach et al. (1996) referred to burnout as “a syndrome of feelings of emotional exhaustion, depersonalization and reduced personal accomplishment can occur among individuals who do people work”.

Schaufeli and Greenglass (2001) defined burnout as “a state of physical, emotional and mental exhaustion that results from long-term involvement in work situations that are emotionally demanding”.

Borritz et al. (2006) defined burnout emphasized on the physical and emotional exhaustion aspect that occurred from prolonged occupational stress among human service workers, where engaged employees gradually get overwhelmed of emotional exhaustion, loss of energy, and withdrawal from work.

Demerouti, Bakker, Nachreiner, and Schaufeli (2000) defined burnout as a

syndrome of work-related negative experiences, including feelings of exhaustion and disengagement from work.

In conclusion, the theoretical definition of nurse burnout in this study was defined as the syndrome of feelings of emotional exhaustion, depersonalization and reduced personal accomplishment by nurses through their working experience.

3.5.4.2 Components of nurse burnout

According to Maslach et al. (1996) explanation, burnout consists of three components which include emotional exhaustion, depersonalization, and reduced personal accomplishment. Emotional exhaustion can be defined as feeling emotionally overwhelmed and exhausted by work. Depersonalization, also called cynicism, refers to an impassive and impersonal response towards those receiving one's service, care, treatment or instruction. Reduced personal accomplishment, or inefficacy, describes a feeling of reduced competence and lack of successful achievement in one's work with people.

Borritz et al. (2006) conducted a five year follow up study among 2,391 employees from different organizations in the human service work, including social security offices, psychiatric prison, institutions for severely disabled, hospitals, and homecare services. In Borritz study, burnout was focused on exhaustion. The key feature of exhaustion is related to three specific domains in the person's life, including general exhaustion, exhaustion attributed to work in general, and exhaustion attributed to work with clients.

Demerouti et al. (2000, p. 455) stated that Oldenburg Burnout Inventory (OLBI) was an alternative measure of burnout, which can be used in non-service workers as well. OLBI has two components, including exhaustion and disengagement. Exhaustion is defined as "intensive physical, affective and cognitive strain, as a long-term consequence of prolonged exposure to work stressors." Disengagement refers to "distancing oneself from one's work, and to negative attitudes towards the work object, work content, or one's work in general."

In conclusion, the components of burnout are variously defined by several authors. However, all of them can be covered into three components, including emotional exhaustion, depersonalization, and personal accomplishment.

3.5.4.3 Measurements of nurse burnout

1) Maslach Burnout Inventory-Human Service Scale (MBI-HSS)

The MBI-HSS has been shown to be the most valid and reliable multidimensional instrument for measuring burnout in human service work (Evans & Fischer, 1993; Schaufeli & Van Dierendonck, 1993). MBI-HSS is the original version of this measure and is the most widely used measure of job burnout (Maslach et al., 1996).

The MBI-HSS is a self-report measure which includes 22-items. It is considered as the gold-standard measure for burnout (Maslach et al., 1996).These items have been designed to measure the three subscales of burnout: emotional exhaustion (EE) (9-items), depersonalization (DP) (5-items) and personal accomplishment (PA) (8-items). Each item is answered on a seven-point response scale, scored 0 – 6 (‘never’, ‘a few times a year’, ‘once a month or less’, ‘a few times a month’, ‘once a week’, ‘a few times a week’ and ‘every day’). The EE scale assesses feelings of being emotionally overextended and exhausted by one’s work. The DP scale assesses the presence of an unfeeling and impersonal response towards recipients of one’s efforts. The PA scale assesses feelings of competence and successful achievement related to one’s work. Results are reported in terms of a high, moderate and low degree of burnout depending on the respective sores for each measure. A high degree of burnout is reflected in high scores on the EE and DP subscales and in low scores on the PA subscale which is rated inversely. An average degree of burnout is reflected in average scores on the three subscales, and a low degree of burnout is reflected in low scores on the EE and DP subscales and a high score on the PA subscales.

Psychometric analysis demonstrates that MBI-HSS has acceptable reliability and validity (Sullivan, 1993). Conbach’s alpha for internal consistency were reported at .90 for EE; .79 for DP; and .71 for PA. The test-retest reliability coefficients were .82 for EE; .60 for DP and .80 for PA. Convergent validity was established in three different ways (Langemo, 1990). A mean score was calculated for each respondent by adding all items and dividing them by the number of the items.

2) The Maslach Burnout Inventory – General Survey (MBI-GS)

The MBI-GS consists of 16 items and three subscales: emotional exhaustion

(five items); cynicism (five items); and professional efficacy (six items). e.g. ‘working all day is really a strain for me’, 0 = *never*, 6 = *everyday*); e.g. ‘I have accomplished many worthwhile things in this job’, 0 = *never*, 6 = *everyday*). Higher scores of MBI-GS indicate higher levels of burnout. Its three subscales have acceptable inter-item consistency: exhaustion (.93), cynicism (.84) and efficacy (.76). However, this instrument was used in general occupational groups not involved in human services group (Schaufeli, Leiter, Maslach, & Jackson, 1996).

Compare with the MBI-HSS, the MBI-GS focuses on the personal relationship among individuals. While MBI-HSS pays more attention on the relationship between individuals and their work setting (Maslach & Leiter, 1997). Therefore, MBI-HSS version was more suitable to measure nurse burnout in hospital settings.

3) Oldenburg Burnout Inventory (OLBI)

OLBI (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Demerouti, Bakker, Vardakou, & Kantas, 2003) conceives of burnout as a syndrome of work-related negative experiences, including feelings of exhaustion and disengagement from work. The OLBI has been developed for use in different kinds of occupations, including non-service work.

This instrument aims to overcome a psychometric shortcoming of the MBI, namely the one-sided wording of the items (Demerouti et al., 2001). In the MBI scales, all EE and DP items are phrased negatively, and all PA items are phrased positively. From a psychometric point of view, such one-sided scales are inferior to scales that include both positively and negatively worded items (Price & Mueller, 1986), and might lead to artificial factor solutions (Lee & Ashforth, 1990).

To avoid these psychometric problems, Demerouti (1999) proposed and constructed an alternative measure of burnout, called OLBI. OLBI includes both negatively and positively worded items. Two components of exhaustion and disengagement were included in OLBI. The third burnout component, reduced personal accomplishment (Maslach et al., 1996), is excluded from this definition of burnout because it is not thought to constitute a core dimension of the condition (Shirom, 2002).

Demerouti et al. (2000) tested a theoretically derived model of burnout and overall life satisfaction among 109 German nurses. The Cronbach's alpha of the exhaustion scale was .84. The Cronbach’s alpha of disengagement was .92. A factor

analysis confirmed the two-dimensional factorial structure of the burnout construct.

However, this instrument was developed with the purpose of using in different kinds of occupations, including non-service work. In addition, it was developed under the German context. Therefore, it may not be appropriate to measure Chinese nurse burnout.

4) Copenhagen Burnout Inventory (CBI)

In Benmark, CBI was developed based on the theoretical assumptions and empirical results of existing burnout instruments, including MBI-HSS, MBI-GS and Burnout Measure (Pines et al., 1981). The CBI focuses on exhaustion, including three scales (1) Personal burnout comprises six items on general symptoms of exhaustion and is applicable to every person either in the workforce or not. (2) Work-related burnout is based on seven items on symptoms of exhaustion related to work and applies to every person in the workforce. (3) Client-related burnout contains six items on symptoms of exhaustion related to working with recipients in human services and is applicable only to people who work with clients (Borritz, 2006).

All items have five response categories. The responses are rescaled to a 0-100 metric (the values being 0-25-50-75-100). Scale scores are calculated by taking the mean of the items in that scale. The Cronbach's alphas of personal related burnout, work related burnout, and client related burnout were .87, .87, and .85, respectively. The correlation among personal and work burnout, personal and client burnout, and work and client burnout were .73, .46, and .61, respectively. The criterion-related validity was tested between psychosocial work environment and burnout. Psychosocial work environment was measured by COPSOQ. Burnout was measured by CBI scales. The results showed that burnout was highest related to job satisfaction (-.51), quantitative demands (.48), role-conflict (.44), and emotional demands (.42) and lowest for job insecurity (.11) and cognitive demands (.14). The discriminate validity of CBI was tested between the occupational groups. The highest burnout levels were found among midwifes and home helpers in the capital. While low levels were found among senior doctors and head nurses. However, this instrument was developed and tested among the Benmark population. In addition, it was not specific to the nursing population. Therefore, it may not be appropriate to measure Chinese nurse burnout.

5) Chinese version of Maslach Burnout Inventory-

Human Service Scale (C-MBI-HSS)

Chinese version Maslach Burnout Inventory was developed by Li and Liu (2000) based on Maslash and Jackson (1986) inventory. After obtaining permission from the original authors, Li translated MBI to Mandarin using translation and back-translation methods. Chinese version MBI consists of 22 items, three subscales including exhaustion, personalization and reduced personal accomplishment. It is a seven-point Likert scale from 0 = *fully congruous* to 6 = *fully incongruous*. The evaluation score was categorized into 3 levels based Best and Kahn (2003) and calculated by researcher as follows:

Burnout	Low	Moderate	High
Emotional exhaustion	0-16	17-26	≥27
Depersonalization	0-6	7-12	≥13
Personal accomplishment	≥39	32-38	0-31

In Li (1996) study, no item was deleted or added through the expert review. The content validity for each item was more than .80. The reliability of this instrument was assessed by internal consistency. The Cronbach's alpha coefficient for C-MBI-HSS was .93, and for the three subscales of emotional exhaustion, depersonalization and reduced personal accomplishment were .91, .81, and .84 respectively.

In addition, Chen (2005) tested construct validity of C-MBI-HSS among 220 nurses by using the EFA. Before conducting the EFA, Kaiser-Meyer-Olkin (KMO) and Bartlett's were tested. KMO was .85 and Bartlett's test was significant (χ^2 = 2054.47, p = .00). The principal component analysis with varimax rotation method was used for EFA. The cutoff points of factor loading was .4. Three factors with 22 items were extracted with Eigenvalue more than 1 and explained 55.89% of the total variance.

In this study, C-MBI-HSS was selected because of the following reasons:

(1) C-MBI-HSS has been reported to have good psychometric properties.

(2) It was appropriated to be used among Chinese RNs.

(3) According to Schaufeli and Enzmann (1998), over 90% of empirical research have used MBI-HSS or MBI-GS to measure burnout. The original MBI-HSS version was suitable to measure nurse burnout in hospital settings.

3.5.5 Intention to leave

3.5.5.1 Definitions related to intention to leave

From the literature review, the terms ‘turnover intent’, ‘intent to leave’, ‘intention to leave’, ‘anticipated turnover’ and ‘intention to quit’ has been found to describe the situation that employee plan to leave their work position.

According to the explanation of Hinshaw and Atwood (1985), intention to leave is defined as the individual’s opinions or perceptions regarding the probability of leaving their present job voluntarily. Similarity, Rahim and Psenicka (1996) referred to intention to leave a job as to the intention or trend wherein an employee leaves the organization by which they are currently employed. In addition, Price and Mueller (1981) referred to nurse intent to leave as RN’s expectation of resignation in predictable future. Moreover, the definitions of turnover intent, turnover intention and anticipated turnover were found from the literature review as well. Mobley, Griffeth, Hand, and Meglino (1979) stated that turnover intent was the cognitive process that people think to quit, plan to leave, or desire to leave a job. Similarity, Vandenberg and Nelson (1999) defined turnover intention as individual’s personal opinions that they will leave their work organization in the near future forever. Moreover, Hinshaw, Smeltzer, and Atwood (1987) defined anticipated turnover as “the degree to which the nursing staff members perceived they would terminate their position eventually at some unspecified time in the future”. Therefore, either the word of turnover intent or anticipated turnover has the same meaning as intention or intent to leave. Therefore, in this study, the theoretical definition of nurses’ intention to leave was defined as nurses’ perception or opinion of the possibility of voluntarily terminating of their current positions.

3.5.5.2 Measurements of intention to leave

From literature review, the instrument for measuring intention to leave include single item measurement, and long term measurement.

1) Single item measurement

From literature review, intention to leave is commonly measured by single item measurement. For instance, in Price and Mueller (1981) study, single item with a five-point response scale: 1 = *definitely will not leave,* 5 = *definitely will leave* was used to measure nurses’ intention to leave. In Hinshaw & Atwood (1982) study, the measure of an individual’s intention to leave the hospital is a single-item scale which asks “Do you plan to leave this facility within the next year?” Scores range from 1 = *not at all* to 7 = *I surely do*. Similarity, in Rahim and Psenicka (1996) study, intention to leave a job

was measured by the following question: "What would you rather do if your livelihood were sufficient". Responses were provided on a four-point scale that included the following choices: 1 = *"I would continue working in this organization"*; 2 = *"I would switch to another organization in the same occupational field"*; 3 = *"I would switch to another occupational field"*; and 4 = *"I would give up working completely"*. More currently, in intent to leave was measured by response to the question "How likely are you to leave your principle position in the next 12 months"? Response categories included 1 = *very unlikely*, 2 = *somewhat unlikely*, 3 = *somewhat likely*, and 4 = *very likely* (Aiken et al., 2012). In addition, reasons for leaving position responses were collapsed into three categories: "career advancement" (e.g., promotion, accepted a new position, returned to school) "situational" (e.g., family reasons, relocation, retirement, illness) or "job dissatisfaction" (e.g., unhappy with pay, short staffing, poor management). A fourth category of "other" was used when indicated by the respondents and when multiple cross-category reasons were listed by respondents.

Single item questionnaire did not describe concept construct and it was also lack of reliability and validity (DeVellis, 2012, p. 70). Thus, this was considered as the limitation of using those instruments to measure nurses' intention to leave. Therefore, the long term measurement were reviewed.

2) Long term measurement

(a) Chinese version of Turnover Intention Questionnaire (C-TIQ)

Chinese version of Turnover Intention Questionnaire (C-TIQ) was translated and back translated by Li and Li (2000) from Turnover Intention Questionnaire (Michaels & Spector, 1982). It is a four-point Likert scale. The score ranged from 1 = *never*, 2 = *seldom*, 3 = *occasionally*, to 4 = *frequently*. The higher score interpreted higher intention to leave. C-TIQ included three sub-scales (TI1, TI2, and TI3) with total of six items. TI1 included two items. It presented the possibility of resigning current work. TI2 included two items. It described the motivation of finding other jobs. TI3 included two items. It illustrated the possibility of accessing to external work. Li and Li (2000) tested reliability and validity of C-TIQ among 251 industrial technology research institute staffs. The results showed that Cronbach's alpha of C-TIQ was .77 and content validity was 67.67%. However, this instrument was initially developed in

non-nursing population. In addition, there are two items in each dimension. It may not be appropriately used SEM as recommended by Hair, Black, Babin, and Anderson (2010). Thus, C-TIQ was not selected to be used in this study.

(b) Anticipated Turnover Scale (ATS)

The Anticipated Turnover Scale (ATS) developed by Hinshaw and Atwood (1985) is a self-reported instrument that contains 12 items. This instrument was tested among 1597 RNs, LPNs, and nursing assistants (NAs). The Cronbach's alpha for the ATS was .84. Construct validity was established using factor analysis (Hinshaw & Atwood, 1985). Principal components analysis yielded two factors explaining 54.9% of the variance. However, Barlow and Zangaro (2010) stated that according to personal communication with Hinshaw, ATS was used as a one-factor instrument. It is a seven-point Likert scale. The score ranged from 1 = *strongly disagree* to 7 = *strongly agree*. The higher score interpreted higher intention to leave. The lower score interpreted low intention to leave. The range of scores was from 7 to 84. Six items were positively worded and six items were negatively worded.

In this study, ATS was selected to measure nurses' intention to leave, because the following reasons.

(1) ATS had the good psychometric property with several items to reflect the constructs. It is better than the signal item measurement. Twelve studies have reported acceptable reliability and validity of the ATS to be used among RNs in the US based on Barlow and Zangaro (2010) meta-analysis reports.

(2) ATS was initially developed in nursing population, it was suitable to be used to measure nurses' intention to leave in hospital settings.

(3) In Liou and Grobe (2008) study, researchers used ATS to measure Asian nurses' intention to leave option. Therefore, it may be appropriate for using to measure Chinese nurses' intention to leave.

4. The Relationships among Nurse Staffing, Nurse Work Environment, Nurses' Job Satisfaction, Nurse Burnout, Nurses' Intention to Leave, and Nurse-Assessed Quality of Nursing Care

Based on Aiken (2002) NWE-NS-OM and empirical literature, the selected variables to predict nurse-assessed quality of nursing care were nurses' intention to

leave, nurse burnout, nurses' job satisfaction, nurse work environment and nurse staffing. The details of their relationships are presented as follows.

4.1 The impact of nurses' intention to leave on nurse-assessed quality of nursing care

The empirical studies showed that when a nurse would like to leave his or her current job, their assessed quality of nursing care score was lower. For example, in MacDavitt (2008) study, when comparing nurses who intended to leave their current position within the next year with those who planned to stay at their current positions, (1) nurse report quality of nursing care in general as excellent, (2) quality of nursing care on the last shift as excellent or good, and (3) quality of nursing care over the past year as unchanged or improved decreased 58%, 42%, and 38% by statistical analysis of Odd Ratio (OR) (OR, 0.42, $p < .01$; 0.58, $p < .05$; and 0.62, $p < .01$), respectively. OR is the statistical analysis method to indicate the risk associated with the change from intention to stay to intention leave.

However, Ma, Lee, Yang, and Chang (2009) conducted a cross-sectional questionnaire survey to compare the differences in level of job satisfaction, nurse characteristics, and perception of quality of patient care between those who intended to stay and those who intended to leave their current job among 1,016 nurses in four acute care hospitals in Taiwan. In addition, factors influencing intention to leave was studied in this study. The result showed that the nurses who intended to leave ($M = 6.42$) perceived a lower quality of nursing care than those who intended to stay ($M = 7.02$) with the p-value = .001. Through the logistic regression analysis, quality of nursing care as perceived by nurses was not related to nurses' intention to leave ($p = .67$).

Therefore, it was hypothesized that nurse intention to leave had a negative direct effect on nurse-assessed quality of nursing care.

4.2 The impact of nurse burnout on nurses' intention to leave and nurse-assessed quality of nursing care

It has been found in the literature review that when nurses experience higher burnout, their desire to leave their work will be increased. Nurse-assessed quality of care will be decreased in the situation of higher burnout.

4.2.1 The impact of nurse burnout on nurses' intention to leave

Janssen, de Jonge, and Bakker (1999) conducted a study to investigate the

relationship between burnout and turnover intentions among 156 Dutch nurses in general hospital of Netherlands. Since Maslach (1993) stated that emotional exhaustion was the core dimension among three dimensions of burnout. In Janssen's study, emotional exhaustion was selected and the result revealed that there was a positive relationship between emotional exhaustion and turnover intention ($r = .17$, $p < .05$).

Estryn-Béhar et al. (2007) clarified that burnout was associated with nurses' intent to leave among 28,561 hospital-based nurses across10 European countries. It was found that nurse burnout in France, Germany, Italy, United Kingdom, Netherlands, Norway, Belgium, Poland, and Finland had a significant positive associated with intention to leave. When burnout scores increased from low to medium, nurses' intention to leave in the above countries, with the exception of Finland and Poland, increased 1.27 times to 2.46 times and p value range from .00 -.07, using statistical analysis of odd ratio. Additionally, comparing the low burnout score with the high score, nurse intention to leave increased 2.33-5.43 times in the above nine countries (OR, 3.55, $p = .00$; OR, 2.75, $p = .00$; OR, 3.17, $p = .00$; OR, 2.71, $p = .00$; OR, 3.16, $p = .00$; OR = 3.42, $p = .00$; OR = 5.43, $p = .00$; OR = 2.34, $p = .00$; OR = 2.33, $p = .00$).

Moreover, Spence Laschinger, Leiter, Day, and Gilin (2009) examined the influence of burnout on turnover intention among 612 Canadian staff nurses. The results showed that the correlation between emotional exhaustion, cynicism and turnover intention was 0.40 ($p < .05$) and 0.46 ($p < .05$), respectively. Emotional exhaustion and cynicism can significantly predict turnover intention ($\beta = .19$, $p < .05$; $\beta = .27$, $p < .05$, respectively).

What is more, Bartram et al. (2012) studied burnout and intention to leave among 183 nurses in one public regional hospital in Australia. A positive relationship was found between burnout and intention to leave ($r = .45$, $p < .001$).

In China, Tan, Zou, Liu, and Hu (2014) investigated the relationships between nurses' job burnout and turnover intention among 207 ICU nurses from four provincial level tertiary general hospitals in Changsha. The 22-item C-MBI-HSS and three-item Turnover Intention Questionnaire (TIQ) were used to conduct the survey. TIQ was developed by researcher to be used in ICU. The results showed that emotional exhaustion and depersonalization were significantly positive correlated with turnover intention ($r = .53$, $r = .38$, $p < .05$). Personal accomplishment was significantly negative

correlated with turnover intention ($r = -.31$, $p < .05$).

Similarity, Chen et al. (2014) investigated the current situation and correlation between job burnout and turnover intention among 563 nurses in different levels of hospitals in China. Two hundred and seventy two out of 563 nurses came from tertiary general hospitals in western Guangdong. The job burnout was measured by 22-items C-MBI-HSS. Turnover intention was measured by C-TIQ. C-TIQ included sub-dimensions of TI1, TI2, and TI3. The results showed that emotional exhaustion had a significant positive correlation with TI1, TI2, and TI3 (.58, .45, .29, $p < .01$, respectively). Depersonalization had a significant positive correlation with TI1, TI2, and TI3 (.42, .36, .23, $p < .01$, respectively). Personal accomplishment's rescore has a significant positive correlation with TI1, TI2, and TI3 (.35, $p < .01$; .37, $p < .01$; .14, $p < .05$).

In conclusion, both total score and sub-scales score of nurse burnout have been found related to nurses' intention to leave. In this study, the total score of nurse burnout was proposed to be used. Thus, it was hypothesized that nurse burnout had a positive direct effect on nurses' intention to leave.

4.2.2 The impacts of nurse burnout on nurse-assessed quality of care

In MacDavitt (2008) study, the relationship between nurse burnout and nurse reported quality nursing care were examined. The results showed that when nurses reported burnout scores were moved from moderate or higher compared to low, nurses reported (1) quality in general as excellent or good, (2) on the last worked shift as excellent or good quality, and (3) unchanged or improved quality over the past year increased 2.26 times ($p < .01$), 2.93 times ($p < .005$), and 2.68 times ($p < .01$), respectively through statistical analysis of Odd Ratio. Comparing nurse reported burnout on depersonalization dimension as low with moderate or high, nurses reported quality in general as excellent or good, quality on the last shift worked increased 2.74 times ($p < .05$) and 3.25 times ($p < .01$), respectively, by using Odd Ratio's statistical analysis.

Poghosyan, Clarke, Finlayson, and Aiken (2010) examined the relationship between nurse burnout and nurse-rated quality of care among 53,846 nurses cross six countries (U.S.A., Canada, Germany, U.K., Japan, and New Zealand). The results showed that higher levels of burnout were associated with lower ratings of quality of

care. In adjusted models, each unit increased in the emotional exhaustion dimension's score, related to a 2% - 6% ($p < .01$) rise in the odds of reporting fair or poor quality of care. In addition, each unit increased in the depersonalization dimension score was associated with 6% - 9% ($p < .01$) increased in the odds of reporting fair or poor quality care. The odds of reporting poor quality care decreased 3% - 6% ($p < .01$), by each unit of personal accomplishment increased.

In conclusion, in the literature, both total score and sub-scales of nurse burnout have been found related to nurse-assessed quality of care. In this study, the total score of burnout was proposed to be used. Thus, it was hypothesized that nurse burnout has a negative direct effect on nurse-assessed quality of care. In addition, since nurse burnout had a positive direct effect on nurses' intention to leave (Bartram et al., 2012; Estryn-Bćhar et al., 2007) and nurses' intention to leave had a negative direct effect on nurse-assessed quality of care (MacDavitt, 2008), it was hypothesized that nurse burnout has a negative indirect effect on nurse-assessed quality of care due to their intention to leave.

4.3 The impact of nurses' job satisfaction on nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care

Based on an extensive review, when nurses report being less satisfied with their work, they will feel more burnout and the likelihood of leaving their work will be increased. In addition, a lower score of their assessed quality of nursing care will be reached.

4.3.1 The impact of nurses' job satisfaction on nurse burnout

Maslach (1982) stated that burnout reflects the phenomenon that cumulated in the work environment stressors and defeating of the employees' defenses in order to force them into psychological retreat. It was determined by personal accomplishment, emotional exhaustion, and depersonalization. Higher levels of job satisfaction and less stressful work environments could reduce employee's experience of burnout. Thus, Kalliath and Morris (2002) conducted a study to test the hypothesis that lower levels of burnout could be predicted by higher levels of job satisfaction. The study results revealed that job satisfaction had significant direct negative influence on emotional exhaustion ($\beta = -.97$, $p < .01$), and indirect influence on depersonalization through exhaustion ($\beta = -.58$, $p < .01$).

Additionally, Kwak, Chung, Xu, and Eun-Jung (2010) examined the relationship between job satisfaction and burnout among 496 RNs across 23 acute hospitals in South Korea. By using Spearman correlation analyses, the results showed that job satisfaction negatively correlated with total burnout scores ($r = -.42$, $p < .001$).

In China, Chen (2005) studied the effects of job satisfaction on burnout among 194 nurses across three Chinese cities (Hangzhou, Huzhou, and Wuxi). The results revealed that nurse job satisfaction dimensions of nursing care satisfaction, colleague satisfaction, supervisor satisfaction, development satisfaction, and reward satisfaction were related to emotional exhaustion ($r = -.23$, $p = .001$; $r = -.17$, $p = .02$; $r = -.18$, $p = .01$; $r = -.22$, $p = .002$; and $r = .24$, $p = .001$, respectively). Nursing care satisfaction, colleague satisfaction and supervisor satisfaction were negatively associated with depersonalization ($r = -.26$, $p = .000$; $r = -.35$, $p = .000$; $r = -.17$, $p = .02$, respectively). While each dimension of job satisfaction was positively related to personal accomplishment ($r = .44$, $p = .000$; $r = .25$, $p = .000$; $r = .31$, $p = .000$; $r = .33$, $p = .000$; $r = .23$, $p = .001$). Additionally, emotional exhaustion was predicted by colleague satisfaction and reward satisfaction ($\beta = -.18$, $p = .005$ and $\beta = -.17$, $p = .01$, respectively). Colleague satisfaction was depersonalization's predictor ($\beta = -.27$, $p = .000$). Nursing care satisfaction and supervisor satisfaction were predictors of personal accomplishment ($\beta = .39$, $p = .005$; $\beta = .18$, $p = .01$, respectively).

Similarity, Ling (2005) explored job stressor, job satisfaction and burnout relationships among 307 nurses across five hospitals in Shangdong province, China. The study results showed that there were significant negative relationships among single item job satisfaction and emotional exhaustion, cynicism, and inefficacy ($r = -.31$, $p < .001$; $r = -.21$, $p < .001$; $r = -.18$, $p < .001$, respectively).

In conclusion, nurses' job satisfaction significantly influenced both total score and sub-scales scores of nurse burnout. In this study, it was hypothesized that nurses' job satisfaction had a negative direct effect on total score of nurse burnout.

4.3.2 The impact of nurses' job satisfaction on nurses' intention to leave

Various studies have found that job satisfaction is linked to nurses' intention to leave their job (Huang et al., 2008; Liu et al., 2012; Lu, Lin, Wu, Hsieh, & Chang, 2002; Shader, Broome, Broome, West, & Nash, 2001).

Shader et al. (2001) studied the factors influencing anticipated turnover among

241 RNs in an academic medical center in Canada. Using stepwise regression analysis, the results showed that job satisfaction significantly influenced turnover intention (β = -0.35, $p < .001$).

Lu et al. (2002) investigated the relationships among professional commitment, job satisfaction, and turnover intentions among 2197 Taiwanese RNs. The findings indicated that job satisfaction was negatively correlated with intention to leave the organization and profession ($r = -.48$; $r = -.37$; respectively, $p < .01$).

Huang et al. (2008) explored relationship between job satisfaction and intent to leave among 435 contract nurses in one tertiary hospital in Changsha, China. The results showed that there was a negative relationship between nurses' job satisfaction and nurses' intention to leave ($r = -.45$, $p < .01$).

Liu et al. (2012) studied about the relationship between nurse job satisfaction and intention to leave among 2,250 nurses across 19 general hospitals located in Shanghai, China. The results showed that when nurse job satisfaction on the dimensions of extrinsic rewards, scheduling, interaction, praise/recognition, and control/responsibility as dissatisfied compared with nurses scored as satisfied, nurses' intention to leave increased 4.64, 2.18, 2.33, 2.03, and 1.93 times ($p < .001$), respectively.

Thus, it was hypothesized that nurses' job satisfaction had a negative direct effect on nurses' intention to leave.

4.3.3 The impact of nurses' job satisfaction on nurse-assessed quality of nursing care

Empirical evidence shows that nurses' job satisfaction has a significant correlation with nurse perception of quality of nursing care. Redfern et al. (2002) studied the relationship among work satisfaction, staff stress, nurse reported quality of care and residents moral in south London, United Kingdom (UK). The results showed that job satisfaction had a positive significant relationship with nurse reported quality of care ($r = .54$, $p < .01$).

MacDavitt (2008) conducted a study to examine the relationship between job satisfaction and nurse reported quality of nursing care. The results showed that when nurses rated low job satisfaction compared with high job satisfaction, nurse reported excellent or good quality of care in general and quality over the past year as unchanged

or improved were decreased 70% and 63% (OR, 0.30, $p < .01$; OR, 0.37; $p < .01$), respectively.

Additionally, Kwak et al. (2010) examined the relationship between job satisfaction and nurse reported quality of nursing care 496 RNs across 23 acute hospitals in South Korea. By using Spearman correlation analyses, it was found that job satisfaction positively correlated with perceived quality of care ($r = .20$, $p < .05$).

Thus, it was hypothesized that nurses' job satisfaction had a positive direct effect on nurse-assessed quality of nursing care. In addition, it was hypothesized that nurses' job satisfaction positively indirectly influenced nurse-assessed quality of nursing care through burnout and intention to leave, because it has been found that nurses' job satisfaction had a negative direct effect on nurse burnout (Chen, 2005; Kalliath & Morris, 2002; Kwak et al., 2010; Ling, 2005), nurse burnout had a positive direct effect on nurses' intention to leave (Spence Laschinger et al., 2009), and nurses' intention to leave had a negative direct effect on nurse-assessed quality of nursing care (MacDavitt, 2008).

4.4 The impacts of nurse work environment on nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care

Based on Aiken (2002) NWE-NS-OM, when nurses work in a better work environment, they will feel more satisfied, experience lower burnout, have less intention to leave, and assessed higher quality of nursing care. The following sections provide the research evidence to support the theoretical explanation.

4.4.1 The impacts of nurse work environment on nurse' job satisfaction

When reviewing literature, it has been found that several studies using nurse work environment based on Lake (2002) five domains' Practice Environment Scale of the Nursing Work Index (NWI-PES) was associated with nurse' job satisfaction. For example, Manojlovich (2005a) investigated 332 hospital nurses throughout Michigan. It was found that the practice environment was directly associated with nurse job satisfaction ($r = .68$, $p < .01$). In addition, nurses' practice environment was indirectly related to nurses' job satisfaction through RN-MD communication ($\beta = .39$, $p < .01$).

Similarity, Manojlovich and Laschinger (2007) tested relationships among structural empowerment, nurse work environment and job satisfaction among 276

nurses in Michigan. Research findings showed that each dimension of nurse work environment was positively associated with nurses' job satisfaction. The Correlation coefficient of nurse participation in hospital affairs (policy involvement), nursing foundations for quality of care (nursing model of care), nurse manager ability, leadership and support of nurses (leadership), staffing and resource adequacy (staffing adequacy), and collegial nurse-physician relations (RN/MD relationship) to nurses' job satisfaction was 0.54, 0.50, 0.53, 0.59, and 0.6 ($p < .05$), respectively.

Aiken et al. (2008) studied about the effects of nurse work environment on nurses' job dissatisfaction among 10,184 nurses in 168 Pennsylvania hospitals. It also found that nurse work environment had a negative relationship with job dissatisfaction. When nurse work environment score changed from better to mix, the odd ratio of nurses' job satisfaction decreased 26% (OR, 0.74; $p < .01$).

In China, Liu et al. (2012) explored the relationship between nurse work environment and nurses' job dissatisfaction among 1,104 nurses in 21 Chinese hospitals throughout the Guangdong province. The nurses' job satisfaction decreased 50% (OR, 0.5; $p < .0001$), when nurse work environment was good in comparison to poor. Similarity, You et al. (2013) examined the impact of nurse work environment on job dissatisfaction among 9688 nurses across 181 hospitals. The results showed that when comparing the best nurse work environment with the rest, nurses' job satisfaction decreased 44% (OR, 0.56; $p < .001$).

Thus, nurse work environment was likely to have a positive direct effect on nurses' job satisfaction.

4.4.2 The impact of nurse work environment on nurse burnout

Nurse burnout was another variable significantly influenced by nurse work environment. The reviewing empirical evidence was written as follows. For example, Aiken et al. (2008) examined the relationship between nurse work environment and nurse burnout among 10,184 nurses in 168 Pennsylvania hospitals. It has been found that nurse work environment was negatively related to nurse burnout. When nurse work environment was perceived as better versus mixed, the nurse burnout increased 26% (OR, 0.74; $p < .01$).

Van Bogaert et al. (2009) determined the effects of nurse work environment on sub-scales of the MBI by using linear regression analyses among 155 nurses in three

Belgian hospitals. The results showed that adjusted beta coefficient between nurse–physician relations, hospital management and organizational support, nurse management at the unit level, and emotional exhaustion were -3.7, -2.8, -3.3, ($p < .01$), respectively. Additionally, the adjusted beta coefficient between hospital management and organizational support and depersonalization was -2.4 ($p < .01$). The adjusted beta coefficient between nurse–physician relations, hospital management and organizational support, nurse management at the unit level and personal accomplishment were 3.2, 2.7, 3.1 ($p < .01$), respectively.

Rochefort and Clarke (2010) studied nurse work environment and job outcomes which include burnout among 553 nurses across Quebec neonatal intensive care units of Canada. The results showed that higher ratings of resource adequacy were associated with lower emotional exhaustion. The regression coefficient showed that when nurse perceptions of resource adequacy moved from the lowest to highest level, nurses' emotional exhaustion level was reduced 16.5% ($p < .05$).

In China, Liu et al. (2012) determined the effects of nurse work environment on nurse outcomes, including nurse burnout, among 1,104 Guangdong province nurses in 21 Chinese hospitals. The results revealed that when nurse work environment ranged from good to poor, nurse burnout increased 32.7% (OR, 0.67; $p < .01$). Similarity, You et al. (2013) examined the nurse work environment influencing nurse burnout among 9688 nurses across 181 hospitals. Compared to nurses who reported unfavorable work environments, nurses who reported the best work environments were 1.51 times less likely to report burnout (OR, 0.66; $p < .001$).

Thus, it was hypothesized that nurse work environment had a negative direct effect on nurse burnout.

4.4.3 The impacts of nurse work environment on nurses' intention to leave

The nurse work environment factors influencing nurse intention to leave has been studied by several researchers. For example, Gardner et al. (2007) examined the association among nurse perceptions of nurse work environment, nurse intention to leave and nurse turnover among 199 nurses across 56 dialysis units in Chicago, U.S.A. The research findings showed that there was a significant negative relationship between total score of nurse work environment and nurses' intention to leave ($r = -.25$, $p < .01$).

Aiken et al. (2008) conducted the study to examine the relationship between nurse work environment and nurse intention to leave among 10,184 nurses in 168 Pennsylvania hospitals. The results showed that there was a positive relationship between nurse work environment and intention to leave within 1 year. When nurse work environment score moved from better to mixed, nurses' intention to leave decreased 13% (OR, 0.87; $p < .01$).

El-Jardali et al. (2011) explored the relationship between nurse work environment and nurse intent to leave among 793 RNs across 69 Lebanese hospitals. The results revealed that every 1 point score decreased on nurse work environment of career development dimension was associated with 93% increased in nurse reporting an intent to leave the country (OR = 1.93, $p = .001$). In addition, every 1 point score decreased on nurse work environment of nurse participation dimension was related to 51% and 53% increased nurse reported to intent to leave the country and the hospital (OR, 1.51, $p = .02$, and OR, 1.53, $p = .005$, respectively).

In China, the association between nurse work environment and intention to leave was also supported both by qualitative and quantitative research. Choi, Pang, Cheung, and Wong (2011) conducted a phenomenological qualitative research and used semi-structured interview to explore first line public hospital RNs living experiences regarding their work in Hong Kong. The results revealed that when RNs worked in unfavorable work conditions, they displayed the frustration emotional and determined to leave their work.

Thus, it was hypothesized that nurse work environment had a negative direct effect on intention to leave.

4.4.4 The impacts of nurse work environment on nurse-assessed quality of nursing care

In Rochefort and Clarke (2010) study, the result showed that high scores on three work environment subscales of nurse-management relationships, nurse-physician relationships, staffing and resource adequacy were related to a statistically significant increase in nurse-appraised quality of care. These coefficients imply that, when moving from the worst to the best work environments according to nurses' perceptions, improvements from 6.7% to 11% in the ratings of quality of nursing care as excellent were observed ($p < .05$)

Moreover, in China, You et al. (2013) examined the impact of nurse work environment on nurse reported quality of nursing care among 9688 nurses across 181 hospitals. The results showed that when nurse work environment score ranged from the best to the rest, nurse-assessed quality of care was decreased 26% (OR = 0.74, p = .008).

Thus, it was hypothesized that nurse work environment had a positive direct effect on nurse-assessed quality of nursing care. In addition, as is shown by the empirical evidence, it was found that nurse work environment had a positive effect on nurses' job satisfaction (Aiken et al., 2008; Liu et al., 2012; Manojlovich, 2005a; Manojlovich & Laschinger, 2007; You et al., 2013), nurses' job satisfaction had a negative direct effect on nurse burnout (Chen, 2005; Kalliath & Morris, 2002; Kwak et al., 2010; Ling, 2005); and nurse burnout had a positive direct effect on nurses' intention to leave (Spence Laschinger et al., 2009). Moreover, it was also found that nurse burnout had a positive direct effect on nurses' intention to leave (Tan et al., 2014) and nurses' intention to leave had a negative direct effect on nurse-assessed quality of nursing care (MacDavitt, 2008). Thus, it was likely to hypothesize that nurse work environment has a positive indirect effect on nurse-assessed quality of nursing care through nurses' job satisfaction, burnout, and intention to leave.

4.5 The impacts of nurse staffing on nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care

Based on Aiken (2002) NWE-NS-OM, when one nurse takes care of more patients, nurse burnout, and intention to leave will increase and nurses' job satisfaction, and nurse-assessed quality of nursing care will be reduced. Depending on whether the term nurse to patient ratio or patient to nurse ratio was selected to be used in different studies, the direction of the nurse staffing influence nurse outcomes were either positive or negative. The empirical studies supporting explanations of hypothesized model are provided below.

4.5.1 The impacts of patient to nurse ratio on nurses' job satisfaction, nurse burnout and nurses' intention to leave.

From the literature review, several studies have shown that higher patient-to-nurse ratio is directly associated with nurses' job dissatisfaction, burnout (Aiken et al., 2002; Rafferty et al., 2007; Sheward, Hunt, Hagen, Macleod, & Ball, 2005; You et al., 2013), and intention to leave (Aiken et al., 2012).

A cross-sectional study was conducted by Aiken et al. (2002) to determine the relationship between patient-to-nurse ratio and nurse outcomes (job dissatisfaction, burnout) among 10184 staff nurses in Pennsylvania. Under the conditions, hospital and nurse characteristics were adjusted. By using odd ratio statistical analysis, when each additional patient per nurse was added, burnout and job dissatisfaction was increased 1.23 times ($p < .001$) and 1.15 times ($p < .001$), respectively.

Sheward et al. (2005) conducted another study to explore nurse-to-patient ratio associated with emotional exhaustion and job dissatisfaction among 19,454 RNs in Scotland and England. The nurse-to-patient ratio was classified into four groups, which were 1 to 4, 5 to 8, 9 to 12, and more than 13 patients per nurses. The statistical analysis showed that nurse-to-patient ratio was highly related to emotional exhaustion and job dissatisfaction. By using odd ratio statistic, when the number of patients that nurses took care increased from 0-4, 5-8, 9-12, to 13 or greater, burnout was increased from 0.57, 0.67, 0.80 to 1.00 ($p < .01$), respectively. In addition, job dissatisfaction became greater from 0.70, 0.75, 0.84 to 1.00 ($p < .01$), respectively.

Moreover, Rafferty et al. (2007) explored the effect of patient-to-nurse ratio on nurse job dissatisfaction, and nurse burnout among 3,984 nurses in 30 hospitals in England. The findings of this study showed that nurses dissatisfied with their jobs and experienced high burnout accounted for 35.6% and 36.4%, respectively. Average rang of patient-to-nurse ratio among 30 hospitals was between 6.9 to 14.3 patients per nurse. In this study, nurse staffing was categorized into four quartiles. The first quartile of trusts ranged from 6.9 to 8.3 patients per nurse. The second quartile of trusts ranged from 8.6 to 10.0 patients per nurse. The third quartile of trusts ranged from 10.1 to 12.0 patients per nurse. The fourth quartile of trusts ranged from 12.4 to 14.3 patients per nurse. Therefore, the term 'nurse staffing level' was used instead of 'nurse staffing'. When nurse staffing level increase from the first to second quartiles, emotional exhaustion levels increased 1.34 times ($p = .02$). When nurse staffing level increased from the first to third quartiles, job dissatisfaction level increased 1.38 times ($p < .001$). When nurse staffing level increased from first to fourth quartile, job dissatisfaction and emotional exhaustion levels increased 1.71times ($p < .001$) and 1.78 times ($p < .001$), respectively.

Aiken et al. (2012) conducted another study to explore the effects of nurse

staffing on nurse burnout, nurse job dissatisfaction, and nurse intention to leave among 33,659 nurses in European hospitals and 27,509 nurses in the hospitals in the United States. Using robust logistic regression, the results showed that for every additional patient was added, the ORs of nurse burnout, job dissatisfaction, intention to leave in the next year were increased 1.05, 1.07, 1.05 times in the Europe hospitals and 1.03, 1.06, 1.03 times in the United States hospitals, respectively.

In China, Zhu et al. (2012) examined the impact of nurse staffing and nurses' reported quality of care among 9688 nurses across 181 Chinese hospitals. The study results showed that each additional patient to nurse ratio associated with 1.04 ($p = .02$) and 1.04 ($p = .02$) times increasing nurse burnout and nurse job dissatisfaction, respectively. Thus, in this study, it is hypothesized that patient to nurse ratio will have a direct negative effect on job satisfaction, and a direct positive effect on burnout and intention to leave.

Thus, it was hypothesized that patient to nurse ratio has a negative direct effect on job satisfaction, and a positive direct effect on burnout and intention to leave, respectively.

4.5.2 The impact of patient to nurse ratio on nurse-assessed quality of nursing care.

From reviewing literature, it was also found that nurse staffing was directly associated with nurse perception of quality of nursing care in the following studies.

Rafferty et al. (2007) conducted a study to explore the association between patient-to-nurse ratio and nurse-rated quality of care among 3,984 nurses in 30 English acute care settings. The results revealed that higher patient to nurse ratios were related to lower or deteriorating quality of care in their units and hospitals. When nurse staffing level increased from first to second quartile, the decreased quality of nursing care in their units and hospitals were 1.35 times ($p = .07$) and 1.44 times ($p = .02$), respectively. When nurse staffing level increased from the first to third quartile, the decreased quality of nursing care in their units were 1.59 times ($p = .008$). When nurse staffing level increased from first to fourth quartile, the decreased quality of nursing care at the units and hospitals were 1.92 times ($p < .001$) and 1.75 times ($p = .004$), respectively.

Aiken et al. (2008) studied the effects of nurse staffing on nurse assessed quality of nursing care, nurses' job satisfaction, nurse burnout, and nurses' intention to leave

among 10,184 nurses in 168 Pennsylvania hospitals. The results showed that nurse staffing had a positive relationship with nurse assessed quality of nursing care. When one patient per nurse was added, the adjusted ORs for each of the four quality of nursing care items were increased 1.33 times ($p < .01$), 1.16 times ($p < .001$), 1.22 times ($p < .01$), and 1.26 times ($p < .05$), respectively.

Another study was conducted by Cho et al. (2009) to explore nurse-to-patient ratio associated with nurse-rated quality of nursing care among 1365 nurses from 22 Korea hospitals. The results showed that when nurse-to-patient ratio was not more than 2.0 or 2.5 compared with not more than 3.0, the ORs of nurse perceived high quality of nursing care were decreased 3.26 or 2.44 times ($p < .05$), respectively.

Aiken et al. (2012) studied the effects of nurse staffing on nurse reported quality of nursing care among 33,659 hospital nurses in Europe and 27,509 hospital nurses in the United States. By using robust logistic regression, the results showed that each additional patient per nurse increased, the ORs of nurses reporting poor or fair quality care was increased 1.11, 1.07, 1.15 times for Europe and 1.06, 1.03, 1.10 times for the U.S.A., respectively.

In China, You et al. (2013) examined the impact of nurse staffing and nurses' reported quality of care among 9688 nurses across 181 Chinese hospitals. The study results showed that each additional patient to nurse ratio associated with 1.05 times ($p = .005$) increased nurse reporting of poor/fair quality of nursing care.

Similarity, Zhu et al. (2012) analyzed the relationship between nurse staffing and nurse reported quality of nursing care among 7802 medical and surgical nurses across 181 hospitals in mainland China. The nurse staffing was measured by nurse to patient ratio and categorized into less than 0.4, 0.4 to less than 0.5, 0.5 to less than 0.6, and equal or greater than 0.6. The results showed that when comparing nurse to patient ratio among the categories of less than 0.4 and 0.4 to less than 0.5 to greater than 0.6, nurses reported quality of nursing care of poor or fair was increased 1.49 ($p < .01$) and 1.65 ($p < .01$) times, respectively. Nurses reporting not confident in patients' self-care ability on discharge were increased 1.34 ($p < .05$), 1.45 ($p < .05$), 1.54 ($p < .05$) times, when nurses to patient ratio moved from less than 0.4, 0.4 to less than 0.5 and 0.5 to less than 0.6 to equal or great than 0.6, respectively.

Thus, patient to nurse ratio is likely to have a negative direct effect on nurse-

assessed quality of nursing care. Additionally, patient to nurse ratio has a negative indirect effect on nurse-assessed quality of nursing care through nurses' job satisfaction. This is because it has been found that nurse-to-patient ratio has a positive effect on nurses' job satisfaction (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Rafferty et al., 2007; Sheward et al., 2005); nurses' job satisfaction had a negative direct effect on nurse burnout (Chen, 2005; Kalliath & Morris, 2002; Kwak et al., 2010; Ling, 2005); and nurse burnout had a positive direct effect on nurses' intention to leave (Spence Laschinger et al., 2009). Furthermore, both nurse burnout and nurses' intention to leave had a negative direct effect on nurse-assessed quality of nursing care (MacDavitt, 2008). Therefore, it was hypothesized that patient to nurse ratio has a positive indirect effect on nurse-assessed quality of nursing care through nurses' job satisfaction, burnout and intention to leave, respectively.

5. Structural Equation Model (SEM) in nursing research

In this part, the basic concepts used in SEM, Confirmatory Factor Analysis (CFA) models and Goodness-of-Fit (GOF) index related to model assessment are presented as follows.

5.1 SEM basics

Structural Equation Model (SEM) is defined as "Multivariate technique combining aspects of factor analysis and multiple regression that enables the researcher to simultaneously examine a series of interrelated dependence relationships among the measured variables and latent constructs as well as between several latent constructs" (Hair et al., 2010, p. 634).

Measured variable was also named as an indicator. It is the observed value that is used as a measure of a latent construct. Researchers must specify which indicators are associated with specified latent construct. It can be gathered through surveys, tests, or observational methods (Hair et al., 2010). *Latent construct* was also called latent variable or latent factor. In the SEM, it cannot be measured directly, but can be represented or measured by one or more measured variables (indictors). In the multiple regression, it was important to distinguish independent variables and dependent variables. However, the SEM exogenous constructs and endogenous constructs should be distinguished. *Exogenous constructs* are determined by factors outside the model.

They are not explained by any other construct or variables in the model. *Endogenous constructs* are theoretically determined by factors within the model. They are dependent on other constructs (Hair et al., 2010).

In general, SEM consists of two parts: the measurement model and the structural equation model. *The measurement model* specifies "how latent variables or hypothetical constructs depend on or are indicated by the observed variables. It describes the measurement properties of the observed variables" *The structural equation model* specifies "the causal relationship among the latent variables, describes the causal effects, and assigns the explained and unexplained variance" (Jöreskog & Sörbom, 1996, p. 1)

The general progress of SEM analysis included: (1) model conceptualization, (2) path diagram construction, (3) model specification, (4) model identification, (5) parameter estimation, (6) assessment of model fit, and (7) model modification (Diamantopoulos & Siguaw, 2000).

The strength of SEM is it can accommodate measurement error, correlated residuals, and nonrecursive models to determine reciprocal causation. In addition, it can be used to analyze causal models involving latent variables (Polit & Beck, 2012, p. 452). Therefore, SEM was used to determine the factors influencing nurse-assessed quality of care.

5.2 Confirmatory factor analysis models

Confirmatory factor analysis (CFA) is defined as "a way of testing how well measured variables represent a smaller number of constructs" (Hair et al., 2010, p. 693).

In general it includes first-order factor model and second-order factor model. First-order factor is defined as "the covariances between measured items explained with a single latent factor layer"(Hair et al., 2010, p. 689). Second-order factor model is defined as "caused multiple first-order latent factors, which in turn cause the measured variables"(Hair et al., 2010, p. 754).

The usage of second-order factor model should consider the following rules of thumb:

(1) Second-order factors must have a theoretical justification and should be used only in relationships with other constructs of the same general level of abstraction.

(2) All of the first-order factors should be expected to influence other related constructs in the same way.

(3) At least three first-order constructs should be used to meet the minimum conditions for identification and good measurement practice.

In this study, Chinese Nurse Job Satisfaction Scale (CNJS), Chinese Nurse-Assessed Quality of Care Scale (CNAQNCS), and Chinese version of the Practice Environment Scale (C-PES) were not violated the above rules. These three instruments were appropriated to use second-order CFA.

However, the Chinese version of Anticipated Turnover Scale (C-ATS) was single dimension and the Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS) were written in both positive items and negative items. Therefore, the above rules were violated. The first-order CFA was used for the measurement model of C-ATS and C-MBI-HSS analysis.

5.3 Assessing the overall goodness-of-fit (GOF) of the hypothesized model

To determine how well the hypothesized model fit with observed data. According to Jöreskog and Sörbom (1996), four measures of statistical criteria should be used to assess the model GOF, including Chi-square (χ^2), Goodness-of-fit index(GFI), Adjusted goodness-of-fit index(AGFI), Root mean square residual (RMR), and standardized value of RMR(SRMR).

5.3.1 The first set of statistical criteria to assess the model GOF is related to χ^2 test.

The χ^2 GOF test is used to evaluate the appropriateness of the hypothesized model fit with observed data. The χ^2 GOF test is non-significant with $p > .05$ is suggested that the hypothesized model fit with the observed data. The close of p value to 1.00 interpreted hypothesized model prefect. However, the χ^2 GOF test value depended on sample size and hypothesized model complexity. The equation is as follows:

χ^2 = (N-1) (observed sample covariance matrix —SEM estimated covariance matrix).

In the equation, N is the overall sample size. It can be seen from the equation that when the sample size is large, the χ^2 test value will be increased. In addition, the χ^2 test is also likely to be increased when more observed variables are added. Moreover, the estimated covariance matrix is influenced by how many parameters are specified in

the estimated model, so the model degree of freedom (df) also influences the χ^2. Therefore, except p value more than .05, the ratio of $\chi^2/df < 3$ is recommended for SEM (Hair et al., 2010), and ratio of $\chi^2/df < 2$ is recommended for CFA (Wu, 2012). Since χ^2 of GOF test is significantly influenced by large sample size and increased model complexity, alternative measures of GOF tests are recommended.

5.3.2 The second set of statistical criteria to assess the model GOF are GFI and AGFI

GFI is less sensitive to sample sizes that attempt to produce a fit statistic. It is an indicator of the "relevant amount of variances and covariance accounted for by the model and thus shows how closely the model comes to perfectly reproducing the observed covariance matrix". The AGFI is also less sensitive to sample size and model complexity. It is an extension of GFI that is adjusted by the degree of freedom for the proposed model to the degree of freedom for the null model. Value of the GFI and AGFI should range between 0 and 1. The value more than .90 are usually considered as acceptable fits (Hair et al., 2010).

5.3.3 The third set of statistical criteria to assess the model GOF are RMR and SRMR.

RMR is a measure of the average of the fitted residuals and can only be interpreted in relation to the sizes of the observed variances and covariance. This measure works well if all observed variables are standardized. The standardized value of RMR (SRMR) shows "how well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available" The lower RMR and SRMR values represent better fit. Values of SRMR less than .05 are indicative of good fit, between .05 and under .08 present reasonable fit, between .08 and .1 present mediocre fit and if more than 0.10 present poor fit (Diamantopoulos & Siguaw, 2000, p. 85). Additionally, the difference between the sample covariance matrix and the fitted matrix divided by the large-sample error of the residual is called a standardized residual. For a good fit model, the absolute value of the largest standardized residual and the smallest standardized residual should be no more than 2 (Jöreskog & Sörbom, 1996).

Summary

In this study, nurses-assessed quality of nursing care was defined as Chinese RNs' perception about the degree of excellence on the standard nursing services they provide with their expectation to meet patients' needs and to satisfy patients' demands. Nurse-assessed quality of nursing care is important, because it has been found related to patients' medication errors, nosocomial infections, patient falls, mortality and to reduce patients' length of stay in the hospitals. Therefore, it was important to determine factors influencing nurse assessed quality of nursing care.

According to Aiken (2002) NWE-NS-OM, certain factors were selected to predict nurse-assessed quality of nursing care, including nurse staffing, nurse work environment, and nurse outcomes variables. In addition, some interesting nurse outcomes variables in this study include nurses' job satisfaction, nurse burnout, and nurses' intention to leave.

Among factors of nurse outcome, nurses' intention to leave was likely to have a negative direct effect on nurse-assessed quality of nursing care. Additionally, nurse burnout was hypothesized that it had a positive direct effect on intention to leave and negative direct effect on nurse-assessed quality of nursing care. Nurse burnout was hypothesized to have a negative indirect effect on nurse-assessed quality of nursing care through their intention to leave. Furthermore, nurses' job satisfaction was hypothesized to have a positive direct effect on nurse-assessed quality of nursing care and negative direct effect on burnout and intention to leave. Nurses' job satisfaction had a positive indirect effect on nurse-assessed quality of nursing care through burnout and intention to leave.

Moreover, regarding the nurse work environment factor, it was hypothesized that nurse work environment has a positive direct effect on nurse-assessed quality of nursing care and job satisfaction, while it has a negative direct effect on burnout and intention to leave, respectively. Further, it has a positive indirect effect on nurse-assessed quality of nursing care through job satisfaction, burnout, and intention to leave.

The hypothesized factor of nurse staffing influenced other study variables as follows: patient to nurse ratio has a negative direct effect on nurse-assessed quality of nursing care and job satisfaction and a positive direct effect on burnout and intention to leave-respectively. Further, patient to nurse ratio has a negative indirect effect on nurse-

assessed quality of nursing care through job satisfaction. Patient to nurse ratio has a positive indirect effect on nurse-assessed quality of nursing care through burnout and intention to leave, respectively. The hypothesized model was showed in Figure 6.

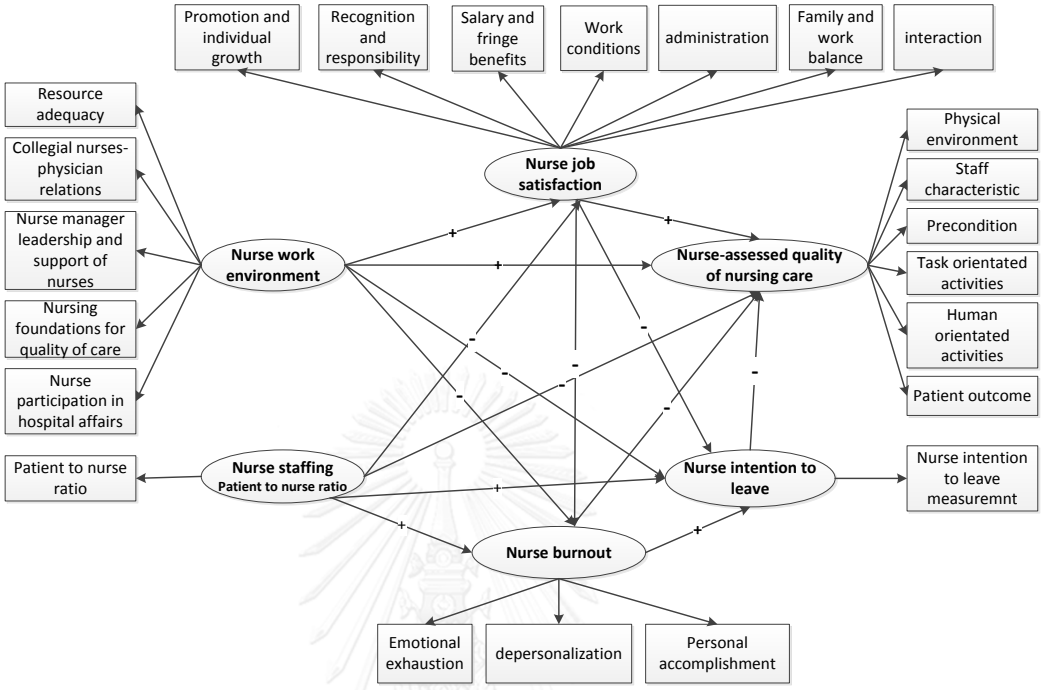


Figure 6 A hypothesized causal model of factors influencing nurse-assessed quality of nursing care in Chinese hospitals

Chapter III
Methodology

This chapter describes research methodology used in the present study. It includes research design, population and sample, research instruments, protection of human subject, data collection procedure, and data analysis in detail.

Research Design

The survey study design for casual modeling was used to examine factors influencing nurse-assessed quality of nursing care, including nurse staffing, nurse work environment, nurse job satisfaction, nurse burnout, and nurse intention to leave in Chinese hospitals. The conceptual framework of this study was guided by Aiken (2002) Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM).

Population and Sample

Population: RNs worked in inpatient department at tertiary general hospitals in China.

Sample: RNs from four of the tertiary general Chinese hospitals randomly selected from the six administration regions of China. The sampling met the following inclusion and exclusion criteria:

Inclusion criteria: (1) Nurses hold RN licenses. (2) Nurses had been employed by the hospital for at least three months, since new nurses have a period of three-month probation. (3) Nurses provided direct nursing care to the patients during their hospitalization. (4) Nurses were willing to participate into the study.

Exclusion criteria: (1) Nurses worked at the administration position, such as vice head nurse, head nurse, nurse supervisor. (2) Nurses worked at the operation room, outpatient department, nursing division department, admissions office, and supplying room. (3) Inpatient department nurses that are in administrative duties and not involved in direct patient care, such as transcription nurses (Wei ji hu shi), office nurses (ban gong shi hu shi), administrative nurses (zhu ban hu shi), dressing room nurses (huan yao shi hu shi), and therapeutic nurses (zhi liao ban hu shi).

Sample size: The calculation of sample size in this study included the instrument testing phase and the main study phase. In each phase, different criteria were used with a specific purpose.

1. The instrument testing phase

In the instrument testing phase, the researchers would like to test psychometric properties of newly developed CNJSS and CNAQNCS. In addition, the reliability of exiting instruments of C-PES, C-MBI-HSS and C-ATS were tested among this sample size as well. According to Tinsly and Tinsly (1987) suggestion, 5 to 10 subjects per item up to about 300 subjects are needed to test the instrument construct validity. Comrey (1973) also classified a sample of 300 subjects as good. This rule of thumb was used to select participants with the same inclusion criteria of participants as the main study in the instrument testing phase.

2. The main study phase

According to Hair, Black, Babin, Anderson, and Tatham (2006), it suggested that the ratio is 5 to 20 response for each parameter in SEM. The hypothesis study model supposes 64 parameters, which are derived from the following relationships:

1) Exogenous variables (nurses' work environment and nurse staffing) and endogenous variables (nurses' job satisfaction, nurse burnout, and nurses' intention to leave), 8 parameters;

2) Endogenous variables and endogenous variables, 6 parameters;

3) Exogenous variables and their observe variables, 6 parameters;

4) Exogenous observe variables and their error terms, 6 parameters;

5) Endogenous variables and their observe variables, 17 parameters;

6) Endogenous observe variables and their error terms, 17 parameters;

7) The residual of endogenous variables, 4 parameters.

Therefore, the minimum number of participants should be 320 RNs, which is equal to 64 × 5. However, according to suggestions made by Hair et al. (2010, p. 662) the minimum sample size of 500 RNs is required with large numbers of constructs or one construct having fewer than three measured items. Since nurse staffing was measured by one item, 500 RNs were needed. Moreover, considering the attrition of the sample, 10% of samples were added. Therefore, 550 RNs were selected from the research setting for hypothesis model testing.

Sampling technique: The sampling techniques in this study are presented in two phases. In the instrument testing phase, the stratified random sampling method was used. In the main study phase, the multi-stage random sampling method was used.

1. The instrument testing phase

Stratified random sampling was used to select participants in one Chinese tertiary general hospital. The selected hospital had a total of 59 wards which met the inclusion criteria and were selected for this study. The number of RNs in these wards totaled 751. These 59 inpatient wards can be grouped into medical departments, surgical departments, eye, ear, nose, & throat (EENT) departments, gynecology and obstetrics (OBGYN) departments, pediatric departments, and intensive care unit (ICU) departments. In order to prevent participants' attrition, 10% of the sample size was added. Therefore, 330RNs were needed for instrument testing, in each strata, the number of nurses were calculated by that strata proposition. For example, there were total 32 RNs in the OBGYN wards, thus 14 ($300 \times 32 \div 751 = 14$) RNs were selected from this strata. Each strata selected RNs number are shown in Table 3. In addition, 302 questionnaires were returned back with a 91.52% return rate. The returned questionnaires in each strata are presented in Table 3 as well.

Table 3 Number of questionnaires sent out and returned back from each hospitals strata in instrument testing phase

Departments	Total number of RNs in the departments	Selected number of RNs from the departments	Returned number of questionnaires in each strata
Medical	370	163	154
Surgical	264	116	101
EENT	13	6	6
OBGYN	32	14	11
Pediatric	32	14	14
ICU	40	18	16
Total	751	331	302

2. The main study phase

A multi-stage random sampling procedure was used to select RNs for main study as shown in Figure 7.

1) First step: There are six administration regions in China. The north, northeast, and northwest are grouped as the north China area. The east, south center, and southwest are grouped as the south China area (News, 2005). Considering the geographical culture differences, it was generally divided into two groups. One group was the culture of southern China and another group was the culture of northern China. Therefore, in order to increase the generalizability of this study's findings, the participants were randomly selected from two out of three northern China area hospitals and two out of three southern China area hospitals, respectively. In conclusion, in this study, participants were randomly stratified draw from the four regions hospitals, which included the northeast, northwest, south center and southwest regional hospitals.

2) Second step: Simple random sampling was used to select one tertiary general hospital in selected administration regions. Since tertiary hospitals admit patients with complicated diseases, it will be more challenging for nurses to delivery good nursing care to patients. In addition, many national studies or policy implementations in healthcare settings were primarily conducted at the tertiary level. The hypothesized causal model established in this study can be further benchmarked by primary and secondary hospitals in China. Therefore, four tertiary general hospitals were selected. The number of RNs in each regional hospital was selected according to the proportion of RNs in each selected hospital to the total number of nurses from four selected regional hospitals as showed in Figure 7. For example, if the total number of RNs in one regional hospital was 480, the selected number of RN from that hospital was 61, which equal to $550 \times 480 \div (480 + 1600 + 1300 + 1000) = 61$.

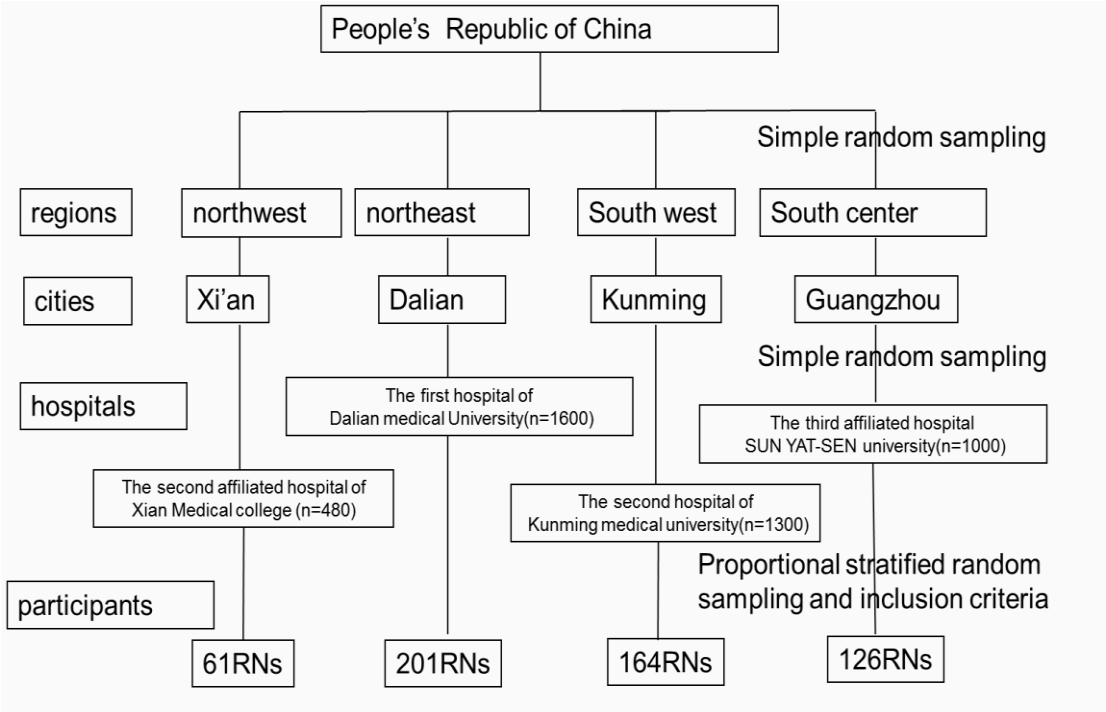


Figure 7 Multi-stage random sampling method

3) Third step: The proportional stratified random sampling method was used to select participants from the inpatient department from each tertiary general hospital. The inpatient departments in Chinese tertiary general hospitals generally can be grouped into surgical departments, medical departments, OBGYN departments, pediatric departments, ICU departments, emergence (ER) departments, and EENT departments. Each of the grouped departments was seen as the strata. Each strata RNs' number was received from each hospital's nursing division department. Then, the number of RNs that were required for each strata in each tertiary general hospital was calculated based on the proportion of RNs number in each strata to total number of RNs in that hospital as shown in Table 4. For example, the number of RNs were selected from the first hospital surgical department was 57, which was calculated by $258 \times 201 \div 920 = 57$. As a result, 566 questionnaires were needed to be sent out and 537 completed questionnaires were returned back. The return rate was 94.88%.

Table 4 Number of Questionnaires Sent Out and Sent Back from Each Hospitals Strata in Main Study Phase

	The First Hospital of Dalian Medical University			The Second Hospital of Kunming Medical University			The Third Affiliated Hospital SUN YAT-SEN University			The Second Affiliated Hospital of Xian Medical College			Total		
	Total	SO	RE	Total	SO	RE	Total	SO	RE	Total	SO	RE	Total	SO	RE
Surgical	258	57	51	333	65	63	175	45	44	66	13	13	832	180	171
Medical	401	88	84	272	53	43	161	41	40	122	23	23	956	205	190
OBGYN	47	10	9	63	13	13	21	6	6	64	12	12	195	41	40
Pediatric	23	6	6	37	8	8	47	12	12	31	6	4	138	32	30
ICU	124	28	28	58	12	12	69	18	18	15	3	3	266	61	61
ER	35	8	6	61	12	11	0	0	0	15	3	3	111	23	20
EENT	32	7	7	26	6	6	26	7	5	19	4	4	103	24	22
Total	920	204	191	850	169	159	499	129	125	332	64	62	2601	566	537

Total = total number of RNs in each strata,
SO = the number of questionnaires were sent out in each strata,
RE = the number of returned questionnaires from RNs in each strata.

Instrumentations

A number of questionnaires were used to collect the data, which include demographic data form, nurse staffing measurement form, Chinese Nurse Job Satisfaction Scale (CNJSS), Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS), Chinese version of Anticipated Turnover Scale (C-ATS), Chinese version of the Practice Environment Scale (C-PES), and Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS). In the following parts, the researcher presented the details of the description or development of the instruments, instrument scoring, translation and back translation process, and instrument psychometric property testing. The data collection was conducted between August, 2014 and January, 2015. In the following parts, the researcher describes aforementioned progress into four parts: Description of the developed Chinese instruments of CNJSS and CNAQNCS; Description of the existing Chinese version instruments of the C-PES and C-MBI-HSS psychometric properties testing; Description of translation instrument of Anticipated Turnover Scale (ATS) into Chinese version of ATS (C-ATS); Description of demographic data form with nurse staffing measurement form.

Part 1. Description of the developed instruments

The Chinese Nurse Job Satisfaction Scale (CNJSS) and The Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS) were developed by the researchers through literature review and the interview of clinical experts. The procedures of instrument development followed DeVellis (2012) guidelines, which including identifying concept construct, generating the item pool, identifying the format of the scale, investigating content validity, and testing psychometric properties.

1. Chinese Nurse Job Satisfaction Scale (CNJSS)

1.1 The development of CNJSS constructs, items, and format

The theoretical underpinning of CNJSS development was based on the Herzberg's Two Factor Theory (Herzberg, 1959), Adams's Equity Theory (Adams, 1973), and Vroom's Expectancy Theory (Vroom, 1964). Eight components with 37 items of nurses' job satisfaction can be identified from literature review, including individual professional development (3 items), work itself (6 items), recognition and praise (6 items), responsibility and control (6 items), remuneration (salary, vocation,

fringe benefits) (6 items), work conditions (5 items), administration and organizational policies (3 items), interaction (5 items), family and work balance (3 items).

According to Waltz, Strickland, and Lenz (2010) statement, the qualitative inquire described and illustrated a concept based on the individual perception of their society. Therefore, through interviewing Chinese clinical nurse experts who have knowledge and experience in the area of clinical nurse job satisfaction, the researcher can get culturally sensitive instrument components regarding Chinese nurses' job satisfaction. All of the selected experts for interview met the qualification as:

1) Having professional title at least associate professor,

2) Working at the clinical setting more than 20 years,

3) Engaging in nursing administration positions,

4) Providing social service, such as at nurse association

The name list of experts were showed in Appendix B. The interview questions carried out include 1) How do you describe the concept of job satisfaction of nurses? 2) What nurses consider as components of their job satisfaction? A tape recorder and paper-pencil were used for data collection. The content analysis method was utilized to analyze the data. After interviewed six experts (1 head nurse, 2 vice nurse directors, and 3 nurse directors) from a variety of regional hospitals (northeast, southwest and south central), the data reached saturation of responses.

Based on literature review and the interviews with nurse experts, eight dimensions with 45 items of nurses' job satisfaction were initially established, including as follows:

1) Individual growth and promotion (5 items),

2) Recognition (6 items),

3) Responsibility and control (6 items),

4) Salary and fringe benefits (7 items),

5) Work conditions (6 items),

6) Administration (6 items),

7) Interaction (5 items), and

8) Family and work balance (4items).

Thirty seven out of 45 items came from literature review. Eight out of 45 items came from experts that were interviewed. These eight items explained totally new ideas

related to contemporary nurses' job satisfaction. Each item was written in a clear and simple sentence, explaining only one idea, and avoiding double negatives (DeVellis, 2012). CNJSS is a five-point Likert scale with the score ranging as follows: 1= *fully dissatisfied*, 2 = *dissatisfied*, 3 = *unsure*, 4 = *satisfied*, and 5 = *fully satisfied*. All items were written in positive way. The higher mean of total score interpreted a higher nurses' job satisfaction. The lower mean of total score interpreted a lower nurses' job satisfaction. According to the score of nurses' job satisfaction range from 1 to 5, containing five ranks, the mean score was divided into five levels by using the class interval formula $\bar{x} = (\overline{x}_{\max} - \overline{x}_{\min})/k$. Furthermore, in order to keep the intervals from overlapping, 0.01 was added to each subsequent lower limit (Polit, 1996). The range of mean scores with the levels of interpretation are presented in Table 5.

Table 5 Levels of interpretation of nurses' job satisfaction

Range of Mean Scores	Levels of Interpretation
1.00 – 1.80	a very low level of nurses' job satisfaction
1.81 – 2.60	a low level of nurses' job satisfaction
2.61 – 3.40	a moderate level of nurses' job satisfaction
3.41 – 4.20	a high level of nurses' job satisfaction
4.21 – 5.00	a very high level of nurses' job satisfaction

1.2 Content validity and psychometric properties of CNJSS testing

The content validity, construct validity of initial CNJSS by using EFA, internal consistency reliability of initial CNJSS, construct validity of CNJSS by using CFA, and construct reliability of CNJSS are presented as followings.

1.2.1 Content validity of initial CNJSS

Content validity is defined as "assessment of the degree of correspondence between the items selected to constitute a summated scale and its conceptual definition" (Hair et al., 2010, p. 92). As suggested by Lynn (1986), the number of a panel experts for content validity test was selected as five. According to Davis (1992), experts' panel for content validity testing should consider the following characteristics: having achieved the same clinical experience as target population, possessing professional certification relate to topic, or conducting research on related topics. Therefore, the selection of content experts is qualified as follows (Appendix C):

1) Having at least a master's degree or graduate students' supervisor holding bachelor's degree,

2) Having at least a professional title of associate professor,

3) Having more than 20 years' work experiences in nursing profession

4) Having research or publications in the field of nursing administration, especially related to nursing care quality management and human resource management.

5) Having a background of teaching students in nurse administration course or at the nurse administration positions.

The content validity index (CVI) was assessed by experts by rating each item's relevance to constructs and operational definition based on 1 = *not relevant*, 2 = *somewhat relevant*, 3 = *quite relevant*, 4 = *highly relevant*. Then, for each item, the item CVI (I-CVI) was calculated as "the number of experts giving a rating of 3 or 4, divided by the number of experts". For scale CVI (S-CVI), the S-CVI/Ave was used by computing the averaging I-CVIs (Polit & Beck, 2012, p. 337). By using aforementioned formula for CVI calculation, 43 items were left with I-CVI ranging from .8 to 1 and S-CVI/Ave of .97. According to experts' suggestions, the item "trust relationship with the patients" and the item "trust relationship with patients' family members" were integrated into one item "trust relationship with patients or patients' family members". The item "Patients recognize my work" and the item "Patients' family member recognize my work" were integrated into one item "Patients or patients' family members recognize my work".

1.2.2 Construct validity of initial CNJSS by using EFA

Construct validity is defined as "the validity of inferences from observed persons, settings, and interventions in a study to the constructs that these instances might represent" (Polit & Beck, 2012, p. 723). The purpose of EFA was to "identify a group of linear combinations of the items that are called factors. These underlying factors are defined in mathematical terms" (Waltz et al., 2010, p. 169). Thus, the process of EFA is considered data-driven. The construct validity of initial CNJSS with 43 items was tested among 302 RNs. Item analysis and the internal consistency reliability were analyzed first before testing the construct validity by EFA.

1) Item analysis: The descriptive statistics showed that these 43 items' Skewness

ranged from -.83 to .05. The kurtosis ranged from -1.28 to 2.24. According to Kline (2011), the absolute value of skewness more than 3.0 illustrates “extreme” skewness. The absolute value of Kurtosis more than 10.0 indicates a problem, and the absolute value of kurtosis more than 20.0 suggests a more serious problem. Thus, CNJSS skewness and kurtosis were normal distribution.

2) Internal consistency reliability: Item-to-total correlation ranged from .46 to .68, which are more than .30 as suggested by Nunnally (1978). The Cronbach’s alpha of each dimension ranged from .82 to .91, which are more than .7 for newly developed instrument (Polit & Beck, 2012).

3) EFA: Kaiser-Meyer-Olkin (KMO) test was .93 and Bartlett’s test was significant (χ^2 = 9578.45, p = 0.000), which indicate adequate sample size for conducting EFA and the significance of all correlations within a correlation matrix (Leech, Barrett, & Morgan, 2005). The principal axis factoring extraction method using varimax rotation method was used for EFA. Since the sample size is 302, the cutoff point of factor loading was set up as .35 (Polit & Beck, 2012). The items of #29, #31, #43 were deleted from analysis, because their factor loading are less than .35. The result of final EFA extracted seven factors (40 items) with eigenvalues from 1.06 to 15.87, which together accounted for 70.50% of the variance as showed in Table 6. These are as follows: recognition and responsibility, administration, salary and fringe benefits, promotion and individual growth, work conditions, family and work balance, and interaction.

Two items (#24 and #39) were considered to move from the first order factor to the next lower factor, because the first order factor does not make senses when one reads the item meaning. The CNJSS includes 40 items in seven dimensions after EFA. Factor loading value ranged from .37 to .84. The dimensions with the number of items are presented in Table 6.

1.2.3 Internal consistency reliability of initial CNJSS

Reliability is “the degree of consistency or dependability with which an instrument measures an attribute” (Polit & Beck, 2012, p. 741).

In this study, from the try out (n = 302), the overall scale internal consistency reliability Cronbach’s alpha of 40-items’ CNJSS was .96. Seven dimensions’ Cronbach’s alpha ranged from .84 to .93 as shown in Table 6. The item-to-total

correlation ranged from .46 to .68.

Table 6 The description of 40-item Chinese Nurse Job Satisfaction Scale (CNJSS) after EFA (n = 302)

Dimensions	Eigenvalue	Percent of Variance Explained	Number of Items	Cronbach's alpha after EFA	Item to total correlation after EFA
1. Recognition and responsibility	16.85	39.18	11	.93	.68 — .78
2. Administration	3.80	8.83	7	.92	.60 — .83
3. Salary and fringe benefits	2.79	6.50	7	.91	.58 — .80
4. Promotion and individual growth	2.08	4.84	5	.84	.56 — .79
5. Work conditions	1.46	3.40	4	.86	.57 — .82
6. Family and work balance	1.28	2.98	3	.85	.62 — .80
7. Interaction	1.10	2.55	3	.84	.63 — .81
Overall CNJSS	29.36	70.50	40	.96	.46 — .68

1.2.4 Construct validity of CNJSS by CFA

In the CFA, the construct validity is extend to "which a set of measured items actually reflects the theoretical latent construct those items are designed to measure". (Hair et al., 2010, p. 708). The purpose of CFA is to test hypothesize construct validity of the instrument. CFA can define the factors directly and then determine how well the defined measurement model fits the observed data. Thus, the process of CFA is theory-driven rather than data-driven (Waltz et al., 2010). Before conducting CFA, the assumption of normality, linearity, and multicollinearity were tested.

1) Normality: The univariate normality was tested by Critical Ratio (CR) of Skewness (SI) and Kurtosis (SK) among 40 items. The CR of SI ranged from -11.44 to 4.69, which were higher than an absolute value of 1.96 ($\alpha = .05$) (Hair et al., 2010). The CR of SK ranged from -5.66 to 14.05, which were higher than an absolute value of 1.96 ($\alpha = .05$) as well. Thus, the assumption of normality was violated.

2) Linearity: It was tested by the scatterplot matrix. Since the scatterplots revealed a linear relationship between each pair of variables, the assumption of linearity was not violated.

3) Multicollinearity: Both the latent variables and observed variables were tested. Firstly, the correlation matrix among seven latent variables were tested. The correlation among pairs of latent variables ranged from .31 to .63. According to Hair et al. (2010), bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .80. Secondly, the correlation matrix among 40 items' observed variables were tested. Bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of 0.85 (Polit, 2010). The results of correlation among each item ranged from .03 to .80. Thus, the assumption of multicollinearity was not violate for both the latent variables and observed variables of 40-item's CNJSS.

The construct validity of CNJSS with 40 items was tested by 510 RNs through the assessment of measurement model by CFA. Since the data violated the normality assumption, the estimation method of Robust Maximum Likelihood (RML) was used to run the measurement model of CNJSS. The result of CFA presented the measurement model of CNJSS with 299 parameters for estimating model identification. The number of unique variance parameter estimation was calculated by the formula as follows:

$n\,(n+1)/2 = 40 \times 41/2 = 820$

Thus the model was over identified, which indicates the model can be analysed (Hair et al., 2010).

The second-order CFA was used to analyse the CNJSS construct validity. The result confirmed CNJSS has 40 items with 7 dimensions as showed in Figure 8. The Goodness of fit statistics presented that CNJSS fitness was acceptable (χ^2 = 572.56, df = 521, p -value = .06, GFI = .92, AGFI = .95, RMSEA = .01, and CFI = 1.00) as what is showed in Table 7. The items' statistic reports are presented in Table 8, which includes unstandardized factor loading (b), complete standardized factor loading (B), standard error (SE), t-value (t), squared multiple correlation (R^2), and error/residual variances (EVs). The unstandardized factor loading (b) of each dimension ranged from 0.35 to 0.62 at a statistically significant level of .05. The dimension of salary and fringe benefits had the highest unstandardized factor loading (b = 0.62), followed by family and work balance (b = 0.59), and promotion and individual growth (b = 0.48). The factor loading (B) of each item ranged from .34 to .89 at a statistically significant level of .05.Nurse job satisfaction had Item 6 with the highest factor loading (B =.89), and

the squared multiple correlation for nurse job satisfaction was .80, followed by item 35 with the factor loading of .86 and squared multiple correlation for nurse job satisfaction of .73. The basic measurement model of CNJSS is showed in Figure 8.

1.2.5 Construct reliability of CNJSS

Construct reliability is defined as "measure of reliability and internal consistency of the measured variables representing a latent construct" (Hair et al., 2010). The value of construct reliability (ρ_c) of greater than .6 is considered as desirable, which indicates a reliable indicator of the construct (Diamantopoulos & Siguaw, 2000).

In this study, latent variables' ρ_c of CNJSS ranged from .75 to .91, which is greater than .6 (Table 9). It indicated that CNJSS had high construct reliability for each latent variables. The dimension of administration (ρ_c = .91) had the highest construct reliability, which was followed by dimension of salary and fringe benefits (ρ_c = .89). The dimension of work condition (ρ_c = .75) had the lowest construct reliability, which was followed by interaction (ρ_c = .78) and family and work balance (ρ_c = .78).

A complementary measure to construct reliability is the average variance extracted. It shows the amount of indictors' variance due to measurement error in related construct. The value of average variance extracted (ρ_v) of greater than .50 is suggested by Diamantopoulos and Siguaw (2000). If the ρ_v value is less than .50, it indicates that the measurement error accounts for a greater amount of variance in the indicators than the underlying latent variable is. In this study, each latent variables' average variance extracted of CNJSS ranged from .35 to .58. The dimensions of recognition (ρ_v = .35) and work conditions (ρ_v = .43) can explain the variance of latent variable at a moderate level. The other factors can explain the variance of latent variable at a high level.

Table 7 Goodness of Fit Statistics of Chinese Nurse Job Satisfaction Scale (CNJSS) Measurement Model (N = 510)

Relative Fit Index	Statistic from CNJSS	Acceptable goodness of Fit Statistics	Model achieve criteria
Chi-square – test	572.56 (P = 0.059)	P ≥ .05	Yes
Chi-square/degree of freedom	1.10	< 2.00	Yes
Comparative Fit Index (CFI)	1.00	> .90	Yes
Goodness of Fit Index (GFI)	.92	> .90	Yes
Adjusted Goodness of Fit Index (AGFI)	.95	> .80	Yes
Normed fit index (NFI)	.99	> .90	Yes
Root Mean Square Error of Approximation (RMSEA)	.01	< .08	Yes
Standardized Root Mean Square Residual (SRMSR)	.05	< .07	Yes

Table 8 Factor Loading and Factor Score Regression of Chinese Nurse Job Satisfaction Scale (CNJSS) (N = 510)

Nurse job satisfaction of latent constructs	b	B	SE	t	R^2	Error
1.Promotion and individual growth (PIG)	**0.48**	**.70**	**0.04**	**13.10***	**.49**	.51
Item 1. professional training	1.00	.74			.55	.45
Item 2. get a permanent position	0.93	.53	0.08	11.12*	.28	.72
Item 3. promotion	1.19	.80	0.08	14.12*	.64	.36
Item 4. continuing education	0.93	.73	0.07	13.96*	.54	.46
Item 5. participation in research	1.04	.81	0.07	15.37*	.65	.35
2.Recognition and responsibility (PR)	**0.43**	**.78**	**0.03**	**17.20***	**.60**	**.36**
Item 6. supervisor recognize	1.00	.89			.80	.20
Item 7. peers recognize	0.83	.73	0.05	18.02*	.53	.47
Item 8. other co-workers recognize	0.87	.76	0.05	16.64*	.58	.42
Item 9. patients recognize	0.57	.50	0.06	9.88*	.25	.75
Item 10. society recognizes	0.90	.57	0.08	10.73*	.33	.67
Item 11. responsibility	0.29	.34	0.04	6.92*	.12	.88
Item 12. outcome of the patients	0.68	.58	0.07	10.31*	.34	.66
Item 13. control working conditions	0.49	.46	0.06	8.65*	.21	.79
Item 14. work with my ability	0.81	.66	0.07	12.23*	.44	.56
Item 15. solve problems	0.43	.39	0.06	7.41*	.15	.85
Item 16. undertake challenging work	0.44	.39	0.06	7.63*	.15	.85
3.Salary and fringe benefits (SFB)	**0.62**	**.66**	**0.04**	**14.18***	**.44**	**.58**
Item 17. current salary	1.00	.84			.71	.29
Item 18. overtime pay	0.83	.74	0.05	18.46*	.55	.45
Item 19. night shift pay	0.90	.72	0.05	17.42*	.51	.49
Item 20. fringe benefits	0.84	.75	0.05	18.58*	.56	.44
Item 21. pursing development	0.55	.60	0.04	13.02*	.36	.64
Item 22. increasing rate salary	0.95	.83	0.05	21.07*	.68	.32
Item 23. equity of payment	0.86	.65	0.06	15.26*	.42	.58
4.Work conditions (WC)	**0.44**	**.80**	**0.03**	**14.91***	**.64**	**.39**
Item 24. work rotation	1.00	.77			.60	.40
Item 25. working time	0.82	.57	0.08	10.29*	.33	.67
Item 26. overtime condition	1.13	.68	0.10	11.61*	.47	.53
Item 27. resting	1.10	.58	0.11	10.20*	.34	.66
5.Administration (AD)	**0.35**	**.83**	**0.03**	**12.52***	**.70**	**.34**
Item 28. flexible working schedule	1.00	.60			.35	.65
Item 29. personal needs	1.07	.70	0.07	15.46*	.49	.51
Item 30. makes nurses work together	1.25	.80	0.08	15.15*	.65	.35
Item 31. Solve personal problems	1.49	.81	0.11	13.52*	.66	.34

* $p < .05$

Table 8 Factor Loading and Factor Score Regression of Chinese Nurse Job Satisfaction Scale (CNJSS) (N = 510) (continued)

Nurse job satisfaction of latent constructs	b	B	SE	t	R^2	Error
Item 32. on my point of view	1.63	.82	0.12	13.99*	.68	.32
Item 33. manager consolation	1.47	.75	0.11	13.00*	.57	.43
Item 34. the communication matter	1.41	.82	0.10	13.82*	.68	.32
6.Family and work balance (FWB)	**0.59**	**.74**	**0.04**	**15.05***	**.59**	**.37**
Item 35. family and work need	1.00	.86			.73	.27
Item 36. family member sick	1.01	.68	0.08	12.73*	.46	.54
Item 37. time for family member	0.90	.66	0.07	12.54*	.43	.57
7.Interaction (IN)	**0.38**	**.67**	**0.03**	**12.61***	**.44**	**.23**
Item 38. nursing personal	1.00	.82			.68	.32
Item 39. Pharmacist or laboratorian	1.14	.68	0.13	8.66*	.47	.53
Item 40. patient or family member	0.88	.70	0.10	9.34*	.49	.52

* $p < .05$

Table 9 Construct Reliability and Average Variance Extracted of Chinese Nurse Job Satisfaction Scale (CNJSS) (N = 510)

Latent Variables	Construct Reliability of Latent Variables	Average Variance Extracted
Administration (AD)	.91	.58
Salary and fringe benefits (SFB)	.89	.54
Recognition and responsibility (RR)	.85	.35
Promotion and individual growth (PIG)	.85	.53
Family and work balance (FWB)	.78	.54
Interaction (IN)	.78	.54
Work conditions (WC)	.75	.43

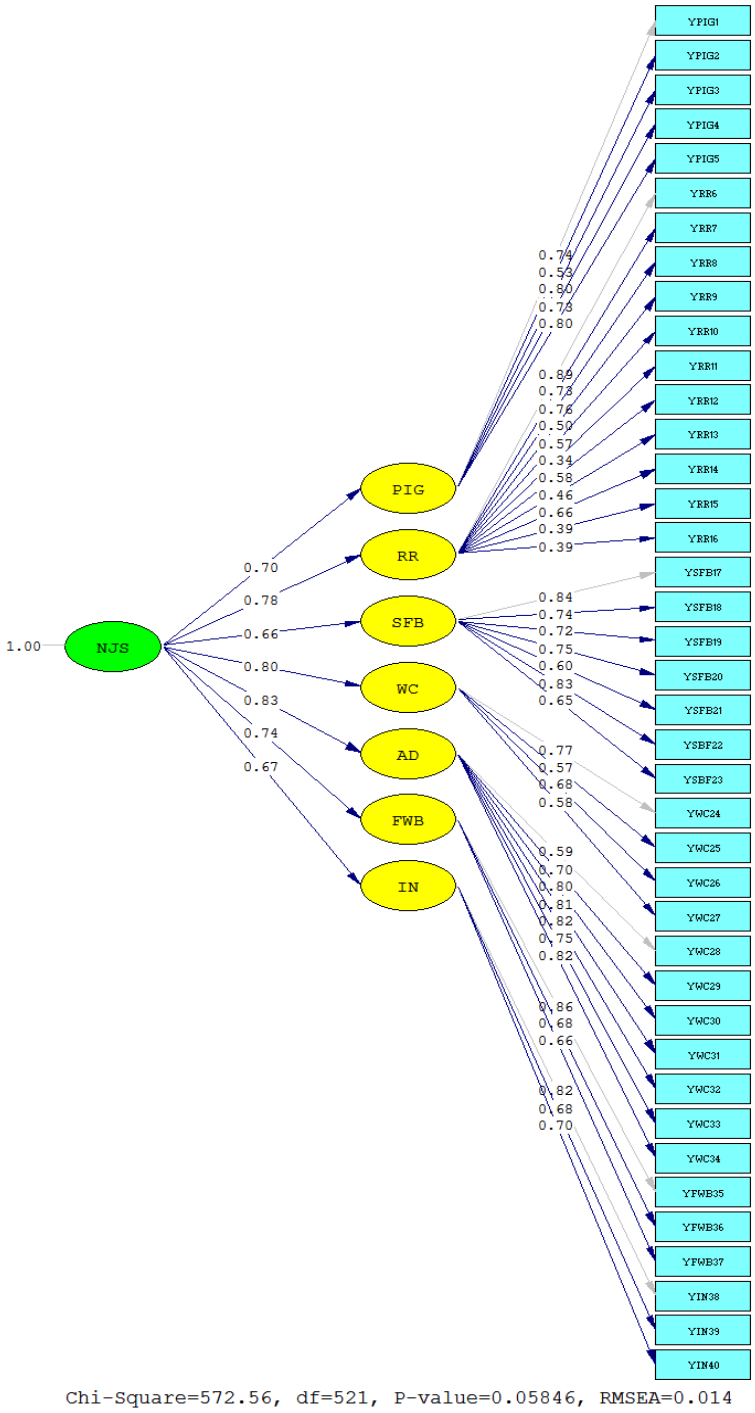


Figure 8 Measurement model of Chinese Nurse Job Satisfaction Scale (CNJSS)

2. Chinese Nurse-assessed quality of nursing care scale (CNAQNCS)

2.1 The development of CNAQNCS constructs, items, and format

The theoretical underpinning of CNAQNCS was based on the Donabedian (1980) structure-process-outcome model and literature review. The processes for CNAQNCS development are same as CNJSS development.

The constructs of CNAQNCS were obtained from literature review and the interview experts. Eight dimensions were synthesized from literature review, including nurse staffing, physical environment, staff characteristic, precondition, timeless activities, task orientated activities (physical care, give information, health education), human orientated activities (empathetic, respect, and psychological support), and patient outcomes (patient needs, patient satisfaction). In order to confirm CNAQNCS construct and culture adaptation, clinical nurse experts were interviewed. These selected interview experts met the same qualification as nurses' job satisfaction experts. All of these clinical administration experts have at least associate professor titles and work in the clinical setting more than 20 years. All of them responded for nurse association work at different levels, such as province level or city level.

The questions carried out for the interview include: (1) How do you describe the concept of nurse-assessed quality of nursing care? (2) What nurses consider as components of nurses-assessed quality of nursing care? A tape recorder and paper-pencil were used to collect data. The interview stopped when the data reached saturation of responses. Total of five clinical nurse experts (1 head nurse, 1 vice nurse directors, and 3 nurse directors) who have experience and knowledge about quality of nursing care in a variety of regional (northeast, southwest and south central) Chinese tertiary general hospitals were interviewed.

The content analysis method was utilized to analyze the interview data. Through the content analysis, eight themes were generated to confirm the components of CNAQNCS, including nurse staffing, physical environment, staff characteristic, precondition, timeless activities, task orientated activities (physical care, do the right thing), human orientated activities (empathetic, respect and psychological support), and patient outcomes (patient needs, patient satisfaction, and patient safety). Although nurse staffing was reviewed as one component of quality nursing care from literature review and the interview experts, it may not be considered as the nurse-assessed quality

of nursing care component for this study. Because empirical studies have showed that nurse staffing is a predictor of nurse-assessed quality of nursing care (Aiken et al., 2012; Rafferty et al., 2007).Therefore, the components of nurse-assessed quality of nursing care include seven dimensions, including physical environment, staff characteristic, precondition, timeless activities, task orientated activities (physical care, giving information, health education, do the right thing), human orientated activities (empathetic, respect, and psychological support), and patient outcomes (patient needs, patient satisfaction, patient safety).

After formulating the constructs of nurse-assessed quality of nursing care, 48 items were initially generated as follows:

1) physical environment (5items),
2) staff characteristic (8 items),
3) precondition (6 items),
4) timeless activities (5 items),
5) task orientated activities (11 items),
6) human orientated activities (6 items), and
7) patient outcomes (7 items).

Twenty-seven out of 48 items were developed from literature review. Twenty-one out of 48 items were developed from interviewing experts.

CNAQNCS is a five-point Likert scale with the score ranging from 1 to 5, while 1 = *strongly disagree*, 2 = *disagree*, 3 = *unsure*, 4 = *agree* and 5 = *strongly agree.* All of the items were written in positive way. The higher mean of total score interpreted a better nurse-assessed quality of nursing care. The lower mean of total score interpreted a poorer nurse-assessed quality of nursing care.

According to the score of nurse-assessed quality of nursing care range from 1 to 5, containing five ranks, the mean score was divided into five levels by using the class interval formula $\bar{x} = (\overline{x}_{\max} - \overline{x}_{\min})/k$. Furthermore, in order to keep the intervals from overlapping, 0.01 was added to each subsequent lower limit (Polit, 1996). The range of mean scores with the levels of interpretation are presented in Table 10.

Table 10 Levels of interpretation of nurse-assessed quality of nursing care

Range of Mean Scores	Levels of Interpretation
1.00 – 1.80	a very low level of nurse-assessed quality of nursing care
1.81 – 2.60	a low level of nurse-assessed quality of nursing care
2.61 – 3.40	a moderate level of nurse-assessed quality of nursing care
3.41 – 4.20	a high level of nurse-assessed quality of nursing care
4.21 – 5.00	a very high level of nurse-assessed quality of nursing care

2.2 Content validity and psychometric properties of CNAQNCS testing

The content validity, construct validity of initial CNAQNCS by using EFA, internal consistency reliably of initial CNAQNCS, construct validity of CNAQNCS by using CFA, and construct reliability of CNAQNCS are presented as followings.

2.2.1 Content validity of initial CNAQNCS

The content validity of CNAQNCS with 48 items was evaluated by a panel of five nurse experts the same as the CNJSS evaluation experts. After testing content validity, 48 items were determined with I-CVI ranged from .8 to 1 and S-CVI/Ave of .98, which are acceptable by Polit and Beck (2012).

2.2.2 Construct validity of initial CNAQNCS by EFA

The construct validity of CNAQNCS with 48 items was tested among 302 RNs. Before testing the construct validity, the item analysis and the internal consistency reliability were utilized.

1) Item analysis: The skewness of these 48 items ranged from -2.08 to -0.85. The Kurtosis of these items ranged from 1.04 to 7.02. According to Kline (2011), the absolute value of skewness more than 3.0 illustrates “extreme” skewness. The absolute value of Kurtosis more than 10.0 indicates a problem, and the absolute value of kurtosis more than 20.0 suggests a more serious problem. Thus, CNAQNCS skewness and kurtosis were not high non-normal.

2) Internal consistency: Item-to-total correlation of CNAQNCS ranged from .62 to .85, which are more than .3 as suggested by Nunnally (1978). The Cronbach’s alpha of each dimension ranged from .91 to .95, which are more than .7 (Polit & Beck, 2012).

3) EFA: KMO testing result was .97 and Bartlett’s testing result was significant

(χ^2 = 16194.93, p = .000), which indicates the sample size is adequate for EFA, and all items are significant correlated. The principal axis factoring extraction method by using varimax rotation method was used for EFA. Since this study's sample size is 302, the cutoff point of factor loading was set up as .35, which is suggested by Hair et al. (2010). The result of EFA extracted six factors (48 items) with eigenvalues from 1.00 to 28.47, which together accounted for 74.78% of the variance as showed in Table 8. They are presented as task orientated activities, staff characteristic, physical environment, human orientated activities, precondition, and patient outcomes. Three items (# 38, # 21, and # 43) were considered to move from the first order factor to the next lower factor, because the first order factor does not make senses when one reads the item meaning. Items' factor loading value ranged from .40 to .81. The dimensions with the number of items are presented in Table 11.

2.2.3 Internal consistency reliability of initial CNAQNCS

In this study, from the tryout (n = 302), after EFA, CNAQNCS retained 48 items and overall scale internal consistency Cronbach's alpha was .99. The six dimensions Cronbach's alpha ranged from .62 to .85 as shown in Table 11. The item-to-total correlation ranged from .62 to .85.

Table 11 The description 48-item of Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS) after EFA (n = 302)

Dimensions	Eigenvalue	Percent of Variance Explained	Number of Items	Cronbach's alpha after EFA	Item to total correlation after EFA
1. Task orientated activities	28.47	59.31	14	.97	.71 — .86
2. Staff characteristic	2.36	4.91	8	.95	.76 — .86
3. Physical environment	1.68	3.49	6	.83	.44 — .76
4. Human orientated activities	1.33	2.76	7	.94	.75 — .85
5. Precondition	1.07	2.22	7	.93	.73 — .82
6. Patient outcomes	1.00	2.09	6	.90	.66 — .83
Overall CNAQCS	35.89	74.78	48	.99	.62 — .85

2.2.4 Construct validity of CNAQNCS by CFA

Before conducting CFA, the assumption of normality, linearity, and multicollinearity were tested.

1) Normality: The univariate normality was tested by Critical Ratio (CR) of Skewness (SI) and Kurtosis (SK) among final 38 items. The CR of SI ranged from -12.14 to -1.12. The CR of SK ranged from -4.27 to 14.41. The results of CR's SI and SK were not inside an absolute value of 1.96 ($\alpha = .05$) (Hair et al., 2010). Thus, the assumption of normality was violated.

2) Linearity: It was tested by the scatterplot matrix. Since the results of scatterplots revealed a linear relationship between each pair of variables, the assumption of linearity was not violated.

3) Multicollinearity: both the latent variables and observed variables were tested for multicollinearity. Firstly, the correlation matrix among six latent variables were tested. According to Hair et al. (2010), the bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .80. Initially the dimension of Task Orientated Activities and Precondition had higher multicollinearity ($r = .85$). Thus, eight items (#22, #23, #24, #25, #26, #28, #33, and #34) in the dimension of Task Orientated Activities and two items (#37 and #42) in the dimension of Human Orientated Activities were deleted. Then, the correlation among pairs of latent variables among 38-item of NAQNCS were tested. The results revealed that the pairs' correlation ranged from .42 to .80. Secondly, correlation matrix among 38 items' observed variables were tested. According to Pilot (2010), bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .85. The results illustrated that the correlation among 38 items ranged from .17 to .81.Therefore, the assumption of multicollinearity was not violated for both latent variables and observed variables of 38-item's NAQNCS.

The construct validity of CNAQNCS with 38 items was tested by the measurement model of CFA. Since the data violated the normality assumption, the estimation method of Robust Maximum Likelihood (RML) was used to run the measurement model of CNAQNCS. The result of CFA showed that 243 parameters were included in the CNAQCS measurement model. The number of unique variance parameter estimation was determined by following formula:

n (n+1)/2 = 38×39/2 = 741.

Thus, the model was over identified, which indicates the model can be analysed (Hair et al., 2010).

The construct validity of CNAQCS was tested by the second-order CFA. The result illustrated CNAQCS included six dimensions with 38 items. The GOF statistics presented that CNJSS fitness is acceptable (χ^2 = .05, df = 498, p-value = .05, GFI = .93, AGFI = .90, RMSEA = .01, and CFI = 1.00) as shown in Table 12. The unstandardized factor loading (b) of each dimension ranged from 0.31 to 0.51 at statistic significant level of .05 (Table 13). The dimension of task orientated activities had the highest unstandardized factor loading (b = 0.51), followed by precondition (b = 0.46) and human orientated activities (b = 0.46). The factor loading (B) of each item ranged from .52 to .83 at statistic significant .05 level. Nurse assessed quality of care had three items (#2, #3, #5) with the highest factor loading (B =.83) and squared multiple correlation for nurse assessed quality of care of .69 for these three items. The basic measurement model of CNAQCS is showed in Figure 9.

2.2.5 Construct reliability of CNAQNCS

Each latent variables had high construct reliability, which ranged from .83 to .95, as shown in Table 14. It indicated that construct reliability of CNAQNCS was good. The dimension of task orientated activities (ρ_c = .95) had the highest score of construct reliability, which followed by the dimensions of physical environment (ρ_c = .90) and staff characteristic (ρ_c = .90).

Each latent variables' average variance extracted ranged from .46 to .61, as showed in Table 14. The dimension of patient outcomes can explain the variance of latent variable at a moderate level, and other dimensions can explain the variance of latent variables at a high level.

Table 12 Goodness of Fit Statistics of Chinese Nurse-Assessed Quality of Nursing Care Scale (CNAQNCS) Measurement Model (N = 510)

Relative Fit Index	Statistic from CNAQNCS	Acceptable goodness of Fit Statistics	Model achieve criteria
Chi-square –test	550.63 (P = 0.05)	P ≥ .05	Yes
Chi-square/degree of freedom	1.10	< 2.00	Yes
Comparative Fit Index (CFI)	1.00	> .90	Yes
Goodness of Fit Index (GFI)	.95	> .90	Yes
Adjusted Goodness of Fit Index (AGFI)	.92	> .80	Yes
Normed fit index (NFI)	.99	> .90	Yes
Root Mean Square Error of Approximation (RMSEA)	.01	< .08	Yes
Standardized Root Mean Square Residual (SRMSR)	.04	< .07	Yes

Table 13 Factor Loading of Chinese Nurse-Assessed Quality of Nursing Care Scale (N = 510)

Quality of nursing care of latent construct	b	B	SE	t-value	R^2	Error
1. physical environment (PE)	**0.39**	**.58**	**0.04**	**11.09***	**.33**	**.67**
Item 1. hygienic room	1.00	.69			.47	.52
Item 2. comfortable environment	1.15	.79	0.05	24.70*	.62	.38
Item 3. good ventilation	1.16	.79	0.06	18.32*	.62	.38
Item 4. safe environment	1.15	.79	0.07	16.00*	.62	.38
Item 5. quiet ward environment	1.25	.86	0.07	16.99*	.75	.25
Item 6. environment problems	1.03	.70	0.07	14.53*	.49	.51
2. staff characteristic (SC)	**0.55**	**.77**	**0.04**	**14.70***	**.60**	**.40**
Item 7. cautious	1.00	.72			.52	.48
Item 8. carefully	1.00	.72	0.04	24.93*	.51	.49
Item 9. observe the patient	1.17	.85	0.07	16.05*	.72	.28
Item 10. polite and pleasant	0.99	.71	0.06	16.88*	.50	.50
Item 11. smile to patients	1.05	.75	0.07	15.73*	.56	.44
Item 12. listen to patients	1.12	.80	0.07	19.94*	.64	.36
Item 13. repeatedly patients doubt	1.24	.88	0.08	16.26*	.78	.22
Item 14. work well with my team	1.09	.78	0.07	16.15*	.61	.39
3.precondition (PR)	**0.74**	**.94**	**0.04**	**19.12***	**.89**	**.11**
Item 15. up-to-data knowledge	1.00	.78			.61	.39
Item 16. mastered clinical technical	0.88	.69	0.05	16.89*	.47	.53
Item 17. operating process	0.97	.76	0.05	17.69*	.58	.42
Item 18. experience helpful	0.83	.65	0.06	14.12*	.43	.57
Item 19. ward quality management	0.71	.56	0.06	12.55*	.31	.69
Item 20. manage drugs	0.88	.69	0.06	14.84*	.48	.52
Item 21. intend to help patients	1.00	.78	0.06	17.05*	.61	.39
4. task orientated activities (TOA)	**0.81**	**.98**	**0.04**	**21.90***	**.97**	**.03**
Item 27. sufficient information	1.00	.82			.68	.32
Item 29. explain clearly	0.82	.68	0.05	17.61*	.46	.54
Item 30. guidance do self-care	0.92	.76	0.05	19.53*	.58	.42
Item 31. good basic nursing care	0.86	.71	0.05	17.76*	.50	.50
Item 32. individualized care	0.84	.70	0.05	16.44*	.49	.51
Item35. effectively health education	0.98	.81	0.05	20.31*	.65	.35
5. human orientated activities (HOA)	**0.73**	**.97**	**0.04**	**18.93***	**.95**	**.05**
Item 36. psychological feelings	1.00	.75			.57	.43
Item 38. patient privacy	0.96	.72	0.05	16.45*	.52	.48
Item 39. build confidence	0.97	.74	0.05	17.82*	.54	.46
Item 40. relieve fear	1.00	.75	0.06	17.14*	.56	.44
Item 41. relieve worry about illness	0.88	.67	0.05	16.20*	.44	.56
6. patient outcomes (PO)	**0.50**	**.89**	**0.04**	**12.30***	**.80**	**.20**

* $p < .05$

Table 13 Factor Loading of Chinese Nurse-Assessed Quality of Nursing Care Scale (N = 510) (continued)

Quality of nursing care of latent construct	b	B	SE	t-value	R^2	Error
Item 43. never get complains	1.00	.56			.31	.69
Item 44. meet patient satisfaction	1.43	.81	0.11	13.49*	.65	.35
Item 45. provide safety service	1.48	.83	0.12	12.77*	.69	.31
Item 46. avoid physical damage	1.13	.63	0.10	10.92*	.40	.60
Item 47. avoid chemical damage	1.25	.70	0.11	11.61*	.49	.51
Item 48. avoid biological damage	0.94	.52	0.10	9.49*	.27	.73

* $p < .05$

Table 14 Construct Reliability and Average Variance Extracted of Chinese Nurse Assessed Quality of Nursing Care Scale (CNAQNCS) (N = 510)

Latent Variables	Construct Reliability of Latent Variables	Average Variance Extracted
Staff characteristic (SC)	.92	.61
Physical environment (PE)	.90	.60
Task orientated activities (TOA)	.88	.56
Human orientated activities (HOA)	.84	.53
Precondition (PR)	.87	.50
Patient outcomes (PO)	.84	.47

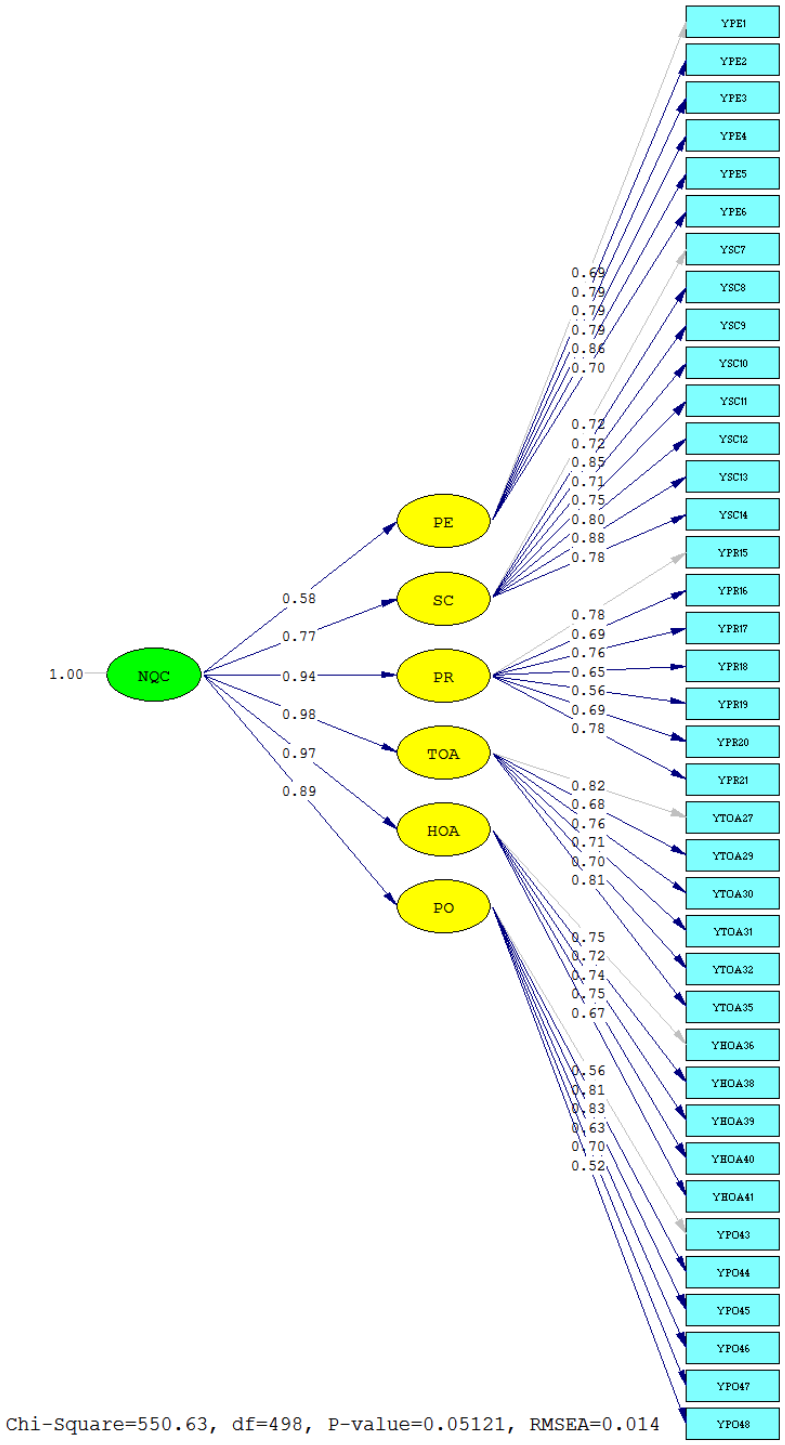


Figure 9 Measurement model of Chinese Nurse Assessed Quality of Nursing Care Scale (CNAQNCS)

Part 2: Description of existing Chinese version instruments psychological properties testing

The Chinese version of the Practice Environment Scale (C-PES) and Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS) were translated and back translated from PES-NWI and MBI-HSS. In the existing literature, the content validity, internal consistency reliability, and EFA of C-PES and C-MBI-HSS have been tested among Chinese RNs. These psychometric properties of C-PES and C-MBI-HSS were acceptable in previous studies.

In this study, the internal consistency reliability of C-PES and C-MBI-HSS were tested among 302 RNs from tryout data. The construct validity and construct reliability of C-PES and C-MBI-HSS were tested among 510 RNs by CFA to assess the goodness-of-fit.

1. Chinese version of the Practice Environment Scale (C-PES)

Nurses' working environment was assessed by C-PES. The C-PES was translated and adapted from the Lake (2002) PES-NWI by Chinese researcher Wang and Li (2011). According to Wang and Li (2010), C-PES has 28 items with six dimensions, including nurse self-development (3 items), nurse participation in hospital affair (5 items), nursing foundations for quality of care (7 items), nurse ability, nurse managers' leadership and support of nurses (5 items), resource adequacy (4 items), and collegial nurse-physician relations (4 items). In Wang and Li's study, C-PES content validity index was calculated by five nursing administration experts with position level higher than associate professor. It was .94. The construct validity was established by EFA using the principal component analysis method with factor loading of more than .4. The Cronbach's alpha coefficient of total scale was .91. Test-retest reliability for total scale was .84. The six dimensions were more than .70.

Scoring and interpretation of the score: It is a four-point Likert scale. The score ranged from 1 = *strongly disagree* to 4 = *strongly agree*. The score can be categorized into three levels. Mean score of subscale value greater than or equal to 2.5 on four or five subscales is categorized as *"favorable"*. Mean score of subscale value greater than or equal to 2.5 on two or three subscales is categorized as *"Mixed"*. Mean score of subscale value greater than or equal to 2.5 on one subscale was categorized as "*Unfavorable"* (Lake, 2002).

According to the score of nurse work environment range from 1 to 4, containing four ranks, the mean score of was divided into four levels by using the class interval formula $\bar{x}$ = ($\bar{x}$ max − $\bar{x}$ mix)/k. Furthermore, in order to keep the intervals from overlapping, 0.01 was added to each subsequent lower limit (Polit, 1996). The range of mean scores with levels of interpretation are presented in Table 15.

Table 15 Levels of interpretation of nurse work environment

Range of Mean Scores	Levels of Interpretation
1.00 – 1.75	a very poor level of nurse work environment
1.76 – 2.50	a poor level of nurse work environment
2.51 – 3.25	a good level of nurse work environment
3.26 – 4.00	a very good level of nurse work environment

Internal Consistency Reliability: The constructs of C-PES included six dimensions, which is inconstant with both original English version and Taiwanese version of PES-NWI in five constructs. In addition, PES-NWI was used in several studies with five dimensions. In order to enhance the comparative findings with other studies, this study used the original five dimensions classification of the construct validity of C-PES with 28 items. From the tryout (n = 302), the total internal consistency Cronbach's Alpha was .94. The Cronbach's Alpha of five dimensions ranged from .64 to .88. The item-to-total correlation ranged from .36 to .68 as shown in Table 16.

Table 16 The reliability of Chinese version of the Practice Environment Scale (C-PES) from tryout (n = 302)

Dimensions	Item No	Cronbach's α	Item to total correlation
1. Nurse participation in hospital affairs	8	.86	.38 -.71
2. Nursing foundations for quality of care	9	.88	.50 -.69
3. Nurse manager ability/leadership/support of nurses	4	.64	.27 -.53
4. Staffing and resource adequacy	4	.82	.57 -.70
5. Collegial nurse-physician relations	3	.82	.63 -.70
Total	28	.94	.36 -.68

Construct validity by CFA: The assumption of normality, linearity, and multicollinearity were tested before conducting CFA.

1) Normality: The univariate normality was tested by Critical Ratio (CR) of

Skewness (SI) and Kurtosis (SK) among 28 items. The CR of SI ranged from -7.64 to 1.03. The CR of SK ranged from -4.72 to 5.32. The results of CR's SI and SK were not inside an absolute value of 1.96 ($\alpha = .05$) (Hair et al., 2010). Thus, the assumption of normality was violated.

2) Linearity: It was tested by the scatterplot matrix. Since the results of scatterplots revealed a linear relationship between each pair of variables, the assumption of linearity was not violated.

3) Multicollinearity: Both the latent variables and observed variables were tested for multicollinearity. Firstly, the correlation matrix among five latent variables were tested. According to Hair et al. (2010), the bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .80. The results showed that the pairs' correlation ranged from .49 to .69. Secondly, the correlation matrix among 28 items' observed variables were tested. According to Pilot (2010), bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .85. The results showed that the correlation among 28 items ranged from .07 to .62.Therefore, the assumption of multicollinearity was not violated for both the latent variables and observed variables of 28-item's C-PEA.

The constructs of C-PES was assessed by the measurement model of CFA. Since the data violated the normality assumption, the estimation method of Robust Maximum Likelihood (RML) was used to run the measurement model of C-PES. The result of CFA showed that C-PES includes 138 parameters. The number of unique variance parameter estimation of C-PES was calculated with the following formula:

$n (n+1)/2 = 28 \times 29/2 = 406.$

Thus the model is over identified, which indicates the model can be analyzed (Hair et al., 2010).

By using the second-order CFA analysis, the result presented that C-PES had five dimensions with 28 items. The Goodness of fit statistics presented that C-PES is acceptable ($\chi^2 = 299.97$, df = 265, P-value = .07, GFI = .96, AGFI = .94, RMSEA = .02, and CFI = 1.00), as shown in Table 17. The unstandardized factor loading (b) of each dimension ranged from 0.27 to 0.35 at statistic significant level of .05. It can be seen from Table 18, the dimension of (1) staffing and resource adequacy and (2) nurse managers' leadership and support nurse had the highest unstandardized factor loading

(b = 0.35), followed by nursing foundations for quality of care (b = 0.33). The factor loading (B) of each item ranged from .36 to .90 at a statistic significant level of .05. Nurse work environment had Item 14 with the highest factor loading (B =.90) and squared multiple correlation for nurse work environment of .81, followed by item 25 and item 19 with factor loading (B = .83, B = .74) and squared multiple correlation for nurse work environment of .68 and .54, respectively. The measurement model of C-PES is showed in Figure 10.

Construct reliability: Each latent variables' construct reliability of C-PES ranged from .69 to .86, which was considered as higher construct reliability (Table 19). The dimension of nurse participate in hospital affairs (ρ_c = .86) had the highest score of construct reliability, which was followed by the dimension of nursing foundations for quality of care (ρ_c = .85) and nurse-physician relationship (ρ_c = .81).

Each latent variables' average variance extracted of C-PES ranged from .37 to .59 (Table 19). Only the dimension of nurse-physician relationship can explain the variance of latent variable at a high level (ρ_v = .59). The other dimensions, staffing and resource adequacy (ρ_v = .43), nurse mangers' leadership and support nurses (ρ_v = .37), nurse participate in hospital affairs (ρ_v = .44), and nursing foundations quality of care (ρ_v = .40) can explain the variance of latent variable at a moderate level.

Table 17 Goodness of Fit Statistics of Chinese version of the Practice Environment Scale (C-PES) Measurement Model (N = 510)

Relative Fit Index	Statistic from C-PES	Acceptable goodness of Fit Statistics	Model achieve criteria
Chi-square –test	299.97 (p = .07)	P ≥ .05	Yes
Chi-square/degree of freedom	1.13	< 2.00	Yes
Comparative Fit Index (CFI)	1.00	> .90	Yes
Goodness of Fit Index (GFI)	.96	> .90	Yes
Adjusted Goodness of Fit Index (AGFI)	.94	> .80	Yes
Normed fit index (NFI)	.99	> .90	Yes
Root Mean Square Error of Approximation (RMSEA)	.02	< .08	Yes
Standardized Root Mean Square Residual (SRMSR)	.03	< .07	Yes

Table 18 Factor Loading and Factor Score Regression of Chinese version of the Practice Environment Scale (C-PES) (N = 510)

Nurse work environment of latent construct	b	B	SE	t-value	R^2	Error
1. Resource adequacy (RA)	**0.35**	**.79**	**0.03**	**12.02***	**.63**	**.37**
Item 1. adequate support services	1.00	.63			.40	.60
Item 7. enough tim/opportunity	1.08	.64	0.10	11.00*	.41	.59
Item 8. enough registered nurses	1.14	.65	0.10	10.99*	.42	.58
Item 11. enough staff	1.25	.70	0.11	11.10*	.48	.52
2.Collegial nurse-physician relations (NPR)	**0.27**	**.78**	**0.03**	**10.74***	**.61**	**.39**
Item 2. good working relationships	1.00	.61			.37	.63
Item 14. effective team work	1.65	.90	0.14	11.89*	.81	.19
Item 21. collaboration (joint practice)	1.28	.77	0.12	10.83*	.59	.41
3.Nurse managers' leadership and support of nurses (LSN)	**0.35**	**.96**	**0.02**	**15.81***	**.92**	**.08**
Item 3. supportive person	1.00	.68			.47	.54
Item 9 good manager and leader.	0.92	.61	0.07	13.73*	.37	.63
Item 12. praise and recognition	1.25	.73	0.09	14.23*	.54	.46
Item 17. backs up the nursing staff	0.69	.36	0.09	7.49*	.13	.87
4. Nurse foundations for quality of care (NFQC)	**0.33**	**.93**	**0.03**	**11.73***	**.87**	**.13**
Item 4. active staff development	1.00	.52			.27	.73
Item 13. standards of nursing care	0.82	.52	0.08	9.86*	.27	.73
Item 16. work with competent nurse	0.94	.61	0.09	10.16*	.38	.62
Item 19. quality assurance program	1.21	.74	0.11	11.38*	.54	.46
Item 22. a preceptor program	1.05	.70	0.10	11.10*	.49	.51
Item 23. nursing care model	1.26	.72	0.11	11.37*	.53	.47
Item 26. written up-to-date care plan	1.05	.56	0.11	9.78*	.32	.68
Item 27. continuity of care	1.17	.69	0.11	11.03*	.47	.53
Item 28. nursing diagnoses	0.94	.56	0.10	9.65*	.31	.69
5.Nurse participate in hospital affairs (NPHA)	**0.32**	**.83**	**0.03**	**11.83***	**.69**	**.31**
Item 5. clinical ladder opportunity	1.00	.57			.33	.67
Item 6. participate policy decisions	1.32	.64	0.11	11.65*	.41	.59
Item 10. visible/accessible to staff	1.10	.64	0.11	10.17*	.41	.59
Item 15. advancement	1.11	.55	0.10	10.81*	.31	.69
Item 18. listens employee concerns.	1.39	.73	0.12	11.71*	.54	.46
Item 20. hospital internal governance	1.17	.57	0.12	9.86*	.32	.68
Item 24. serve on committees.	1.38	.71	0.12	11.47*	.50	.50
Item 25. staff on daily problems	1.23	.83	0.12	10.35*	.68	.32

* $p < .05$

Table 19 Construct Reliability and Average Variance Extracted of Chinese version of the Practice Environment Scale (C-PES) (N = 510)

Latent Variables	Construct Reliability of Latent Variables	Average Variance Extracted
Nurse participate in hospital affairs (NPHA)	.86	.44
Nursing foundations for quality of care (NFQC)	. 85	.40
Nurse-physician relationship (NPR)	.81	.59
Resource adequacy (RA)	.75	.43
Nurse managers' leadership and support nurses (LSN)	.69	.37

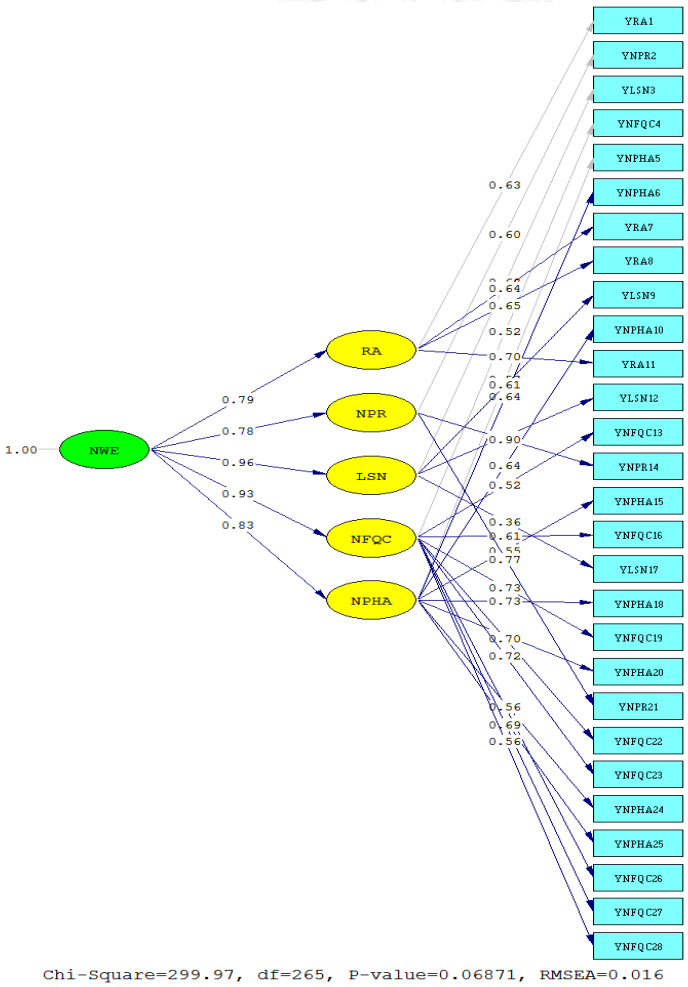


Figure 10 Measurement model of Chinese version of the Practice Environment Scale (C-PES)

2. Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS)

Nurse burnout was measured by C-MBI-HSS. With permission from the original authors (Maslach & Jackson, 1986), Li and Liu (2000) translated MBI to Mandarin using the translation and back-translation methods. C-MBI-HSS is consisted of 22 items and three subscales, including emotional exhaustion (9 times), depersonalization (5 items), and personal accomplishment (8 items). The internal consistency correlation coefficient of total scale was .93. The subscales' correlation coefficient were ranged from .81 to .91. In Chen (2005) study, the factor analysis was used to establish C-MBI-HSS construct validity. The factor loading for each item was more than .40. The three dimensions were found being the same as the original instrument.

Scoring and interpretation of the score: C-MBI-HSS is a seven-point Likert scale with score ranging from 0 = *none* to 6 = *every day*. The score is categorized into three levels for each subscale. The levels of interpretation are presented in Table 20. The subscale of EE and DP was presented in negative items. The subscale of PA was presented in positive items, which were rescored before the data were analyzed. The higher mean of total score interpreted a higher level of nurse burnout, and the lower mean of total score interpreted a lower level of nurse burnout.

Table 20 Levels of interpretation of nurse burnout

Subscale	Low level (total score)	Moderate level (total score)	High level (total score)
EE	<19	19-26	> 26
DP	<6	6-9,	>10
PA	<34	34-39	> 39

Internal Consistency Reliability: In this study from the try out (n = 302), the internal consistency reliability Cronbach's Alpha for each dimension of EE, DP, and PA were .87, .75, and .74 respectively. The item-to-total correlation of EE, DP, and PA ranged from .53 to .71, .38 to .67, and .37 to .55, respectively.

Construct validity by CFA: The assumption of normality, linearity, and

multicollinearity was tested before conducting CFA.

1) Normality: The univariate normality was tested by Critical Ratio (CR) of Skewness (SI) and Kurtosis (SK) among 22 items. The CR of SI ranged from -4.36 to 27.82. The CR of Sk ranged from -6.60 to 42.12. The results of CR's SI and SK were higher than an absolute value of 1.96 ($\alpha = .05$) (Hair et al., 2010). Thus, the assumption of normality was violated.

2) Linearity: It was tested by the scatterplot matrix. Since the results of scatterplots revealed a linear relationship between each pair of variables, the assumption of linearity was not violated.

3) Multicollinearity: Both the latent variables and observed variables were tested for multicollinearity. Firstly, the correlation matrix among three latent variables were tested. According to Hair et al. (2010), the bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .80. The results showed that the pairs' correlation of latent variables ranged from .20 to .48. Secondly, the correlation matrix among 22 items' observed variables were tested. According to Pilot (2010), bivariate multicollinearity occurs when correlations of any variables is greater than absolute value of .85. The results showed that the correlation among 22 items ranged from -.01 to .71. Therefore, the assumption of multicollinearity was not violated for both the latent variables and observed variables of 22 items' C-MBI-HSS.

In this study, the construct validity of C-MBI-HSS was confirmed by the measurement model of CFA. Since the data violated the normality assumption, the estimation method of Robust Maximum Likelihood (RML) was used to run the measurement model of C-MBI-HSS. The result of CFA illustrated that C-MBI-HSS contains 138 parameters. The number of unique variance parameter estimation of C-PES was as follows:

$n (n+1)/2 = 22 \times 23/2 = 253$.

Thus the model was over identified, which indicates the model can be analysed (Hair et al., 2010).

By using the first-order CFA analysis, the result presented that C-MBI-HSS had three dimensions with 22 items. The Goodness of fit statistics presented that C-PES's measurement model is acceptable ($\chi^2 = 140.71$, df =115, P-value = .05, GFI = .98, AGFI = .95, RMSEA = .02, and CFI = 1.00) as showed in Table 21. The factor

loading (B) of each item ranged from .23 to .97 at a statistically significant level of .05 (Table 22). Nurse burnout had Item 8 with the highest factor loading (B = .97) and the squared multiple correlation of .95, followed by item 10 with the factor loading of .82 and the squared multiple correlation of .67. The basic measurement model of C-MBI-HSS is showed in Figure 11.

Construct reliability: Each latent variables' construct reliability ranged from .69 to .82 as shown in Table 23. It indicated that nurse burnout had high construct reliability. The dimension of emotional exhaustion had the highest construct reliability (ρ_c = .82). The dimension of personal achievement had the lowest construct reliability (ρ_c = .74). Each latent variables' average variance extracted ranged from .28 to .36. Thus, the factors of emotional exhaustion (ρ_v = .36) and depersonalization (ρ_v = .35) can explain the variance of latent variable at a moderate level. The factor of personal achievement (ρ_v = .28) can explain the variance of latent variable at a low level.

Table 21 Goodness of Fit Statistics of Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS) Measurement Model (N = 510)

Relative Fit Index	Statistic from C-MBI-HSS	Acceptable goodness of Fit Statistics	Model achieve criteria
Chi-square –test	140.71 (P = 0.05)	P ≥ .05	Yes
Chi-square/degree of freedom	1.22	< 2.00	Yes
Comparative Fit Index (CFI)	1.00	> .90	Yes
Goodness of Fit Index (GFI)	.98	> .90	Yes
Adjusted Goodness of Fit Index (AGFI)	.95	> .80	Yes
Normed fit index (NFI)	.98	> .90	Yes
Root Mean Square Error of Approximation (RMSEA)	.02	< .08	Yes
Standardized Root Mean Square Residual (SRMSR)	.05	< .07	Yes

Table 22 Factor Loading and Factor Score Regression of Chinese version of Maslach Burnout Inventory-Human Service Survey (N = 510)

Nurse Burnout of latent construct	b	B	SE	t-value	R^2	Error
Emotional exhaustion (EE)						
Item 1. emotionally drained from	1.00	.74			.54	.46
Item 2. used up after work	0.94	.70	0.08	11.72*	.49	.51
Item 3. fatigue in the morning	1.08	.68	0.09	11.51*	.47	.53
Item 6. puts too much stress	0.57	.41	0.07	8.34*	.19	.81
Item 8. burned out from work	1.55	.97	0.11	14.44*	.95	.05
Item 13. frustrated by job	0.50	.39	0.06	7.98*	.15	.85
Item 14. working too hard	0.73	.41	0.09	8.36*	.17	.83
Item 16. working is strain	0.69	.42	0.08	8.51*	.18	.82
Item 20. at the end of the rope	0.47	.33	0.07	7.09*	.11	.89
Depersonalization (DP)						
Item 5. impersonal ‘‘objects’’	1.00	.48			.23	.77
Item 10. callous toward people	1.79	.82	0.25	7.25*	.67	.33
Item 11. hardening emotionally	1.93	.81	0.22	8.79*	.66	.34
Item 15. don’t really care	0.61	.34	0.11	5.70*	.12	.88
Item 22. feel patients blame	0.59	.23	0.13	4.47*	.05	.95
Personal achievement (PA)						
Item 4. easily understand patient	1.00	.36			.13	.87
Item 7. deal effectively	1.40	.40	0.23	6.14*	.16	.84
Item 9. positively influence	2.08	.48	0.30	6.85*	.23	.77
Item 12. very energetic	2.12	.47	0.35	6.08*	.22	.78
Item 17. create a relaxed atmosphere	2.12	.62	0.31	6.91*	.38	.62
Item 18. exhilarated after working	2.72	.67	0.43	6.40*	.44	.56
Item 19. accomplished worthwhile	1.79	.40	0.30	5.94*	.16	.84
Item 21. emotional problems calmly	2.65	.70	0.39	6.73*	.49	.51

* $p < .05$

Table 23 Construct Reliability and Average Variance Extracted of Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS) (N = 510)

Latent Variables	Construct Reliability of Latent Variables	Average Variance Extracted
Emotional exhaustion (EE)	.82	.36
Personal achievement (PA)	.74	.28
Depersonalization (DP)	.69	.35

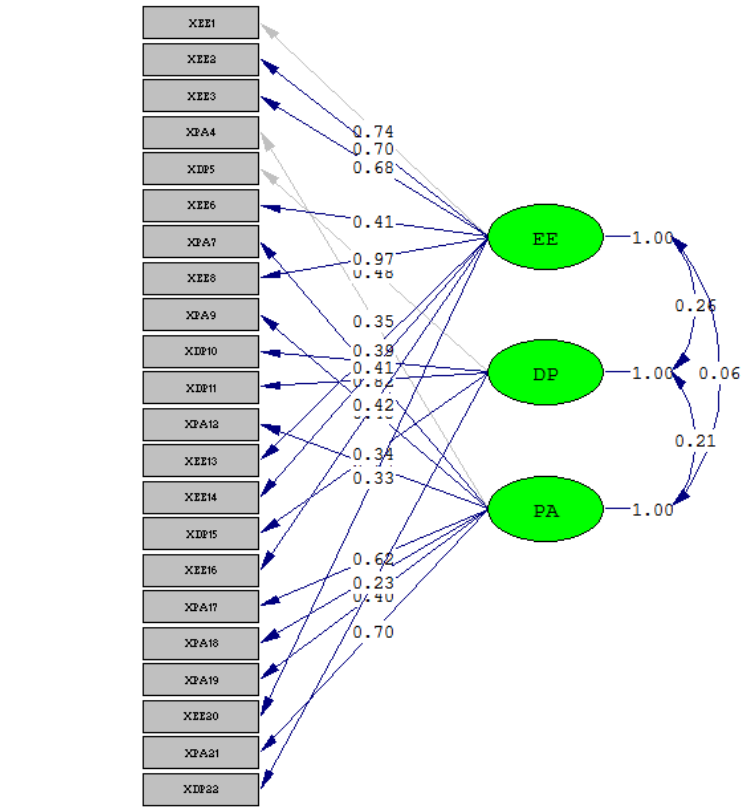


Figure 11 Measurement model of Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS)

Part 3: Description of translation instrument Chinese version of Anticipated Turnover Scale (C-ATS)

The Brislin's model of translation was used to translate ATS into the Chinese version (C-ATS). The psychometric properties of C-ATS were tested by the content validity, internal consistency reliability, construct validity by CFA and construct reliability. The progress of each of these is presented as follows.

Anticipated Turnover Scale (ATS) developed by Hinshaw and Atwood (1985) was a self-reported instrument that contained 12 items. ATS was the selected instrument to measure nurses' intention to leave in this study. The Cronbach's Alpha of ATS was .84. The construct validity was established by the factor analysis (Hinshaw & Atwood, 1985). The factor loading for each item was more than .40.

Scoring and interpretation of the score: It is a seven-point Likert scale. The score ranged from 1 = *agree strongly* to 7 = *disagree strongly.* As a result of the content validity testing, 5 items were left. The total score ranged from 7 to 35. Higher mean of total score interpreted nurses' greater intended to leave in their current positions and lower mean of total score interpreted nurses' lower intended to leave. In order to explain the higher score which interpreted a higher level of nurses' intention to leave, four items had been rescored before analyzing the data.

According to the score of nurses' intention to leave range from 1 to 6, containing seven ranks, the mean score of each item was divided into seven levels by using the class interval formula $\bar{x} = (\overline{x}_{\max} - \overline{x}_{\min})/k$. Furthermore, in order to keep the intervals from overlapping, 0.01 was added to each subsequent lower limit (Polit, 1996). The range of mean scores with the levels of interpretation are presented in Table 24.

Table 24 Levels of interpretation of nurses' intention to leave

Range of Mean Scores	Levels of Interpretation
0.00 – 0.86	a very low level of nurses' intention to leave
0.87 – 1.72	a relatively low level of nurses' intention to leave
1.73 – 2.58	a low level of nurses' intention to leave
2.59 – 3.44	a moderate level of nurses' intention to leave
4.31 – 5.16	a relatively high level of nurses' intention to leave
5.17 – 6.00	a high level of nurses' intention to leave

Translation process: With the permission from researcher Atwood to use the ATS (Appendix D), the Brislin's model of translation was utilized. Brislin's model consists of a cycle of four steps (Yu, Lee, & Woo, 2003): (1) step 1, translating the instrument from the source language (SL) to the target language (TL), by a bilingual person; (2) step 2, reviewing the TL version for grammatical style and comprehensibility by a monolingual person who is a native in the target language; (3) step 3, back-translating the TL version to the source language by a bilingual person who is blinded from the original version of the instrument; and (4) step 4, comparing linguistic congruence and cultural relevancy of the back-translated version of the instrument (obtained in step 3) with the original SL version (Brislin, 1970; Jones, Lee, Phillips, Zhang, & Jaceldo, 2001). These steps for translation is showed in Figure 12.

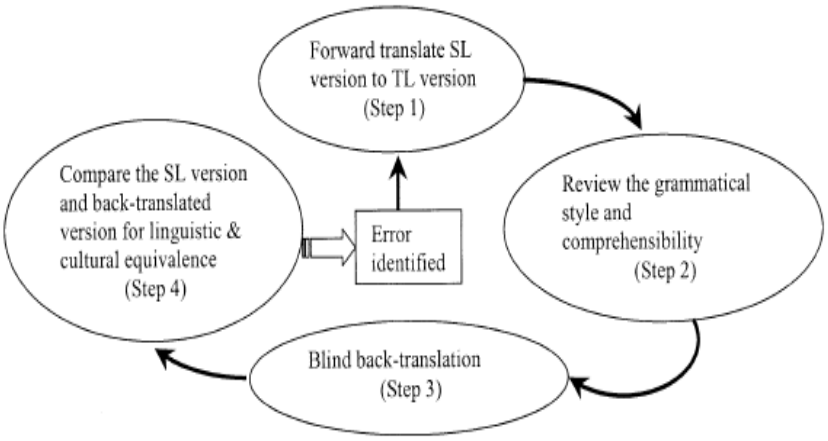


Figure 12 Brislin's Model of translation process. Adapted from "Translation of the chronic heart failure questionnaire" by D. S. F. Yu, D. T. F. Lee, and J. Woo, 2003, Applied Nursing Research, 16(4), p.279. Copyright 2003 by Elsevier Inc.

This study proceeded with the following steps:

Step one, two bilingual translators who are in the nurse administration area and good at English from Dalian Medical University Affiliated first Hospital and Faulty of Nursing, Chulalongkorn University translated the original English version of the ATS into Chinese. This step helped to maximize the equivalence of translation and assure the appropriateness of language usage through through the researcher and bilingual translators comparing the English version and the Chinese version together.

Step two, a monolingual reviewer who is a Chinese teacher reviewed the

Chinese version. This step is needed because the bilingual translators may write Chinese in an English grammatical style. The disagreement in the sentence structures between the Chinese expression written by the bilingual translators and the standardized Chinese expression were discussed by the researcher, the monolingual reviewer, and the previous two bilingual experts.

Step three, two other bilingual translators, one with a master's degree in Nurse Science, and another with a degree in English Language, both from Dalian Medical University, back-translated the Chinese version questionnaire into English. These two bilingual experts are not familiar with the original ATS English version. This step helped to assure the meanings of the Chinese version accurately reflect the English version through the researcher and bilingual translators comparing the English version and the Chinese version together. There was no difference in meaning between the English and Chinese versions.

Step four, the researcher's advisor compared the original English version with the back-translated English version for the linguistic congruence. The name list of translators, back translators, and monolingual expert are showed in Appendix E.

Content validity: After translating the ATS, the Chinese version of ATS (C-ATS) was sent out to validate the content. C-ATS content validity was evaluated by a panel of five nurse experts, who are the same as the nurses' job satisfaction content validity evaluation experts. Five items were left after the content validation process. These five items' I-CVI ranged from .8 to 1 and S-CVI/Ave was .96.

Internal Consistency Reliability: In this study, from the tryout (n = 302), the reliability of C-ATS was .81. Five items' item-to-total correlation ranged from .51 to .72.

Construct Validity by CFA: The assumption of normality and multicollinearity were tested before conducting CFA.

1) Normality: The univariate normality was tested by Critical Ratio (CR) of Skewness (SI) and Kurtosis (SK) among 5 items. The CR of SI ranged from -3.30 to 7.06. The CR of SK ranged from -4.03 to -2.33. The results of CR's SI and SK were higher than an absolute value of 1.96 ($\alpha = .05$) (Hair et al., 2010). Thus, the assumption of normality was violated.

2) Multicollinearity: The five observed variables were tested for multicollinearity. According to Pilot (2010), bivariate multicollinearity occurs when

correlations of any variables is greater than absolute value of .85. The results showed that the correlation among five items ranged from .33 to .59. Therefore, the assumption of multicollinearity was not violated.

In this study, from the main study (N = 510), the construct validity of C-ATS was assessed by the measurement model of CFA. Since the data violate the normal distribution, the estimation method of Robust Maximum Likelihood (RML) was used to run the measurement model of C-ATS. The result of CFA illustrated that C-ATS includes 12 parameters. The number of unique variance parameter estimation of C-ATS was as follows:

$n\,(n+1)/2 = 5 \times 6/2 = 15$.

Thus, the model was over identified, which indicates the model can be analysed (Hair et al., 2010).

By using first-order CFA analysis, the result presented that C-ATS was the unidimensional measurement with 5 items. The GOF statistics presented that the C-ATS goodness fit is acceptable ($\chi^2 = 3.10$, df = 3, P-value = .38, GFI = 1.00, AGFI = 1.00, RMSEA = .01, and CFI = 1.00) as shown in Table 25. The factor loading (B) of each item ranged from .64 to .80 at a statistically significant level of .05 (Table 26). Nurses' intention to leave had both Item 1 and Item 2 with the highest factor loading of .72) and the squared multiple correlation of .52. The basic measurement model of C-ATS is showed in Figure 13.

Construct reliability: The construct reliability of latent variable for nurses' intention to leave was high as .84. The average variance extracted of latent variable for nurses' intention to leave was .51, which indicated the factor can explain the variance of latent variable at a high level as shown in Table 27.

Table 25 Goodness of Fit Statistics of Chinese version of Anticipated Turnover Scale (C-ATS) Measurement Model

Relative Fit Index	Statistic from CNJSS	Acceptable goodness of Fit Statistics	Model achieve criteria
Chi-square –test	3.10 (P = .38)	P ≥ .05	Yes
Chi-square/degree of freedom	1.04	< 2.00	Yes
Comparative Fit Index (CFI)	1.00	> .90	Yes
Goodness of Fit Index (GFI)	1.00	> .90	Yes
Adjusted Goodness of Fit Index (AGFI)	1.00	> .80	Yes
Normed Fit Index (NFI)	.99	> .90	Yes
Root Mean Square Error of Approximation (RMSEA)	.01	< .08	Yes
Standardized Root Mean Square Residual (SRMSR)	.01	< .07	Yes

Table 26 Factor Loading and Factor Score Regression of Chinese version of Anticipated Turnover Scale (C-ATS) (N = 510)

Nurse intention to leave of latent construct	b	B	SE	t-value	R^2	Error
Item 1. quite sure leave	1.04	.72	0.06	17.69*	0.52	.48
Item 2. got another job consider	1.35	.72	0.08	16.49*	0.52	.48
Item 3. no intention to leave	1.07	.64	0.07	14.67*	0.40	.60
Item 4. not sure whether stay	1.14	.69	0.07	16.22*	0.47	.53
Item 5. plan to leave	1.08	.80	0.06	19.23*	0.64	.36

* p < .05

Table 27 Construct Reliability and Average Variance Extracted of Chinese version of Anticipated Turnover Scale (C-ATS) (N = 510)

Latent Variable	Construct Reliability of Latent Variable ($\rho c > .60$)	Average Variance Extracted ($\rho_v > .50$)
Nurse intention to leave	.84	.51

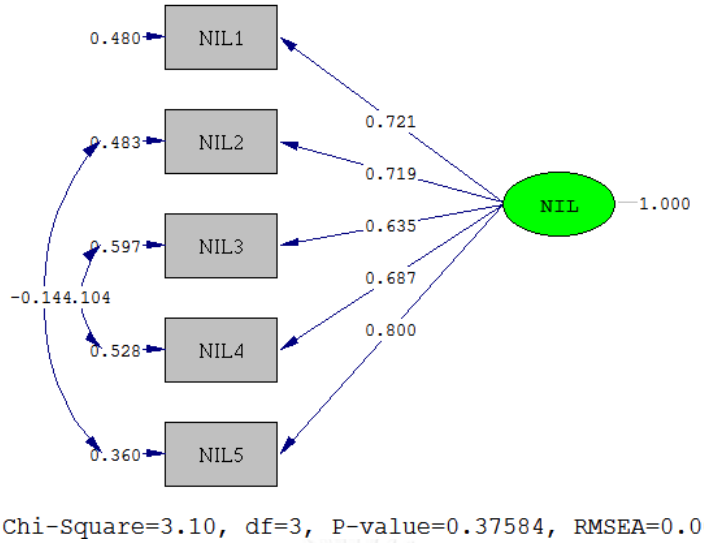


Figure 13 Measurement model of Chinese Anticipated Turnover Scale (C-ATS)

Part 4: Description of demographic data form with nursing staffing form

The demographic data form was developed by the researcher to collect the information related to the RNs' personal background. In addition, the nurse staffing measurement form was developed to measure patient to nurse ratio. Since it was a single table, it was considered as part of the demographic data.

1. Demographic data form

A demographic data form was developed by the researcher. It was designed to collect the participants' information including ages, genders, marital status, education level, working years, employment status, income, work departments, and the average number of patients taken care by one RN's in each shift during the past one month.

2. Nurse staffing measurement form

A nurse staffing measurement form was used to measure patient to nurse ratio. It was modified by the researcher based on the Akien's indicator, literature review and the interview Chinese experts.

Scoring and interpretation of the score: The average number of patients that cared by one RN through different working shifts was calculated to interpret the patient to nurse ratio. Higher number of patients indicates one nurse takes care more patients. Lower number of patients indicates one nurse takes care less number of patients. The average number of patient to nurse ratio from different working shifts was used for data analysis.

Validity: The content validity of nurse staffing was evaluated by a panel of six nurse experts (1 head nurse, 1 supervisor, 1 vice nurse director, 2 nurse directors, 1 dean from nursing school), which came from different regional hospitals or schools (northeast, southwest, southeast, and south center). All of them have the same qualification as other instruments' content validity testing experts. After these six experts' evaluation, the I-CVI was .83, which is acceptable (Polit & Beck, 2012).

Instrument summary: Instruments used for the main study are presented in Appendix F. Two instruments were developed by the researcher, including Chinese Nurse Job Satisfaction Scale (CNJSS) and Chinese Nurse Assessed Quality of Nursing Care Scale (CNAQNCS). Two instruments were selected from the Chinese version, including Chinese version of the Practice Environment Scale (C-PES) and Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS). The

instrument of Chinese version of Anticipated Turnover Scale (C-ATS) was translated and modified from the existing instruments of ATS. The Nurse staffing measurement form was modified from the existing instrument. The testing of psychometric properties of CNJSS, CNAQNCS, and C-ATS included content validity testing, internal consistency reliability, EFA, CFA and construct reliability. C-PES and C-MBI-HSS were tested with internal consistency reliability, CFA and construct reliability. In addition, nurse staffing measurement form was tested with content validity. Therefore, all of the instruments illustrated acceptable validity and reliability. The summary of all instruments' reliability and validity are presented in Table 28.

Table 28 The summary of instruments' reliability and validity

Instruments name	Item No	Reliability		Validity	
		Internal Consistency (n = 302)	Construct Reliability (N = 510)	Content Validity	Construct Validity (N = 510)
CNAQNCS	38	Total: .99. Range: .62 to .85.	Range: .83 to .95	I-CVI: .80 to 1.00; S-CVI: .98.	Model achieve criteria
CNJSS	40	Total: .96. Range: .84 to .93.	Range: .75 to .91.	I-CVI: .80 to 1.00; S-CVI: .97.	Model achieve criteria
C-MBI-HSS	22	Total: .93. Range: .81 to .91.	Range: .69 to .82.	S-CVI: .80.	Model achieve criteria
C-ATS	5	Total: .81.	One dimension .84	I-CVI: .8 to 1, S-CVI: .96.	Model achieve criteria
C-PES	28	Total: .94. Range: .64 to .88.	Range: .69 to .86	S-CVI: .94.	Model achieve criteria
Nurse staffing form	1			I-CVI: .83.	

Protection of Human Subjects

This study was approved by Ethical Review Committee for Research Involving Human Research Subjects, Health Sciences Group, Chulalongkorn University (ECCU) on August 18th, 2014 as showed in Appendix A. The permission for data collection was received from each hospital after getting ECCU approval. In addition, participants received information sheet and consent form. An information sheet explained the purpose, the rationale, the progress of participation, the risk/harm and benefit of this project to participants. In addition, the consent form expressed that participation in the study was voluntary. Participants can withdraw or refuse to take part in this study without being punished or losing benefits at any time. Furthermore, participants' responses were kept confidential and their identities were not exposed to the public. The researcher's address and phone number were also provided in case the participants had any questions.

Data Collection

Data was collected by individual questionnaire. The following steps were performed.

1. Received approval to collect research data from the ECCU.

2. Sought permission from nursing division directors of five selected tertiary general hospitals to conduct this research.

3. Sent a letter to selected tertiary general hospitals' nursing directors. The letter clearly explained the purpose of the study, the procedure of data collection, the request permission to collect data, and the copy of Chinese version questionnaires.

4. Obtained the total number and each strata inpatient departments' number of RNs from hospitals' nursing divisions. The researcher provided training to research assistants about the inclusion criteria of participants' selection and the sampling technique required for data collection.

5. Gave the information sheet, informed consent form and questionnaires to selected participants by the researcher and the research assistants. The information sheet revealed the purpose of study, time needed to complete questionnaires (15 min to 30 min), and method for assurance of confidentially and anonymity. Moreover, it

explained the importance of answering questionnaires' authenticity and integrality.

6. Collected questionnaires from selected participants by the researcher and the research assistants.

7. Examined the completeness of the questionnaires by the researcher. Five hundred and sixty six of questionnaires was sent out. Five hundred and thirty seven of completed questionnaires were returned. The questionnaires' return rate were 94.88%. In preparing for data analysis, the researcher checked and cleaned up all data.

Data Analysis

Before analyzing data, the univariate and multivariate outlier were tested.

The univariate outlier of each variable was tested by inspecting frequency distribution of the Z score. According to Kline (2011), $| Z | > 3.00$ indicates an outlier. Thus, 26 outlier cases were deleted from analyzing.

The multivariate outlier was tested by Mahalanobis distance at $p < .001$. Mahalanobis distance is evaluated as "χ^2 with the degree of freedom equal to the number of variables" (Tabachnick & Fidell, 2007, p. 99). This study included six variables. Any cases with Mahalanobis Distance score greater than $\chi^2(6) = 22.458$ were deleted. Therefore, one case was deleted from Mahalanobis Distance analysis.

Finally, 510 cases were utilized for data analysis. The p-value of .05 was set up as the accepted level of significance for this study. The procedures for data analysis were conducted by the following methods.

1. By using SPSS 22.0, descriptive statistics including frequency, percentage, range, mean and standard deviation were used to describe the characteristics of participants and study variables.

2. By using SPSS 22.0, the reliability of all instruments were tested among 302 RNs, who were parallel subjects for the main study. According to Polit and Beck (2012), it is acceptable that the Cronbach's Alpha Coefficient of the total score is more than 0.7 for new developed instrument and more than 0.8 for existing instrument. As suggested by Wu (2010), it is acceptable that the Cronbach's Alpha Coefficient of subscales more than .6.

3. By using SPSS 22.0, the EFA was used to determine CNJSS and CNAQNCS construct validity. With the sample size of 302 RNs, the item's factor loading more

than .35, factors Eigenvalues more than 1.0, and more than three items in each construct were reported (Hair et al., 2010).

4. By using SPSS 22.0, the assumptions for conducting SEM include normality, linearity, homoscedasticity, and multicollinearity testing.

Normality was tested by skewness, kurtosis statistics and normal probability plot.

Linearity was tested by the residual plot which is the graph between the standardized residuals (Y-axis) versus the predicted value (X-axis).

Homoscedasticity was checked by residuals scatter plot.

Multicollinearity was assessed by Pearson Product Moment correlations for bivariate relationships among 23 observed variables. Multiple regression was used to test multicollinearity by the variance inflation factor (VIF) and the tolerance value among 6 exogenous observed variables and 11 endogenous observed variables (Hair et al., 2010).

5. By using LISREL 8.72 for Windows program, the construct validity of nurses' working environment, nurses' job satisfaction, and nurse-assessed quality of nursing care were tested by second-order CFA model. The construct validity of nurse burnout and nurses' intention to leave were tested by the first-order CFA model. The measurement model's $\chi^2 > .05$, $\chi^2/df < 2$, GFI > .90, NFI > .90, CFI > .90, AGFI > .80, RMSEA < .08, SRMR < .07 for more than 500 participants were reported (Hair et al., 2010).

6. By using LISREL 8.72, the hypothesized causal model was tested and modified for best fit and parsimony by SEM. With the sample size of more than 500, the $\chi^2 > .05$, $\chi^2/df < 3$, GFI > .90, NFI > .90, CFI > .90, AGFI > .80, RMSEA < .08, SRMR < .07 were used to test the model fitness (Hair et al., 2010).

CHAPTER IV
RESULTS

The results of this study are present in this chapter. The results include 1) descriptive statistics of variables, 2) Structural Equation Modeling (SEM) assumption testing, and 3) Findings of research questions and hypothesis testing.

Descriptive Statistics of the Variables

1. Demographic characteristics of participants

Five hundred and ten participants returned self-reported questionnaires were used for analyzing the data. The participants' ages, genders, marital status, education, work experience, income, work units and shift were presented in Table 29.

The participants' age ranged from 21 to 54 with the mean of 31.19 (SD = 6.32). Approximately half of the participants' ages were around 20 to 29 years old (50.98%), which was followed by 30 to 39 (36.67%), 40 to 49 (11.57%). Most of the participants were female (99.21%). Nearly sixty two percent of participants were married. Most of the participants got a bachelor's degree (62.94%), followed by an associate degree (30.59%), a secondary technical certification (5.29%), and a master's degree (1.18%). The participants' work experience ranged from 3 months to 35 years with the mean of 9.14 (SD = 7.13). The largest group of the participants' work experience were not more than five years (38.63%). It was followed by groups of six to ten years (31.76%), 11 to 15years (10.00%).

Considering the employment status, most of the participants were contract nurses (76.08%). Only 23.92% of the participants were permanent nurses. Thirty one point eighteen percent of the participants' annual salary ranged from 60,000 to 79,900 yuan (1USD = 6 yuan). The second majority higher income group annual salary ranged from 80,000 to 99,900 yuan, which accounted for 23.73% of the participants.

In addition, around one third of the participants worked in medical (36.67%), followed by surgical (30.78%) departments, and intensive care unit (ICU) (11.96%). Moreover, the majority of the participants (71.00%) worked the day time shift from 7:30 to 17:00. The different shifts were coded in SPSS as 1 = Shift 1 (7:30-17:00), 2 =

Shit 2 (16:30-24:00), 3 = Shift 3 (16:30-next day8:00), 4 = Shift 4 (8:00-16:00 or 8:00-12:00+14:00-18:00), 5 = Shift 5 (16:00-24:00), 6 = Shift 6 (0:00-8:00), 7 = Shift 7 (8:00-20:00), 8 = Shift 8 (20:00-next day 8:00). Therefore, from the coding line number in each line of SPSS, it can be seen that one participant could work different shifts, such as shift 1 + shift2 + shift3, or shift 4 + shift 5 + shift 6, or shift 7 + shift 8. They may also work other combinations of shift patter based on department assignment.

Table 29 Demographic characteristics of participants (N = 510)

Characteristics	Frequency	Percentage
Age (years)		
20-29	260	50.98
30-39	187	36.67
40-49	59	11.57
≥ 50	4	0.78
Gender		
Male	4	0.78
Female	506	99.22
Marital status		
Never married	191	37.45
Married	316	61.96
Divorced	3	0.59
Education		
Secondary technical	27	5.29
Associate degree	156	30.59
Bachelor's degree	321	62.94
Master's degree	6	1.180
Work experience		
≤5 years	197	38.63
6-10 years	162	31.77
11-15 years	51	10.00
16-20 years	48	9.41
21-25 years	41	8.04
26-30 years	9	1.76
>30 years	2	0.39
Employment status		
Permanent	122	23.92
Contract	388	76.08
Income		
<40,000	99	19.41
40,000-59,900	104	20.39
60,000-79,900	159	31.18
80,000-99,900	121	23.73
100,000-119,900	22	4.31
>120,000	5	0.98

Table 29 Demographic characteristics of participants (N = 510) (continued)

Characteristics	Frequency	Percentage
Work departments		
Surgical departments	157	30.78
Medical departments	187	36.67
OBGYN departments	40	7.84
Pediatric departments	24	4.71
ICU	61	11.96
ER	19	3.73
EENT	22	4.31
Shift †		
Shift 1 (7:30-17:00)	362	70.98
Shit 2 (16:30-24:00)	19	3.73
Shift 3 (16:30-next day8:00)	94	18.43
Shift 4 (8:00-16:00 or 8:00-12:00+14:00-18:00)	155	30.39
Shift 5 (16:00-24:00)	128	25.10
Shift 6 (0:00-8:00)	116	22.75
Shift 7(8:00-20:00)	3	0.59
Shift 8(20:00-next day 8:00)	3	0.59

† Participants could report more than one shift

1.2 Characteristics of study variables

The study variables in this study included nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of care. The description of each study variables and observed variables' Skewness (SI), Kurtosis (SK), and Critical ratio (CR) are presented in Table 30.

Table 30 Description of study variables and observed variables (N = 510)

Variables	Skewness			Kurtosis		
	SI	SE	CR	SK	SE	CR
Nurse staffing	**0.87**	**0.11**	**8.07**	**-0.08**	**0.22**	**-0.38**
Nurse work environment	**0.26**	**0.11**	**2.39**	**-0.17**	**0.22**	**-0.81**
staffing/ resource adequacy	0.00	0.11	-0.02	-0.26	0.22	-1.20
nurse-physician relationship	-0.19	0.11	-1.74	0.51	0.22	2.34
leadership and support nurse	-0.32	0.11	-2.92	0.36	0.22	1.68
nurse foundations for quality of care	0.23	0.11	2.16	-0.33	0.22	-1.51
nurse participate in hospital affairs	0.00	0.11	0.00	-0.04	0.22	-0.17
Nurse job satisfaction	**0.02**	**0.11**	**0.17**	**-0.16**	**0.22**	**-0.75**
promotion/individual growth	-0.30	0.11	-2.75	0.20	0.22	0.92
recognition	0.20	0.11	1.88	0.53	0.22	2.46
salary and fringe benefits	0.02	0.11	0.22	-0.58	0.22	-2.70
work conditions	-0.70	0.11	-6.48	1.00	0.22	4.61
administration	-0.53	0.11	-4.91	1.01	0.22	4.69
family and work balance	-0.08	0.11	-0.78	-0.74	0.22	-3.40
interaction	-0.34	0.11	-3.17	0.40	0.22	1.87
Nurse burnout	**0.21**	**0.11**	**1.93**	**-0.51**	**0.22**	**-2.35**
emotional exhaustion	0.36	0.11	3.31	-0.32	0.22	-1.46
personal achievement	0.59	0.11	5.44	-0.17	0.22	-0.79
depersonalization	1.38	0.11	12.75	1.47	0.22	6.82
Nurse intention to leave	**-0.10**	**0.11**	**-0.88**	**-0.95**	**0.22**	**-4.40**
Quality of nursing care	**0.03**	**0.11**	**0.29**	**-0.77**	**0.22**	**-3.58**
physical environment	-0.69	0.11	-6.42	1.53	0.22	7.09
staff characteristic	-0.46	0.11	-4.22	-0.74	0.22	-3.44
precondition	0.06	0.11	0.59	-0.82	0.22	-3.81
task orientated activities	-0.01	0.11	-0.13	-0.60	0.22	-2.79
human orientated activities	0.15	0.11	1.37	-0.56	0.22	-2.58
patient outcomes	-0.04	0.11	-0.32	-0.37	0.22	-1.71

The nurse staffing score had a positive skewness value (0.87), which suggested that most of the participants had score of patient to nurse ratio lower than the mean score. The kurtosis value of nurse staffing had a negative value (- 0.08), which indicated that the nurse staffing score was shaped like a platykurtic (Table 30). The SI's CR of nurse staffing was 8.07, which was more than critical value of 1.96 (α = .05) (Hair et al., 2010, p. 73). It indicated the non-normal distribution of nurse staffing.

It is seen form Table 30 that the nurse work environment scores had a slight positive skewness value (0.26), which suggested that most of the participants had a score of perceived nurse work environment lower than the mean score. The kurtosis value of nurse work environment was negative (-0.17), which indicated that the scores of nurse work environment were shaped like a platykurtic (flattened curve). The SI's CR of nurse work environment was 2.39, which was more than critical value of 1.96 (α = .05) (Hair et al., 2010, p. 73). In addition, the score of SI's CR in each dimension ranged from -2.92 to 2.16, which were outside an absolute critical value of 1.96 (α = .05). It indicated the non-normal distribution of study variable and observed variables' nurse work environment.

The nurses' job satisfaction had a positive skewness value close to zero (0.02), which suggested that most of the participants had a score of nurses' job satisfaction to the mean score. The kurtosis value of nurses' job satisfaction was negative (-0.16), which indicated nurses' job satisfaction scores were shaped like a platykurtic (flattened curve) (see Table 30). Since the score of critical value of SI (0.17) and SK (-0.75) were both inside the absolute value 1.96, it indicated the normal distribution of nurses' job satisfaction (Hair et al., 2010, p 73). However, the score of SI's CR in each dimension ranged from -6.48 to 1.88, which were outside an absolute critical value of 1.96 (Hair et al., 2010, p 73). It indicated the non-normal distribution of observed variables' nurse job satisfaction.

The nurse burnout had a positive skewness value (0.21), which suggested that most of the participants had a score of nurse burnout lower than the mean score. The kurtosis value of nurse burnout was negative (-0.51), which indicated that nurse burnout scores were shaped like a platykurtic (flattened curve) (see Table 30). Since the score of critical value of SI (1.93) was inside the absolute value 1.96, it indicated the normal distribution of nurses' burnout (Hair et al., 2010, p 73). However, the score of SI's CR

in each dimension ranged from 3.31 to 12.75, which were outside an absolute critical value of 1.96 (Hair et al., 2010, p 73). It indicated the non-normal distribution of observed variables' nurse burnout.

The nurses' intention to leave had a negative skewness value (-0.10), which suggested that most of the participants had a score of nurses' intention to leave higher than the mean score. The kurtosis value of nurses' intention to leave was negative (-0.16), which indicated that nurses' intention to leave scores were shaped like a platykurtic (flattened curve) (see Table 30). Since the score of critical value of SI (-0.88) was inside the absolute value 1.96, it indicated the normal distribution of nurses' intention to leave (Hair et al., 2010, p 73).

The nurse-assessed quality of nursing care had a positive skewness value close to zero (0.03), which suggested that most of the participants had a score of nurse-assessed quality of nursing care to the mean score. The kurtosis value of nurse assessed quality of care was negative (-0.77), which indicated that nurse assessed quality of care scores were shaped like a platykurtic (flattened curve) (see Table 30). Since the score of critical value of SI (0.29) was inside the absolute value 1.96, it indicated the normal distribution of nurse-assessed quality of nursing care (Hair et al., 2010, p 73). However, the score of SI's CR in each dimension ranged from 3.31 to 12.75, which were outside an absolute critical value of 1.96 (Hair et al., 2010, p 73). It indicated the non-normal distribution of observed variables' nurse-assessed quality of nursing care.

SEM Assumption Testing

1. Normality

The normality referred to "which the distribution of the sample data corresponds to a normal distribution" (Hair et al., 2010, p. 36). The normality of SEM was checked by univariate normality and multivariate normality. According to Schumacker and Lomax (2010), the interface of PRELIS in LISREL software program can screen data for both univariate normality and multivariate normality. The results of univariate normality testing and multivariate normality testing are presented in Table 31. Most of observed variables' p–value were less than .05, it indicated the no normality distributed of observed variables. Therefore, the assumption of normality violated in this study.

Table 31 Test of Univariate Normality and Multivariate Normality of the observed variables (N = 510)

	Skewness and Kurtosis	
Observe variables	**Chi-Square**	**P-Value**
Univariate normality testing		
Physical environment	54.13	0.00
Staff characteristic	47.65	0.00
Precondition	45.21	0.00
Task orientated activities	6.46	0.04
Human orientated activities	17.91	0.00
Patient outcomes	4.20	0.12
Promotion and individual growth	8.28	0.02
Recognition and responsibility	7.97	0.02
Salary and fringe benefits	14.37	0.00
Work conditions	46.36	0.00
Administration	33.14	0.00
Family and work balance	30.56	0.00
Interaction	12.53	0.00
Emotional exhaustion	13.25	0.00
Personal achievement	26.62	0.00
Depersonalization	117.20	0.00
Intention to leave	82.25	0.00
Resource adequacy	1.68	0.43
Nurse-physician relationship	7.14	0.03
Leadership and support nurses	10.70	0.01
Nursing fundation for quality of care	7.59	0.02
Nurse participate in hospital affairs	0.01	1.00
Patient to nurse ratio	50.57	0.00
Multivariate normality testing		
Set of study variables	741.21	0.00

2. Homoscedasticity

The homoscedasticity referred to "assumption that dependent variable(s) exhibit equal levels of variance across the range of predictor variable(s)" (Hair et al., 2010, p. 74). This assumption was examined by residual scatter plots. The spread of residual variables randomly around the zero axis within $\pm$ 3 SD indicated the homoscedasticity. This assumption was not violated in this study as showed in Appendix J.

3. Linearity

Linearity referred to "predict values that fall in a straight line by having a constant unit change(slop) of the dependent variable for a constant unit change of the

independent variable" (Hair et al., 2010, p. 35). It was tested by the residual plot which was the graphs between the standardized residuals (Y-axis) versus the predicted value (X-axis). As showed in Appendix J, the scatter plots between standardized residuals and the predicted value illustrated such a linear relationship.

4. Multicollinearity

Multicollinearity referred to as "the extent to which a variable can be explained by the other variables in the analysis"(Hair et al., 2010, p. 2). Bivariate multicollinearity was checked by examining the correlation matrix among individual variables included in the analysis. Bivariate multicollinearity occurs when correlations of any variables is greater than $\pm$ 0.80 (Hair et al., 2010). In addition, the multivariate multicollinearity occurs when the tolerance values are less than 0.1 and variance inflation factor (VIF) values are greater than 10 (Mertler & Vannatta, 2002).

Evidence of multicollinearity was not found, with correlations coefficients among the predicting variables (nurse staffing, nurse work environment, nurse burnout, and nurse intention to leave) ranged from -.11 to .78 as shown in Table 32. The tolerance values ranged from .35 to .98 and VIF ranged from 1.02 to 2.89 as shown in Table 33. The tolerance value and VIF indicated the evidence of non multicollinearity.

In summary, the assumptions for conducting SEM in this study did not violate the linearity, homoscedasticity, and multicollinearity. However, only the assumption of normality violated in this study.

Table 32 Observe Variables Pearson correlations, Means, and Standard Deviations (N = 510)

observed variables	YPE	YSC	YPR	YTOA	YHOA	YPO	YPDG	YRR
indicator of physical environment (YPE)	1.00							
indicator of staff characteristic(YSC)	0.42*	1.00						
indicator of precondition (YPR)	0.48*	0.70*	1.00					
indicator of task orientated activities (YTOA)	0.52*	0.70*	0.80*	1.00				
indicator of human orientated activities (YHOA)	0.50*	0.60*	0.69*	0.80*	1.00			
indicator of patient outcomes(YPO)	0.44*	0.56*	0.63*	0.69*	0.69*	1.00		
indicator of promotion and individual growth (YPDG)	0.29*	0.22*	0.22*	0.23*	0.24*	0.25*	1.00	
indicator of recognition and responsibility (YRR)	0.44*	0.48*	0.52*	0.54*	0.54*	0.48*	0.38*	1.00
indicator of salary and fringe benefits (YSEB)	0.29*	0.18*	0.18*	0.19*	0.22*	0.19*	0.63*	0.31*
indicator of work conditions (YWC)	0.30*	0.21*	0.17*	0.22*	0.25*	0.23*	0.44*	0.41*
indicator of administration (YAD)	0.36*	0.34*	0.27*	0.36*	0.35*	0.32*	0.44*	0.52*
indicator of family and work balance (YFWB)	0.35*	0.19*	0.19*	0.26*	0.27*	0.27*	0.34*	0.41*
indicator of interaction (YIN)	0.38*	0.30*	0.30*	0.34*	0.35*	0.26*	0.39*	0.52*
indicator of emotional exhaustion (YEE)	-0.17*	-0.15*	-0.12*	-0.11*	-0.10*	-0.11*	-0.16*	-0.23*
indicator of depersonalization (YDP)	-0.41*	-0.36*	-0.35*	-0.41*	-0.37*	-0.33*	-0.21*	-0.41*
indicator of personal achievement (YPA)	-0.20*	-0.31*	-0.22*	-0.20*	-0.19*	-0.12*	-0.16*	-0.28*
indictor of nurses' intention to leave (YNILM)	-0.34*	-0.26*	-0.27*	-0.27*	-0.29*	-0.22*	-0.35*	-0.37*
indicator of resource adequacy (XRA)	0.44*	0.24*	0.26*	0.34*	0.32*	0.30*	0.32*	0.36*
indicator of nurse-physician relationship (XNPR)	0.36*	0.30*	0.27*	0.32*	0.35*	0.25*	0.37*	0.46*
indicator of leadership and support nurses (XLSN)	0.39*	0.24*	0.19*	0.30*	0.33*	0.23*	0.42*	0.45*
indicator of nursing foundations for quality care (XNFQC)	0.46*	0.41*	0.37*	0.45*	0.43*	0.36*	0.48*	0.57*
indicator of nurse participate in hospital affair (XNPHA)	0.40*	0.28*	0.26*	0.31*	0.35*	0.28*	0.65*	0.44*
indicator of patient to nurse ratio (XNS_PNR)	-0.13*	-0.07	-0.07*	-0.10*	-0.10	-0.07	0.00	-0.08
Mean	4.09	4.50	4.25	4.26	4.18	4.14	3.29	3.91
Std. Deviation	0.67	0.46	0.49	0.50	0.53	0.55	0.79	0.43

***p < .05**

Table 32 Observe Variables Pearson correlations, Means, and Standard Deviations (N = 510) (continued)

observed variables	YSEB	YWC	YAD	YFWB	YIN	YEE	YDP	YPA
indicator of physical environment (YPE)								
indicator of staff characteristic(YSC)								
indicator of precondition (YPR)								
indicator of task orientated activities (YTOA)								
indicator of human orientated activities (YHOA)								
indicator of patient outcomes(YPO)								
indicator of promotion and individual growth (YPDG)								
indicator of recognition and responsibility (YRR)								
indicator of salary and fringe benefits (YSEB)	1.00							
indicator of work conditions (YWC)	0.47*	1.00						
indicator of administration (YAD)	0.41*	0.57*	1.00					
indicator of family and work balance (YFWB)	0.47*	0.52*	0.45*	1.00				
indicator of interaction (YIN)	0.42*	0.44*	0.47*	0.54*	1.00			
indicator of emotional exhaustion (YEE)	-0.23*	-0.33*	-0.26*	-0.37*	-0.33*	1.00		
indicator of depersonalization (YDP)	-0.25*	-0.26*	-0.32*	-0.24*	-0.41*	0.20*	1.00	
indicator of personal achievement (YPA)	-0.22*	-0.23*	-0.26*	-0.21*	-0.28*	0.48*	0.27*	1.00
indictor of nurses' intention to leave (YNILM)	-0.45*	-0.32*	-0.39*	-0.26*	-0.31*	0.27*	0.32*	0.27*
indicator of resource adequacy (XRA)	0.43*	0.48*	0.38*	0.46*	0.42*	-0.26*	-0.27*	-0.17*
indicator of nurse-physician relationship (XNPR)	0.36*	0.37*	0.49*	0.32*	0.46*	-0.22*	-0.28*	-0.17*
indicator of leadership and support nurses (XLSN)	0.42*	0.41*	0.66*	0.37*	0.39*	-0.18*	-0.25*	-0.18*
indicator of nursing foundations for quality care (XNFQC)	0.47*	0.48*	0.61*	0.35*	0.47*	-0.24*	-0.37*	-0.30*
indicator of nurse participate in hospital affair (XNPHA)	0.61*	0.48*	0.56*	0.44*	0.45*	-0.23*	-0.27*	-0.21*
indicator of patient to nurse ratio (XNS_PNR)	-0.08	0.02	-0.04	0.01	-0.06	-0.05	0.03	-0.04
Mean	2.56	3.56	3.96	2.99	3.65	2.54	1.83	0.95
Std. Deviation	0.87	0.67	0.62	0.94	0.62	1.18	1.15	0.90

***p < .05**

Table 32 Observe Variables Pearson correlations, Means, and Standard Deviations (N = 510) (continued)

observed variables	YNILM	XRA	XNPR	XLSN	XNFQC	XNPHA	XNS_PNR
indicator of physical environment (YPE)							
indicator of staff characteristic(YSC)							
indicator of precondition (YPR)							
indicator of task orientated activities (YTOA)							
indicator of human orientated activities (YHOA)							
indicator of patient outcomes(YPO)							
indicator of promotion and individual growth (YPDG)							
indicator of recognition and responsibility (YRR)							
indicator of salary and fringe benefits (YSEB)							
indicator of work conditions (YWC)							
indicator of administration (YAD)							
indicator of family and work balance (YFWB)							
indicator of interaction (YIN)							
indicator of emotional exhaustion (YEE)							
indicator of depersonalization (YDP)							
indicator of personal achievement (YPA)							
indictor of nurses' intention to leave (YNILM)	1.00						
indicator of resource adequacy (XRA)	-0.30*	1.00					
indicator of nurse-physician relationship (XNPR)	-0.34*	0.49*	1.00				
indicator of leadership and support nurses (XLSN)	-0.38*	0.49*	0.58*	1.00			
indicator of nursing foundations for quality care (XNFQC)	-0.44*	0.59*	0.62*	0.65*	1.00		
indicator of nurse participate in hospital affair (XNPHA)	-0.42*	0.53*	0.57*	0.65*	0.69*	1.00	
indicator of patient to nurse ratio (XNS_PNR)	0.08	-0.05	-0.06	-0.09	-0.11	-0.10	1.00
Mean	3.04	2.79	3.12	3.22	3.20	2.78	14.39
Std. Deviation	1.22	0.58	0.50	0.44	0.41	0.49	9.63

* $p < .05$

Table 33 Assessment for multicollinearity among the study variables (N = 510)

Variables	Tolerance	VIF
Endogenous observe variables		
Promotion and individual growth	0.45	2.22
Recognition and responsibility	0.53	1.90
Salary and fringe benefits	0.44	2.27
Work conditions	0.52	1.94
Administration	0.40	2.52
Family and work balance	0.51	1.98
Interaction	0.51	1.95
Emotional exhaustion	0.66	1.51
Personal achievement	0.73	1.37
Depersonalization	0.69	1.45
Intention to leave	0.67	1.49
Exogenous observe variables		
Resource adequacy	0.51	1.96
Nurse-physician relationship	0.51	1.97
Leadership and support nurses	0.39	2.55
Nursing foundation for quality of care	0.32	3.13
Nurse participate in hospital affairs	0.31	3.22
Patient to nurse ratio	0.95	1.06

Findings of Research Questions and Hypothesis Testing

The findings related to research questions and hypothesis testing are presented as follows.

Question 1. What are the average levels of nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave, and nurse-assessed quality of nursing care in Chinese hospitals?

The dimensions of each study variables' Mean (M), Standard Deviation (SD), and levels of interpretation are presented from Table 34 to Table 38. In addition, the items' description of nurse-assessed quality of nursing care are presented in Table 39 as well.

The score of average nurse staffing ranged from 2 to 42 with a mean of 14.39 (SD = 9.63). The mean of the maximum number of patients that one nurse should take care of was 18.12 (SD = 11.93). The highest number of patients that one nurse took care of was 60 as shown in Table 34.

Table 34 Description the score range, minimum score, maximum score, mean, and standard deviation of nurse staffing (N = 510)

Nurse staffing	Range	Min	Max	M	SD
Average number of patient to nurse ratio	40	2	42	14.39	9.63
The maximum number of patient to nurse ratio	58	2	60	18.12	11.93
The minimum number of patient to nurse ratio	40	0	40	11.26	8.06
Nurse overtime in each shift	8	0	8	0.78	0.79

The total mean score of nurse work environment was 3.01 (SD = 0.39) at good level as shown in Table 35. The dimension of leadership and support nurses had the highest mean (M = 3.22, SD = 0.44), which was followed by the dimension of nursing foundation for quality of care (M = 3.20, SD = 0.41), nurse physician (M = 3.12, SD = 0.50). The dimension of nurse participation in hospital affairs' mean score had the lowest mean score of 2.78 (SD = 0.39). Since all five dimensions mean scores were higher than 2.50, it considered the nurse work environment as favorable in this study.

Table 35 Dimensions' description of nurse work environment (N = 510)

Dimensions of nurse work environment	M	SD	level
Nurse managers' leadership and support of nurses	3.22	0.44	Good
Nurse foundations for quality of care	3.20	0.41	Good
Collegial nurse-physician relations	3.12	0.50	Good
Staffing and resource adequacy	2.79	0.58	Good
Nurse participate in hospital affairs	2.78	0.49	Good
Total nurse work environment	**3.01**	**0.39**	**Good**

The total mean score of nurses' job satisfaction was 3.48 (SD = 0.49) at high level as shown in Table 36. The dimension of administration had the highest mean score (M = 3.96, SD = 0.62). It was followed by dimension of recognition and responsibility (M = 3.91, SD = 0.43), promotion and individual growth (M =3.29, SD = 0.79), interaction mean score (M = 3.65, SD = 0.62), work conditions (M =3.56, SD = 0.67), family and work balance (M = 2.99, SD = 0.94), and salary and fringe benefits (M =

2.56, SD = 0.87). Furthermore, as shown in Appendix H-2, item 29 had the highest mean score (M = 4.14, SD = 0.67), followed by item 30 (M = 4.07, SD = 0.67) and item 11(M = 4.06, SD = 0.63). Item 20 had the lowest mean score (M = 2.25, SD = 1.05), followed by item 18 (M = 2.33, SD = 1.06) and item 22 (M = 2.44, SD = 1.08).

Table 36 Dimensions' description of nurses' job satisfaction (N =510)

Nurse job satisfaction	M	SD	Level
Administration	3.96	0.62	High
Recognition and responsibility	3.91	0.43	High
Interaction	3.65	0.62	High
Work conditions	3.56	0.67	High
Promotion and individual growth	3.29	0.79	Moderate
Family and work balance	2.99	0.94	Moderate
Salary and fringe benefits	2.56	0.87	Low
Total nurse job satisfaction	**3.48**	**0.49**	**High**

The total score of nurse burnout was 42.33 (SD = 18.07) at the moderate level of burnout as shown in Table 37.

The dimension of emotional exhaustion's mean of total score was 22.88 (SD = 10.66), which indicated a moderate level of emotional exhaustion. The dimension of personal achievement's mean of total score was 33.32 (SD = 9.21), which indicated a low level of personal achievement. The dimension of depersonalization's mean of total score was 4.78 (SD = 4.52), which indicated a lower level of depersonalization.

Table 37 Dimensions' description of nurse burnout (N =510)

Nurse burnout	M	SD	Level
Emotional exhaustion	22.88	10.66	moderate
Personal achievement	33.32	9.21	low
Depersonalization	4.77	4.52	low
Total nurse burnout	**42.33**	**18.07**	**moderate**

The mean score of total nurses' intention to leave was 3.04 (SD = 1.22) at low level.

The mean score of total nurse-assessed quality of nursing care was 4.26 (SD = 0.43) at very good level as shown in Table 38. The dimension of staff characteristic had

the highest mean score of 4.50 (SD = 0.46), followed by the dimension of task orientated activities and precondition with a mean score of 4.30 (SD = 0.48) and 4.25 (SD = 0.49), respectively. The lowest mean score was on the dimension of physical environment with a mean score of 4.09 (SD = 0.67). Moreover, as shown in Table 39, Item 8 had the highest mean score with 4.65 (SD = 0.51), followed by item 38 and item 26 with mean score of 4.44 (SD = 0.55) and 4.42 (SD = 0.58), respectively. Item 5 and item 48 had the lowest mean score with 3.90 (SD = 0.88) and 3.90 (SD = 0.81). They were followed by item 6 with a mean score of 3.96 (SD = 0.88).

Table 38 Dimensions' description of nurse-assessed quality of nursing care (N = 510)

Nurse assessed quality of nursing care	M	SD	Level
Staff characteristic	4.50	0.46	Very good
Task orientated activities	4.27	0.53	Very good
Precondition	4.25	0.49	Very good
Human orientated activities	4.18	0.52	Good
Patient outcomes	4.14	0.55	Good
Physical environment	4.09	0.67	Good
Total of nurse-assessed quality of nursing care	**4.25**	**0.43**	**Very good**

Table 39 Items' description of nurse-assessed quality of nursing care (N = 510)

Nurse assessed quality of nursing care	M	SD	Level
Staff characteristic			
Carefully follow rules	4.65	0.51	Very good
Cautious in duties.	4.57	0.53	Very good
Work well with my team	4.54	0.54	Very good
Polite and pleasant	4.53	0.58	Very good
Closely observe patient condition	4.51	0.56	Very good
Patiently listen to my patients	4.44	0.59	Very good
Smile to patients	4.41	0.65	Very good
Patiently explain patients doubt	4.35	0.61	Very good
Mean of sub-total	**4.50**	**0.46**	**Very good**
Task orientated activities			
Basic nursing care	4.41	0.58	Very good
Providing effectively health education	4.34	0.56	Very good
Providing guidance	4.31	0.57	Very good
Providing information	4.26	0.65	Very good
Explaining clearly about expense	4.14	0.73	Good
Providing individualized care	4.08	0.67	Good
Mean of sub-total	**4.27**	**0.53**	**Very good**
Precondition			
Professional experience	4.39	0.64	Very good
Operating process	4.33	0.57	Very good
Intend to help patients	4.27	0.65	Very good
Manage drugs	4.24	0.68	Very good
Clinical technical	4.23	0.64	Very good
Up-to-data knowledge	4.18	0.64	Good
Participated quality management	4.13	0.72	Good
Mean of sub-total	**4.25**	**0.49**	**Very good**
Human orientated activities			
Patient privacy.	4.44	0.55	Very good
Patient psychological	4.14	0.64	Good
Patients confidence	4.12	0.70	Good
Relieve fear	4.11	0.65	Good
Relieve worry	4.08	0.65	Good
Mean of sub-total	**4.18**	**0.52**	**Good**
Patient outcomes			
Safety service	4.30	0.57	Very good
Avoid chemical damage	4.29	0.62	Very good

Table 39 Items' description of nurse-assessed quality of nursing care (N = 510) (continued)

Nurse assessed quality of nursing care	M	SD	Level
Never get complains	4.17	0.84	Good
Meet patient satisfied	4.15	0.70	Good
Avoid physical damage	4.04	0.76	Good
Avoid biological damage	3.90	0.81	Good
Mean of sub-total	**4.14**	**0.55**	**Good**
Physical environment			
Hygienic room	4.25	0.74	Very good
Good ventilation	4.22	0.77	Very good
Comfortable environment	4.13	0.78	Good
Safe environment	4.06	0.81	Good
Environment problems	3.96	0.88	Good
Quiet environment	3.90	0.88	Good
Mean of sub-total	**4.09**	**0.67**	**Good**
Total of nurse-assessed quality of nursing care	**4.25**	**0.43**	**Very good**

Question 2. How nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, and nurses' intention to leave influence nurse-assessed quality of nursing care in Chinese hospitals?

1. Model testing

The structural equation modeling sought to explain relationships among multiple variables, which concluded a measurement model and structural model. The measurement model described how observed variables or indictors indicating the latent variables or constructs. The structural model presented the hypothesized relationships among the latent variables based on the causal relationships. In addition, SEM offers the potential to remove measurement error from estimate of structural relationships. (Hair et al., 2010).

The robustness statistics of Generalized Least Squares (GLS) was used due to observed date violated the assumption of multivariate normal distribution (Hair, et al., 2010, p. 663). The correlation matrix of observed variables by using Bivariate Pearson's correlation with M and SD were used for SEM analysis as shown in Table 32.

The results showed that the study model included 164 parameters. The number of unique variance parameters estimation of SEM were n (n+1)/2 = 23×24/2 = 276.

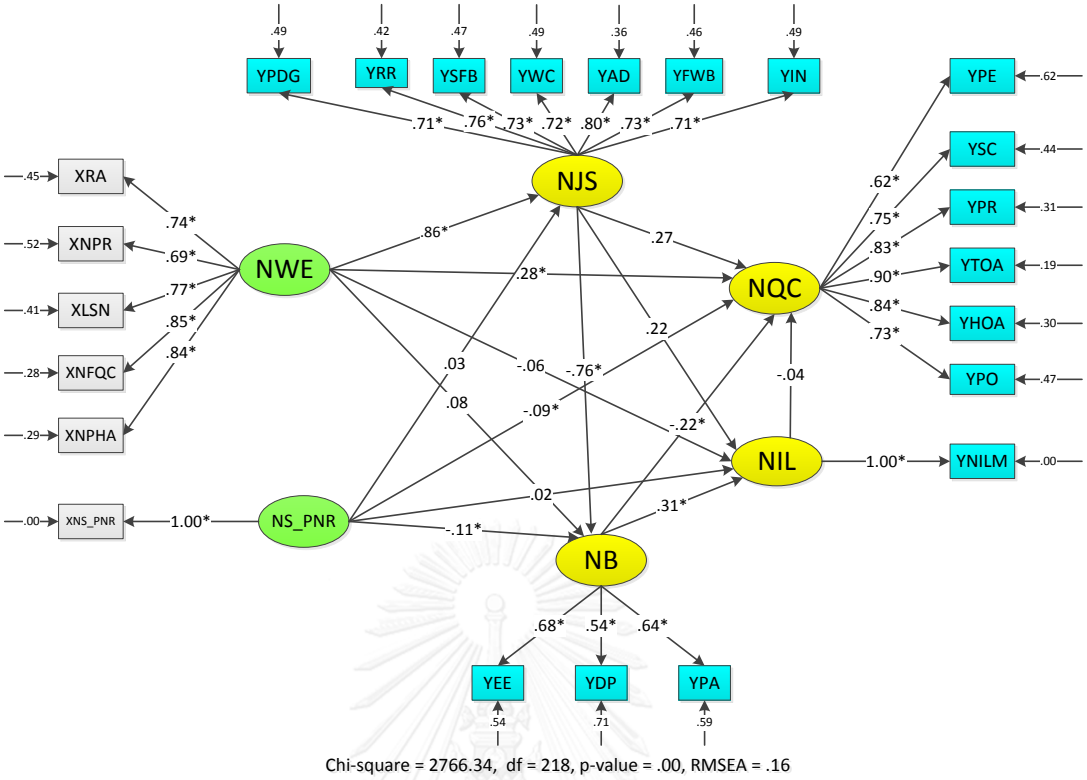
Thus, the model was over identified, which indicated this model can be analyzed (Hair et al., 2010).

In the SEM, the researcher fix the parameters of observed variables physical environment (YPE), promotion and individual growth (YPDG), intention to leave (YIN), emotional exhaustion (YEE), resource adequacy (XRA), and patient to nurse ratio (XNS_PNR) were equal to 1 and constrain the errors of observed variables patient to nurse ratio (XNS_PNR) and intention to leave (YIN) were equal to 0.

The initial hypothesized model (Figure 14) did not achieve the acceptable goodness of fit measures (χ^2 = 2766.34, df = 218, p-value = .00, GFI = .88, AGFI = .85, RMSEA = .15, and CFI = .43) as shown in Table 40. The progress of decreasing the χ^2 values was conducted by suggesting from the modification indices, which is the expected value change of freeing the highest value of Theta-Epsilon (TE), Theta-Delta (TD), and Theta-Delta-Epsilon (TH). This is because under the assumption of SEM, it allows correlation of error terms (Polit & Beck, 2012). Through model modification, the modified model (Figure 15) fitted the empirical data. The modified model had an acceptable goodness fit of index (χ^2 = 175.73, df = 149, p-value = .052, GFI = .97, AGFI = .95, RMSEA = .02, and CFI = 1.00) as shown in Table 40.

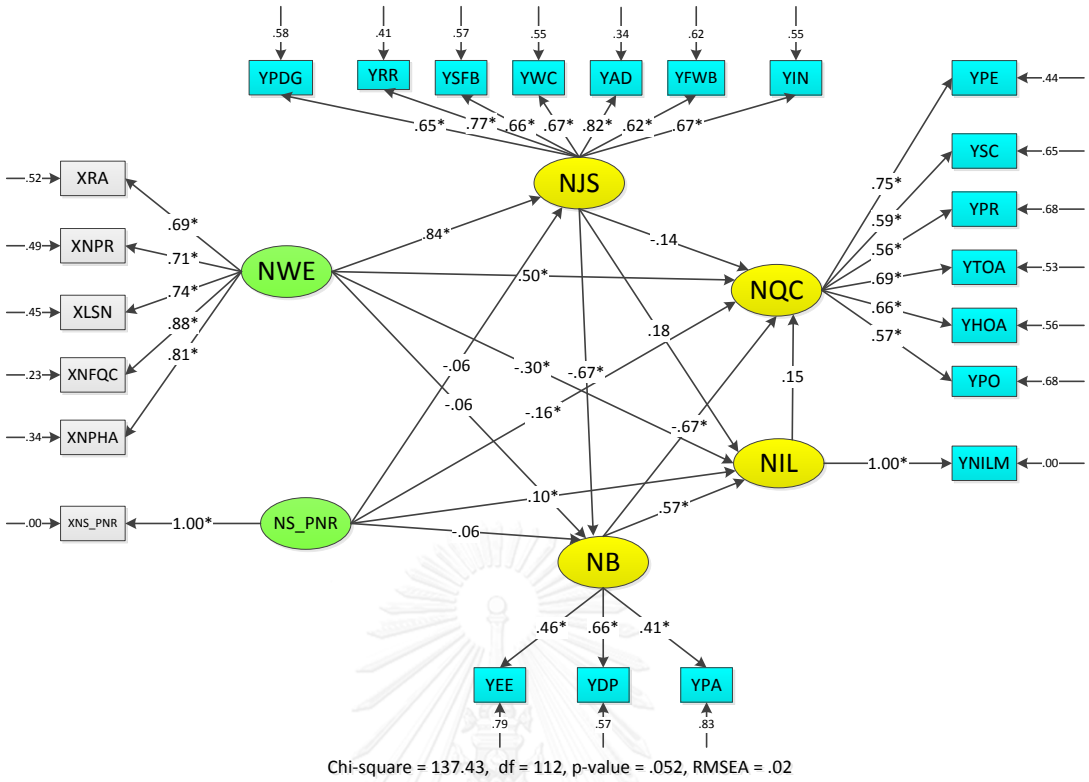
Table 40 Goodness of fit measures for overall model (N = 510)

Relative Fit Index	Acceptable goodness of Fit Statistics	Hypothesized model		Modified model	
		Statistic	Met criteria	Statistic	Met Criteria
Chi-square test	P ≥ .05	2766.34 (p = .00)	No	175.73 (p = .29)	Yes
degree of freedom		218		149	
Chi-square/degree of freedom	< 3.00	12.69	No	1.17	Yes
Comparative Fit Index (CFI)	> .90	.43	No	1.00	Yes
Goodness of Fit Index (GFI)	> .90	.88	No	.97	Yes
Adjusted Goodness of Fit Index (AGFI)	> .80	.85	Yes	.95	Yes
Normed Fit Index (NFI)	> .90	.37	No	.99	Yes
Root Mean Square Error of Approximation (RMSEA)	< .08	.15	No	.02	Yes
Standardized Root Mean Square Residual (SRMSR)	< .07	.16	No	.04	Yes



* p < .05

Figure 14 Hypothesized model of factors influencing nurse-assessed quality of nursing care in Chinese hospitals



*** p < .05**

Figure 15 Modified model of factors influencing nurse-assessed quality of nursing care in Chinese hospitals

1. 1 Measurement model

In this study, the measurement model reflected six constructs of latent variables which included nurse-assessed quality of care, nurses' job satisfaction, nurse burnout, nurses' intention to leave, nurse work environment, and nurse staffing.

After the overall model received the goodness fit, the measurement model part of SEM was presented by 23 observed variables' standardized factor loading (B). In general, based on a p-value at the level of .05, the t-value test statistics needs to be more than an absolute value of 1.96 for acceptable value (Hair et al., 2010). In this study, the t-value of all observed variables ranged from 5.85 to 15.66 as shown in Table 41. Thus all observed variables can significantly reflect latent constructs.

Seventeen out of 23 observed variables (YPE, YSC, YPR, YTOA, YHOA, YPO, YPDG, YRR, YSFB, YWC, YAD, YFWB, YIN, YEE, YDP, YPA, and YNILM) described the constructs of four endogenous variables. As shown in Table 41, the

endogenous observed variables' standardized factor loading (B) ranged from .42 to 1.00 and the squared multiple correlation (R^2) ranged from .17 to 1.00.

Six out of 23 observed variables (XRA, XNPR, XLSN, XNFQC, XNPHA, and XNS_PNR) presented the constructs of two exogenous variables. As shown in Table 41, the exogenous observed variables' standardized factor loading (B) ranged from .69 to 1.00 and the squared multiple correlation (R^2) ranged from .48 to 1.00.

Table 41 Factor loading of all observe variables (N = 510)

Observed Variables	Nurse work environment				Nurse staffing		R^2
	b	SE	t	B	b	B	
indicator of resource adequacy (XRA)	1.00			.69			.48
indicator of nurse-physician relationship (XNPR)	0.94	0.07	14.01*	.71			.51
indicator of leadership and support nurses (XLSN)	0.83	0.06	13.17*	.74			.55
indicator of nursing foundations for quality of care (XNFQC)	0.91	0.06	16.60*	.88			.77
indicator of nurse participate in hospital affair (XNPHA)	1.01	0.07	14.93*	.81			.66
indicator of patient to nurse ratio (XNS_PNR)					1.00	1.00	1.00

*p < .05

Table 41 Factor loading of all observe variables (N = 510) (continued)

Observed variables	Quality of nursing care				Nurse job satisfaction				Nurse burnout				Nurse intention to leave		R^2
	b	SE	t	B	b	SE	t	B	b	SE	t	B	b	B	
physical environment (YPE)	1.00			.95											.56
6staff characteristic(YSC)	0.53	0.05	10.25*	.59											.35
precondition (YPR)	0.55	0.06	9.87*	.56											.32
task orientated activities (YTOA)	0.67	0.06	11.83*	.69											.47
human orientated activities (YHOA)	0.71	0.06	11.52*	.66											.44
patient outcomes(YPO)	0.61	0.06	10.00*	.57											.32
promotion /individual growth (YPDG)					1.00			.65							.42
recognition and responsibility (YRR)					0.65	0.05	12.02*	.77							.59
salary and fringe benefits (YSEB)					1.10	0.08	14.46*	.66							.43
work conditions (YWC)					0.87	0.08	11.63*	.67							.45
administration (YAD)					0.99	0.08	12.48*	.82							.67
family and work balance (YFWB)					1.11	0.11	10.01*	.62							.38
interaction (YIN)					0.81	0.07	11.68*	.67							.45
emotional exhaustion (YEE)									1.00			.46			.21
depersonalization (YDP)									1.38	0.21	6.62*	.69			.43
personal achievement (YPA)									0.69	0.09	7.35*	.42			.32
Nurse intention to leave (YNILM)													1.00	1.00	1.00

*p <.05

1.2 Structural model

The structural model tested causal relationships between latent constructs. This structural model included four endogenous variables (nurse-assessed quality of care, nurses' job satisfaction, nurse burnout, and nurses' intention to leave) with 17 observed variables and two exogenous variables (nurse work environment and nurse staffing) with 6 observed variables as shown in Figure 15.

As shown in Table 42, the results of SEM showed that five path coefficients of exogenous variables were significant at the .05 level. Nurse work environment had the highest effect on nurse assessed quality of care (γ = .50, $p < .05$), followed by nurse staffing (γ = -.16, $p < .05$). Additionally, nurse work environment had the highest effect on nurses' job satisfaction (γ = .84, $p < .05$). Moreover, nurse work environment had the highest effect on nurses' intention to leave (γ = -.30, $p < .05$), followed by nurse staffing (γ = .10, $p < .05$).

Three path coefficients of endogenous variables were significant at the .05 level. Nurse burnout had a negative significant effect on nurse-assessed quality of nursing care (β = -.67, $p < .05$). Nurses' job satisfaction had a negative significant effect on nurse burnout (β = -. 59, $p < .05$). Nurse burnout had a positive significant effect on nurses' intention to leave (β = .56, $p < .05$).

Table 42 Standardized path coefficients, standard error (SE), and T-value of parameters of the hypothesized model of nurse-assessed quality of nursing care (N = 510)

Parameters	Standardized path coefficients	SE	T-value
Gamma			
Nurse work environment → nursing quality care	.50	0.18	3.43*
Nurse work environment → nurse job satisfaction	.84	0.11	10.84*
Nurse work environment → nurse burnout	-.06	0.20	-0.39
Nurse work environment→ nurse intention to leave	-.30	0.35	-2.71*
Nurse staffing → nursing quality care	-.16	0.00	-2.71*
Nurse staffing → nurse job satisfaction	-.06	0.00	-1.21
Nurse staffing → nurse burnout	-.06	0.00	-1.09
Nurse staffing → intention to leave	.10	0.01	2.11*
Beta			
Nurse job satisfaction → nursing quality care	-.14	0.21	-0.65
Nurse burnout → nursing quality care	-.67	0.25	-2.42*
Nurse intention to leave → nursing quality care	.15	0.06	1.08
Nurse job satisfaction → nurse burnout	-.67	0.18	-4.02*
Nurse job satisfaction → nurse intention to leave	.18	0.46	0.95
Nurse burnout → nurse intention to leave	.57	0.53	2.45*

*$p < .05$

In order to answer five hypotheses, the direct, indirect and total effects between causal variables and affect variables are presented as followings and summarized in Table 43.

The study results presented that the hypothesized model fit the empirical data and explained 74% ($R^2 = .74$) the variance of nurse-assessed quality of nursing care by nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, and nurses' intention to leave. Seventy two percent ($R^2 = .72$) the variance of nurses' job satisfaction explained by nurse staffing and nurse work environment. Fifty one percent ($R^2 = .51$) the variance of nurse burnout explained by nurse staffing, nurse work environment, and nurses' job satisfaction. Forty three percent ($R^2 = .43$) the variance of nurses' intention to leave explained by nurse work environment, nurse staffing, nurses' job satisfaction, and nurse burnout (Table 46).

1.2.1 Effect of patient to nurse ratio on nurse-assessed quality of nursing care

Patient to nurse ratio had a significant negative direct effect on nurse-assessed quality of nursing care ($\gamma = -.16$, $p < .05$) and positive direct effect on nurses' intention

to leave (γ = .10, $p < .05$). However, patient to nurse ratio had neither a significant negative direct effect on nurses' intention to leave (γ = -.06, $p > .05$) nor negative direct effect on nurse burnout (γ = -.06, $p > .05$).

However, patient to nurse ratio had no significant negative indirect effect on nurse-assessed quality of nursing care (γ = .03, $p < .05$). In addition, patient to nurse ratio had neither positive indirect effect on nurses' job satisfaction (γ = .04, $p > .05$) nor negative indirect effect on nurses' intention to leave (γ = -.02, $p > .05$).

Total effect of patient to nurse ratio on nurse-assessed quality of nursing care was -.13, at a significant level of .05.

1.2.2 Effect of nurse work environment on nurse-assessed quality of nursing care

Nurse work environment had a significant positive direct effect both on nurse-assessed quality of nursing care (γ = .50, $p < .05$) and nurses' job satisfaction (γ = .84, $p < .05$). In addition, nurse work environment had a significant negative effect on nurses' intention to leave (γ = -.30, $p < .05$). Nurse work environment had no significant negative direct effect on nurse burnout (γ = -.06, $p > .05$).

Nurse work environment had no significant indirect positive effect on nurse-assessed quality of nursing care (γ = .22, $p > .05$). Nurse work environment had a significant indirect negative effect on burnout (γ = -.56, $p < .05$) through nurses' job satisfaction. Nurse work environment also had a significant indirect negative effect on nurses' intention to leave (γ = -.20, $p < .05$) probably through nurses' job satisfaction and nurse burnout.

The total effect of nurse work environment on nurse-assessed quality of nursing care, nurses' job satisfaction, nurse burnout, and nurses' intention to leave were 0.72, 0.84, -0.62, and -0.50, respectively, at a significance of .05 level.

1.2.3 Effect of nurses' job satisfaction on nurse-assessed quality of nursing care

Nurses' job satisfaction had neither a significant negative direct effect on nurse-assessed quality of nursing care (β = -.14, $p > .05$) nor positive direct effect on nurses' intention to leave (β =.18, $p > .05$). Nurses' job satisfaction had a significant negative direct effect on nurse burnout (β = -.67, $p < .05$).

Nurses' job satisfaction had a significant, positive, indirect effect on nurse-assessed quality of nursing care ($\beta = .42$, $p < .05$) probably through nurse burnout and nurses' intention to leave. Nurses' job satisfaction had a significant, negative, indirect effect on nurses' intention to leave ($\beta = -.38$, $p < .05$) through nurse burnout.

The total effect of nurses' job satisfaction on nurse-assessed quality of nursing care, nurse burnout, and nurses' intention to leave were 0.28, -0.67, -0.20, respectively, at a significant level of .05.

1.2.4 Effect of nurse burnout on nurse-assessed quality of nursing care

Nurse burnout had a significant directly negative effect on nurse-assessed quality of nursing care ($\beta = -.67$, $p < .05$). Nurse burnout had a significance direct positive effect on nurses' intention to leave ($\beta = .57$, $p < .05$).

Nurse burnout did not have an indirect positive effect on nurse-assessed quality of nursing care ($\beta = .09$, $p > .05$).

The total effect of nurse burnout on nurse-assessed quality of nursing care was -0.58, at a significant level of .05.

1.2.5 Effect of nurses' intention to leave on nurse-assessed quality of nursing care

Nurses' intention to leave had no significant direct effect on nurse-assessed quality of nursing care ($\beta = .15$, $p > .05$).

Table 43 Summary the total, direct, and indirect effects of causal variables on affected variables (N = 510)

Affected variables	R^2	Causal variables	Direct effect	Indirect effect	Total effect
Nursing quality care	.74	Nurse work environment	.50*	.22	0.72*
		Nurse staffing	-.16*	.03	-0.13*
		Nurse job satisfaction	-.14	.42*	0.28*
		Nurse burnout	-.67	.09	-0.58*
		Nurse intention to leave	.15		0.15
Nurse job satisfaction	.72	Nurse work environment	.84*		0.84*
		Nurse staffing	-.06		-0.06
Nurse burnout	.51	Nurse work environment	-.06	-.56*	-0.62*
		Nurse staffing	-.06	.04	-0.02
		Nurse job satisfaction	-.67*		-0.67*
Nurse intention to leave	.43	Nurse work environment	-.30*	-.20*	-0.50*
		Nurse staffing	.10*	-.02	0.08
		Nurse job satisfaction	.18	-.38*	-0.20*
		Nurse burnout	.57*		0.57*

***p < .05**

2. Hypothesis testing

The following part presents findings of five hypotheses testing regarding the results from the structural model as aforementioned.

Hypothesis 1: Patient to nurse ratio had negative direct effect on nurse-assessed quality of nursing care, job satisfaction, and positive direct effect on burnout and intention to leave, respectively. Further, patient to nurse ratio had a negative indirect effect on nurse-assessed quality of nursing care through job satisfaction. Patient to nurse ratio had a positive indirect effect on nurse-assessed quality of nursing care through burnout and intention to leave, respectively.

The findings indicated that patient to nurse ratio had a significant direct negative effect on nurse-assessed quality of nursing care (γ = -.16, $p < .05$), and a significant directly positive effect on nurses' intention to leave (γ = .10, $p < .05$). However, patient to nurse ratio had no significant direct effect on nurse job satisfaction (γ = -.06, $p > .05$) and nurse burnout (γ = -.06, $p > .05$). In addition,

patient to nurse ratio had no significant indirect effect on nurse-assessed quality of nursing care ($\gamma = .03$, $p > .05$). Therefore, this hypothesis was partially supported.

Hypothesis 2: The good nurse work environment had a positive direct effect on nurse-assessed quality of nursing care and job satisfaction, while it had negative direct effect on burnout and intention to leave, respectively. Further, it had a positive indirect effect on nurse-assessed quality of nursing care through job satisfaction, burnout, and intention to leave.

The findings presented that nurse work environment had a significant positive direct effect on nurse-assessed quality of nursing care ($\gamma = .50$, $p < .05$) and nurses' job satisfaction ($\gamma = .84$, $p < .05$). Nurse work environment had a significant negative direct effect on nurses' intention to leave ($\gamma = -.30$, $p < .05$). Nurse work environment had no significant negative direct effect on nurse burnout ($\gamma = -.06$, $p > .05$). In addition, nurse work environment had no significant indirect positive effect on nurse-assessed quality of nursing care ($\gamma = .22$, $p > .05$). Therefore, this hypothesis was partially supported.

Hypothesis 3: Nurses' job satisfaction had a positive direct effect on nurse-assessed quality of care. Nurses' job satisfaction had a negative direct effect on burnout and intention to leave, respectively. In addition, it can positively indirectly influence nurse-assessed quality of nursing care through burnout and intention to leave.

The findings illustrated that nurses' job satisfaction had neither significant negative direct effect on nurse-assessed quality of nursing care ($\beta = -.14$, $p > .05$) nor positive direct effect on nurses' intention to leave ($\beta = .18$, $p > .05$). Nurses' job satisfaction had significant negative direct effect on nurse burnout ($\beta = -.67$, $p < .05$). Nurses' job satisfaction had a significance, positive, indirect effect on nurse-assessed quality of nursing care ($\beta = .42$, $p < .05$), probably through nurse burnout and nurses' intention to leave. Therefore, this hypothesis was partially supported.

Hypothesis 4: Nurse burnout had a positive direct effect on intention to leave and a negative direct effect on nurse-assessed quality of nursing care. In addition, nurse burnout had a negative indirect effect on nurse-assessed quality of nursing care through intention to leave.

The findings showed that nurse burnout had a significant directly negative effect on nurse-assessed quality of nursing care (β = -.67, p < .05). Nurse burnout had a significant directly positive effect on nurses' intention to leave (β = .57, p < .05). In addition, nurse burnout had no significant indirect effect on nurse-assessed quality of nursing care (β = .09, p > .05). Therefore, hypothesis 4 was partially supported.

Hypothesis 5: Intention to leave had a negative direct effect on nurse-assessed quality of nursing care.

The finding indicated that nurse intention to leave had a no significant direct effect on nurse-assessed quality of nursing care (β = .15, p > .05). Therefore, hypothesis 5 was not supported.

The summary of hypotheses testing are presented in Table 44.

Table 44 Summary of the hypotheses testing results (N = 510)

Effect	Hypothesis	Structural Path Relationship	T-value	p	Standardize regression coefficient		Hypotheses test SEM
					Direct	Indirect	
Direct Effect	H1	NS_PNR → NQC	-2.71	<.05	-.16		Accept
	H1	NS_PNR → NJS	-1.21	>.05	-.06		Not accept
	H1	NS_PNR → NB	-1.09	>.05	-.06		Not accept
	H1	NS_PNR → NIL	2.11	<.05	.10		Accept
	H2	NWE→ NQC	3.43	<.05	.50		Accept
	H2	NWE → NJS	10.84	<.05	.84		Accept
	H2	NWE → NB	-0.39	>.05	-.06		Not accept
	H2	NWE → NIL	-2.71	<.05	-.30		Accept
	H3	NJS → NQC	-0.65	>.05	-.14		Not accept
	H3	NJS→ NB	-4.02	<.05	-.67		Accept
	H3	NJS→ NIL	0.95	>.05	.18		Not accept
	H4	NB→ NQC	-2.42	<.05	-.67		Accept
	H4	NB→ NIL	2.45	<.05	.57		Accept
	H5	NIL→ NQC	1.08	>.05	.15		Not accept
Indirect Effect	H1	NS_PNR →NJS、NB、NIL→ NQC	0.76	>.05		.03	Not accept
	H2	NWE→NJS、NB、NIL→ NQC	1.64	>.05		.22	Not accept
	H3	NJS →NB、NIL→ NQC	2.18	<.05		.42	Accept
	H4	NB →NIL→ NQC	0.79	>.05		.09	Not accept

Chapter V
Discussion

This chapter presents the information about study summary, discussion of hypothesis testing, limitations, implication, and recommendations for future study.

Summary

This survey study design for casual modeling aimed to examine factors influencing nurse-assessed quality of care in Chinese hospitals. The hypothesized model was developed based on Aiken (2002) Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM) in combination with empirical evidence. The multi-stage random sampling procedure was conducted to recruit study participants. The data collection procedure proceeded from the August, 2014 to January, 2015. Data from five hundred and ten participants was collected for analysis.

A number of research instruments of self-report questionnaires were used for data collection, including demographic data, nurse staffing measurement form, Chinese Nurse Job Satisfaction Scale (CNJSS), Chinese Nurse-assessed Quality of Nursing Care Scale (CNAQNCS), Chinese version of Anticipated Turnover Scale (C-ATS), Chinese version of the Practice Environment Scale (C-PES) and Chinese version of Maslach Burnout Inventory-Human Service Survey(C-MBI-HSS). Each of the instrument had acceptable validity and reliability. The assumptions of linearity, homoscedasticity, and multicollinearity did not violate the rules for analyzing SEM， except normality. A LISREL version 8.72 was used to test the hypothesized causal model.

The majority of participants were female (99.21%) and their ages ranged from 20 to 29 (50.98%). More than half of the participants had a bachelor degree (62.94%). More than one third of the participants had working experience of less than five years (38.63%). More than two third of the participants were contract nurses (76.08%). The first largest group of the participants' income ranged 60,000 to 799,000 yuan per year. Most of the participants worked in day time shifts (70.98%).

The results from SEM showed that the hypothesis model fit the empirical data and explained for the 74% of the variance about the nurse-assessed quality of nursing care. The predictors significant directly influenced nurse-assessed quality of nursing care, including nurse burnout, nurse work environment, and nurse staffing. In addition, nurses' job satisfaction also significant indirectly influenced nurse-assessed quality of nursing care through burnout and intention to leave.

Discussion

The study's objectives are presented in the following discussions.

1. To describe the average levels of nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, nurses' intention to leave and nurse-assessed quality of nursing care in Chinese hospitals?

1.1 The average level of nurse staffing

In this study, the average number that nurses that should take care of patients in each shift was 14 or 15 (M = 14.39, SD = 9.63). However, this number was higher than the Ministry of Health of the People's Republic of China (2012) and the Ministry of Health of the People's Republic of China (2011) guidelines' suggestion. These two guidelines suggested that the primary nurses should take care of eight or less than eight patients. In addition, this number was higher than Finland's suggestion of 8.18 (Tervo-Heikkinen, Kiviniemi, Partanen, & Vehvilainen-Julkunen, 2009), Thailand's of 10 (Nantsupawat, 2010), and the USA's of 5 or 6 (Halm et al., 2005). The lower nurse to patient ratio may be related to the limited number of nurses recruited every year in order to control the human resource cost in the clinical setting. In addition, the aging population increased sharply in China, this may be related to the fact that more patients were admitted to hospitals. Therefore, nurses must take care of more patients.

1.2 The average level of nurse work environment

In this study, the nurse work environment was classified as good with a mean score of 3.01 (SD = 0.39). The dimension of nurse participation in hospital affairs (M =2.78, SD = 0.49) and resource adequacy (M = 2.79, SD = 0.58) had a mean score less than 3.00. The dimension of nurse collegial nurse-physician relations (M = 3.12, SD = 0.50), nurse foundations for quality of care (M = 3.20, SD = 0.41), and nurse

managers' leadership and support of nurses (M = 3.22, SD = 0.44) had a mean score of more than 3.00. These results were consistent with previous studies (Jia, 2014; Liu et al., 2012), which interpreted the mean score of total nurse work environment around 3.00. Liu et al. (2012) examined the relationship between hospital work environments and job satisfaction, nurse burnout, and intention to leave among 1104 nurses in Guangdong province, China. The nurse work environment was measured by the Chinese version of PES. The findings showed that mean scores were more than 3.00 on three dimensions, which were "nursing foundations for quality of care" (M= 3.19, SD = 0.26), "nurse manager ability, leadership and support" (M = 3.13, SD = 0.34), and "collegial nurse-physician relations" (M = 3.36, SD = 0.31). Similarly, the mean score of "staffing and resource adequacy" (M = 2.89, SD = 0.38) and "nurse participation in hospital affairs: (M = 2.94, SD =0.37) were slightly lower than 3.00.

These results reflected that the dimension of staffing and resource adequacy received the lowest score in Chinese hospitals in general. This reflects the real Chinese hospital problems with lower resources of nurses. According to the World Health Organization (2006) report, nurses per 100,000 populations in the U.K., Canada, Australia, U. S. A., Japan, and Thailand are 1212, 995, 971, 937, 779, 282, 158, respectively. The doctor to nurse ratio in Thailand, Ireland, U.K., Norway, and Canada are 1:7.6, 1:5.4, 1:5.3, 1:4.7, and 1:4.6 respectively. However, according to the Nation Health and Family Planning Commission of China (2013), although the number of nurses in China has increased dramatically in the last decade, especially since 2006, with an increase of 120,000 to 286,000 nurses each year, the number of nurses reached 2.78 million in 2013; the indicators of nurses per 1000 population and nurse to doctor ratio were still lower than neither developed nor developing countries. For example, the number of nurses per 1000 population has increased from 1.10 in 2006 to 2.05 in 2013 and the nurse to doctor ratio has increased from 0.68:1 in 2006 to 1:1 in 2013 (Nation Health and Family Planning Commission of China, 2013). Therefore, under the current limited resources, it is a challenge for nursing mangers to learn how to effectively and scientifically use the available resources.

Moreover, the dimension of "nurse participation in hospital affairs" generally received one of the lowest scores as well. It reflected that not only nurses have a lower opportunity participation in hospital affairs, but also that nurses have the intention to

participate in hospital affairs. One possible reason for this may be related to a background of lower level of nurse education. Thus in the clinical setting, nurses had the role to only follow the physicians' prescription. However, in order to make excellent nurses feel more self–accomplishment, nursing or hospital managers should provide opportunity for nurses to voice their opinions. Through this practice, more nurses can be motivated to have good performance for further enhancing the quality of nursing care.

1.3 The average level of nurses' job satisfaction

In this study, the nurses' job satisfaction was classified as high with the mean score of 3.48 (SD = 0.49). The high mean score of nurses' job satisfaction in this study was inconsistent with previous studies which reported that Chinese nurses' job satisfaction was low (He, 2006; Tang, et al., 2007). However, the results of high nurse job satisfaction was consistent with a previous study (Ben, Li, & Wang, 2010). Ben et al. (2010) explored the job satisfaction of clinical nurses in the hospital and its influential factors among 501 nurses in one tertiary general hospital in Xinjiang Uygur Autonomous Region, China. Nurses' job satisfaction was measured by NJSS-C. The results showed that the average score of total nurse job satisfaction was 169.34 (SD = 16.74). One possible reason may be related to after implementation of the Good Nursing Care Program, the Chinese government paid more attention to nurses' job satisfaction (Ministry of Health of the People's Republic of China, 2010). In addition, the Chinese nursing career development Plan (2011-2015) (Ministry of Health of People's Republic of China, 2011) also pointed out that it is important to improve both nurses' job satisfaction and patient satisfaction in the clinical setting.

Moreover, three dimensions of "salary and fringe benefits" (M = 2.56, SD = 0.87), "family and work balance" (M = 2.99, SD = 0.94), and "promotion and individual growth" (M = 3.29, SD = 0.79) had the lowest mean score in this study. The results were consistent with previous studies (Ben et al., 2010; Jia, 2014). Jia (2014) studied about the relationship between nurse work environment and nurse job satisfaction among 100 nurses in one Chinese hospital in Inner Mongolia. Nurses' job satisfaction was measured by MMSS. The results showed that the average mean score of the lowest dimension was "individual development" (M = 2.55, SD = 0.71), followed by "salary and fringe benefits" (M = 2.38, SD = 1.05) and "family and work balance" (M = 2.37,

SD =0.79). One possible reason for this may be related to an increased number of contract nurses that were employed in order to fill up the shortage of nurses in the clinical setting. As mentioned in chapter 2, the contract nurses have lower fringe benefits and career development opportunities than permanent nurses. Another possible reason may be related to the fact that clinical nurses had less opportunity to participate in a clinical training program. Nursing professional development may only focus on nursing administration. Most nurses cannot see the direction of their career development. Furthermore, another possible reason may be related to marital status as 99.22% of nurses were female and 61.96% of nurses were married, in this study. Therefore, they had more responsibility to take care family members. However, the nature of nursing work is that nurses should work in the evening or night shift, which provides less opportunity for them to take care of family members. Therefore, in order to increase nurses' job satisfaction and stabilize the nursing workforce, the nurses' manager should consider helping nurses to establish career development plan, equivalent contrast and permanent nurses' development or benefits. Moreover, nurses' family role response should also be considered by nurse mangers to make nurses reassured of their work.

1.4 The average level of nurse burnout

In this study, nurse burnout was at a moderate level with the total score of 42.33 (SD = 18.07). The result was consistent with previous studies that reported Chinese nurse burnout at a moderate level (Wang, Ding, Gao, & Li, 2014; Wang, 2008).

The dimension of emotional exhaustion had the total score of 22.88 (SD = 10.66). It was similar with Wang (2008) who reported the dimension of emotional exhaustion total score was 24.72 (SD =10.51) at the moderate level of nurse burnout. One possible reason nurses experience moderate emotional exhaustion in the Chinese hospital may be related to the shortage of nurses. Nurses had a higher workload in the clinical setting to provide nursing services. They were often called by patients, doctors, or head nurses. Another possible reason may be related to the patient to nurse relationship. As reported in chapter 2, Chinese people are facing the problem of expensive and difficult attainment of health care services. Thus, this causes the patients and nurses relationship to be in a stressful condition. These things may make nurses feel drained by others and emotionally overextended.

The dimension of depersonalization had the total score of 1.83 (SD = 1.15). This result was inconsistent with Wang (2008) who reported that depersonalization had the total score of 6.88 (SD = 6.21). One possible reason may be related to the implementation of the National Good Nursing Care Program (Ministry of Health of the People's Republic of China, 2010). Nurses are required to provide holistic nursing care to patients. Nurses have the responsibility of making patients feel warm and thoughtful when they are admitted. In addition, the nature of nursing work is to save patients' lives. The guideline and regulation to provide good nursing services are carried out by each hospital. Nurses should follow these regulations and provide good services to patients. Thus, it may explain why the dimension of depersonalization received a low score in this study.

The dimension of personal accomplishment had the total score of 33.32 (SD = 9.21) at a low level. The results were consistent with Wang (2008) who reported personal accomplishment with the total score of 32.06 (SD = 8.63). One possible reason may be related to nurses having a higher workload, lower fringe benefits, less opportunity of promotion and continuing education when compared with physicians or hospital managers. Another possible reason may be related to nurses not being recognized by the society due to their lower education background. When patients were in recovery, they appreciated the physicians' medical treatments and ignored the nurses' interventions and services. Therefore, it would reduce nurses' personal accomplishment.

1.5 The average level of nurses' intention to leave

In this study, nurse burnout was at low level with the mean score of 3.04 (SD = 1.22). This result was inconsistent with previous studies which reported a high level of nurses' intention to leave (Ge & Zhao, 2014; Zheng & Zhu, 2007). One possible reason may be related to higher employment pressure prohibitive for nurses to quit their jobs. In addition, as shown in Table 31, the largest group participants' annual income ranged from 60,000 to 79,000 yuan, which was around two times more than the average of Chinese employee's annual income of 35,000 yuan (News, 2014).

1.6 The average level of nurse-assessed quality of nursing care

In this study, nurse-assessed quality of nursing care was at a very good level with the mean score of 4.25 (SD = 0.43). The result was consistent with the previous study (Zhao, 2006). Zhao (2006) studied about nurse perception quality of nursing care

among 221 nurses in one Chinese tertiary general hospital. The results showed that a mean score of overall nurses' perception of quality nursing care was 4.25 (SD = 0.5) at the high level. One possible reason may be related to the standard nurse services measured in this scale was consider at the minimum level to provide good nursing care. In addition, since the quality of nursing care is the core management in clinical wards, regulations and rules to provide standard nursing services were provided by each hospital. Moreover, under the national Good Nursing Program implementation, it also required nurses to provide good nursing services to patients. Thus, the mean of the total score for nurse-assessed quality of nursing care was at the very good level.

However, the dimension that received the lowest score in this study was physical environment with a mean score of 4.09 (SD = 0.67). This result was inconsistent with previous studies (Xue et al., 2010; Zhao, 2006). Zhao (2006) and Xue et al. (2010) reported that the dimension of precondition of care received the lowest score (M = 4.09, SD = .55). One possible reason may be related to the sharply increased aging population in China with limited number of hospitals for patients' admission. In several hospitals, in order for patients to be admitted on time, added beds were temporarily put on the corridor.

In addition, the five lowest score items in this study were #5 "providing quiet ward environment" (M = 3.90, SD = 0.88), #48 "avoid patient biological damage" (M = 3.90, SD = 0.88), #6 "disposing patients' environment problems" (M = 3.96, SD = 0.88), # 46 "avoid patient physical damage" (M = 4.04, SD = 0.76), and # 4 " provide a safe environment" (M = 4.06, SD = 0.81). These lowest score items were inconsistent with previous studies (Xue et al., 2010; Zhao, 2006). In Zhao (2006) study, #41 "I want and try to understand my patients' personal life situation" (M = 3.82, SD = 0.99), # 39 " I have enough time for my patients considering their needs" (M = 3.87, SD = 1.03), # 19 " I evaluate care and treatment together with my patients and their families" (M = 3.87, SD = 0.87), # 24 " I help my patient to relieve their worry about medical expenses" (M =3.88, SD = 1.01), # 17 "I discuss the prognosis and results of care and treatment with my patients" (M = 4.00, SD = 0.85). It can be seen that the problems related to quality of nursing care in the past were focusing on individual care and psychological care. However, nowadays, the problems related to quality of nursing care are emphasized on patient living environment and patient safety problems. One possible

reason may be related to a larger number of patients needing to be admitted to the hospital with limited patients' beds provided. In addition, the more patients one nursing ward has, the more patients' relatives would come. Another possible reason may be related to the overuse of antibiotics in the Chinese population. In general, when people became sick, they could go to the pharmacy to buy drugs. Moreover, in the hospital several kinds of antibiotics were used to treat patients'' illness. Furthermore, the shortage of nurses can also cause nurses to not have enough time to observe and help patients on time. This will cause patients' physical damage.

2. To examine how nurse staffing, nurse work environment, nurses' job satisfaction, nurse burnout, and nurses' intention to leave influence nurse-assessed quality of nursing care in Chinese hospitals?

2.1 Patient to nurse ratio has a significant negative direct effect on nurse-assessed quality of nursing care and a positive direct effect on nurses' intention to leave. However, patient to nurse ratio had neither a significant negative direct effect on nurses' job satisfaction nor nurses' burnout. In addition, patient to nurse ratio had no significant indirect effect on nurse-assessed quality of nursing care. It was partially consistent with hypothesis 1.

Based on Aiken's (2002) NWE-NS-OM, when nurses experience higher workload to take care more patients in a shift, nurses would have lower job satisfaction, feel more frustrated from job, have higher intention to leave their job and have worse performance on their work. The result of this study was consistent with Aiken (2002) model that explained patient to nurse ratio had a significant negative direct relationship with nurse-assessed quality of nursing care. This result was also congruent with Rafferty et al. (2007) reports. In Rafferty et al. (2007) study, patient to nurse ratio was recorded into four quartiles groups. The first quartile of trusts ranged from 6.9 to 8.3 patients per nurse. The second quartile of trusts ranged from 8.6 to 10.0 patients per nurse. The third quartile of trusts ranged from 10.1 to 12.0 patients per nurse. The fourth quartile of trusts ranged from 12.4 to 14.3 patients per nurse. When nurse staffing level increased from first to second quartile, the decreased quality of nursing care on their units and hospitals were 1.35 times ($p = .07$) and 1.44 times ($p = .02$), respectively.

When nurse staffing level increased from first to third quartile, the decreased quality of nursing care on their units were 1.59 times ($p = .008$). When nurse staffing level increased from first to fourth quartile, the decreased quality of nursing care at the units and hospitals were 1.92 times ($p < .001$) and 1.75 times ($p = .004$), respectively. A plausible explanation is, the less number of patients that one nurse take care, the more time nurse can give to patients. Therefore, it contributes to a good achievement of nursing care.

Regarding the finding that patient to nurse ratio had no significant negative direct effect on nurses' job satisfaction, this was not consistent with Aiken (2002) NWE-NS-OM and previous studies. It has been reported that patient to nurse ratio had a significant negative direct relationships with nurses' job satisfaction (Rafferty et al., 2007; Sheward et al., 2005; You et al., 2013) .One possible explanation for this difference may be related to the following reasons. The construct of salary and fringe benefit dimension of CNJSS received the highest raw factor loading (b) of .62 as shown in Table 8. This means that salary and fringe benefit is considered as the most important component of nurses' job satisfaction among Chinese RNs. Under current Chinese marketing economy, if hospitals would like to make more income, they should admit more patients. Therefore, although nurses should take care more patients, they can got more income and make them satisfied with their jobs. Another possible reason may be related to the fact that the patient to nurse ratio was quite different in different shifts, different departments and different hospitals. In China, during the night shift, nurses should take care more patients. However, during the day shifts, one primary nurse may be assigned to be responsible for regulated number of patients (around 8 patients); this requires them to perform more tasks, such as patient health education, patients' special physical examination or writing discharge plans for patients. In addition, nurses worked in ICU may have fewer patients to take care. However, ICU patients have more complex conditions of illness which may cause nurses to feel more frustrated. In this study, the variable of nurse staffing was measured as "The average number of patients to be cared per shift per day", as reported by the nurses. It may hide certain complex nursing care services. Thus, it may cause the insignificant result between patient to nurse ratio and nurses' job satisfaction.

For another finding, patient to nurse ratio did not have a negative direct effect on nurse burnout. This finding was not congruent with Aiken (2002) NEW-NS-OM and previous studies (Rafferty et al., 2007; Sheward et al., 2005; You et al., 2013). All of referenced previous studies stated that the odd ratio of burnout would be increased with each additional patient per nurse. One possible explanation may be related to most of participants in this study worked in day shifts. The average number of patients that participants taking care of was 15. This number was relatively small comparing with the whole unit's around 40 patients that a night shift nurse would have to take care of. However, as mentioned above, it may be related to the fact that day time work has more tasks with less number of patients, or that ICU patients have more complex illness conditions with lower patient to nurse ratio. These factors may make nurses feel more exhausted, more depersonalized, and less personal achievement. Thus, it may be related to the conclusion that patient to nurse ratio had no significant effect on nurse burnout.

For the finding that patient to nurse ratio had a positive direct effect on nurses' intention to leave. It was consistent with Aiken (2002) NWE-NS-OM and Aiken et al. (2012) study. Aiken et al. (2012) conducted a study to explore the effect of patient to nurse ratio on nurses' intention to leave among 33,659 nurses in European hospitals and 27,509 nurses in the U.S.A. hospitals. The results showed that for every additional patient added to a nurse, the OR of nurses' intention to leave in the next year increased 1.05 times for Europe and 1.03 times for USA, respectively. The possible reason that patient to nurse ratio had a significant effect on Chinese nurses' intention to leave is that, from the survey it can be seen that nurses sometimes should take care of a maximum of 42 patients per shift. Compared with the recommendation from the Ministry of Health of the People's Republic of China (2011) that one primary nurse should take care of less than eight patients, the number in this study was quite high. In addition, the average number of patients that one nurse took care of in this study was 14.39 (ranged from 2 to 42) patients. It is higher than other countries' average number of patients that one RN should take care of, such as Finland was 8.18 (Tervo-Heikkinen et al., 2009), Thailand was 10 (Nantsupawat, 2010), and USA was 5 or 6 (Halm et al., 2005). Therefore, in each shift when one RN had to take care of more patients it may cause them to not like this kind of busy work and have intent to withdraw from it.

Contrary to what was hypothesized, patient to nurse ratio had no significant indirect effect on nurse-assessed quality of nursing care. In contrast with previous findings, it may be related to patient to nurse ratio had a lower level of direct effect on nurse-assessed quality of nursing care and no effect on nurses' job satisfaction and nurse burnout. Although patient to nurse ratio had a low significant direct positive effect on nurses' intention to leave, nurses' intention to leave had no significant effect on nurse-assessed quality of nursing care. Another possible reason may be related to that patient to nurse ratio varied significantly among different shifts, such as day shift (average 6-8 required), and evening shift (32-42 required). In addition, a variety of nursing shift combinations existed in the Chinese hospitals. These reasons may influence the measurement of nurse staffing in Chinese hospitals, which result in this none-significant result.

2.2 Nurse work environment had a significant direct positive effect on nurse-assessed quality of nursing care, nurses' job satisfaction and nurses' intention to leave. However, nurse work environment had no significant direct effect on nurse burnout. In addition, nurse work environment had no significant indirect positive effect on nurse-assessed quality of nursing care. It was partially consistent with hypothesis 2.

Based on Aiken's (2002) NWE-NS-OM, when nurse work environment encouraged nursing practice, nurses would provide good nursing care and feel satisfied with their jobs. Therefore, the results of nurse work environment had a significant direct positive effect on nurse-assessed quality of nursing care supported by Aiken's Model. In addition, this result was consistent with previous studies (Van Bogaert, Clarke, Roelant, Meulemans, & Van de Heyning, 2010; Van Bogaert et al., 2009; Van Bogaert et al., 2013; You et al., 2013). One possible reason is that, nurse work environment was defined as 'a system that supports RNs control over the delivery of nursing care and the environment in which care is delivered' (Hoffart & Woods, 1996). For example, Cho et al. (2009) found that nurse who perceived adequate staffing was related to higher nurse rate quality of care (OR = 2.97, $p < .05$). The nurse perception of staffing and resource adequacy had been determined as one of the nurse work environment subscales. In addition, the subscale of leadership and support nurses received the higher score with mean of 3.22 (*SD* = 0.44). This may be related with the fact that nurse

managers pay attention to leadership strategies in order to encourage nurses to provide good nursing care services.

The result of nurse work environment having a significant direct positive effect on nurses' job satisfaction is supported by Aiken (2002) NEW-NS-OM as well. This finding was also congruent with previous studies (Aiken et al., 2008; Liu et al., 2012; Manojlovich, 2005; Manojlovich & Laschinger, 2007; Rochefort & Clarke, 2010; Van Bogaert, Clarke, Vermeyen, Meulemans, & Heyning, 2008; Van Bogaert et al., 2009; Van Bogaert et al., 2013; You et al., 2013). A possible reason is that, good nursing work environment is considered as (1) having sufficient staffing and adequacy resources, (2) harmonious nurse and doctor relationship, (3) excellent leadership strategies and support nurses, (4) encourage higher standardized nursing care, and (5) participation in managing hospital affairs. All of those components have been found as predictors of nurses' job satisfaction. For example, Cho et al. (2009) reported that nurses was less likely to be dissatisfied with their job when they perceived adequate staffing (OR = 0.30, p = .004). When nurses have a good relationship with their colleagues (nurse, physician, supervisor), they are more satisfied with their jobs (Adams & Bond, 2000; Bégat, Ellefsen, & Severinsson, 2005; Shacklock, Brunetto, & Farr-wharton, 2012; Zangaro & Soeken, 2007). It has been reported by several researchers that leadership style significantly influenced nurses' job satisfaction (Andrews, Richard, Robinson, Celano, & Hallaron, 2012; Long, 2004; Ramey, 2002; Wang, Chontawan, & Nantsupawat, 2012). In addition, when hospital organizations paid attention to quality of nursing care, these hospital managers could formulate a policy to award nursing services. Nurses worked in this kind of practice environment could feel more satisfied with their work (Daehlen, 2008; Gelsema et al., 2006; Sparks, 2011). The participatory management strategies were also found significantly influencing nurses' job satisfaction (Hosseinabadi, Karampourian, Beiranvand, & Pournia, 2013). Therefore, one possible reason is that when the nurse work environment had enough resources, a harmonious work relationship with doctors, excellent leadership skills of nursing leaders, good nursing care encouragement, and nurse opportunity to participant in hospital affairs; these positive things could make nurses feel very satisfied to work there and may increase their job satisfaction.

This study found that nurse work environment had no significant effect on nurse burnout. This finding was not congruent with Aiken (2002) NWE-NS-OM and previous study. As previous study revealed that nurse burnout increased 32.7% when nurse work environment changed from good to poor（adjusted OR = 0.673，$p < .01$) (Liu et al., 2012). One possible explanation is C-MBI-HSS combined positive and negative items together. The subscale of EE and DP was presented in negative items. The subscale of PA was presented in positive items. When participant answered the questionnaire, they should have changed the way of their thinking in order to check the appropriate numbers. However, based on the survey result of this study, 78.43% participants could not finish their work on time. The average nurses' overtime was around 47 minute. Therefore, most nurses may have limited time to think over their answers.

Another finding was nurse work environment had a significant negative effect on nurses' intention to leave. This was consistent with Aiken (2002) NWE-NS-OM and previous studies (Aiken et al., 2008; Gardner et al., 2007; Van Bogaert et al., 2013). However, this finding was inconsistent with Liu et al. (2012) study, which was conducted among 1104 bedside nurses in 89 medical, surgical and intensive care units in 21 hospitals across the Guangdong province in China. The possible reason is that, when nurses worked in a place with good facilitate, such as enough resources, support from leaders, a good work relationship with coworkers, good nursing care promotion, and the ability for nurses to voice their opinions in hospital affairs, they would cherish this kind of work environment and intend to stay there.

The finding of nurse work environment had no significant indirect positive effect on nurse-assessed quality of nursing care, which was inconsistent with the research hypothesis. In this study, nurses' job satisfaction and nurses' intention to leave had no direct positive effect on nurse-assessed quality of nursing care. Although nurse burnout had a direct negative effect on nurse-assessed quality of nursing care, nurse work environment had no significant direct negative effect on nurse burnout. Therefore, nurse work environment may not had a significant indirect positive effect on nurse-assessed quality of care supposed through nurses' job satisfaction, nurse burnout and nurses' intention to leave.

2.3 Nurses' job satisfaction had neither significant direct positive effect on nurse-assessed quality of care nor direct positive effect on nurses' intention to leave. And nurses' job satisfaction had a significant direct negative effect on nurse burnout. Nurses' job satisfaction had a significant positive indirect effect on nurse-assessed quality of nursing care through nurse burnout and nurses' intention to leave. The results were partially consistent with hypothesis 3.

The analysis showed that nurses' job satisfaction had no direct positive effect on nurse-assessed quality of nursing care. It was consistent with Aiken (2002) NWE-NS-OM that did not mention the relationship between nurses' job satisfaction and nurse-assessed quality of nursing care. However, this was contrasted with findings from MacDavitt (2008), which showed that when nurses rated low job satisfaction compared with high job satisfaction, the OR of nurse reported excellent or good quality of care in general and quality over a past year as unchanged or improved had decreased 70% and 63% (OR, 0.30, $p < .01$; OR, 0.37; $p < .01$), respectively. A plausible explanation is that, the quality control of nursing care in Chinese general tertiary hospitals are performed by head nurses, nurse supervisors, and nurse division directors, which are called three level quality control of nursing care (Zou, Meng, Zhang, & Yin, 2014). In addition, Quality Control Circle (QCC) was another method that had been used in Chinese hospitals. QCC aimed to encourage every nurses to participate in quality control of nursing care (Zhao, Deng, Zou, & Wang, 2013). These evidences showed that a diversity of strategies have been used to increase nurses' attention to quality of nursing care. In addition, hospital managers regularly check each departments' quality of nursing services in each month. Thus, RNs had to provide a good quality of care to patients in their daily work regardless of their job satisfaction. Another possible reason may be related to the national policy that requires good quality of nursing care must be provided to patients. For instance, Ministry of Health of People's Republic of China (2011) stated that it is important to continue to carry out the Good Nursing Care Project and establish a good system to facilitate and improve quality of nursing care. Moreover, accreditation for all of Chinese tertiary hospitals have been done in 2011 (Ministry of Health of the People's Republic of China, 2011). Therefore, although nurses had lower job satisfaction, they must provide good nursing care to patients as required by hospital managers and the Chinese government. This is because if hospitals could not pass the

accreditation or get praise from the society, it can reduce their ability to compete in their region. This can further influence hospital's income and then influence nurses' job satisfaction, which would result into a vicious circle.

The finding that nurses' job satisfaction did not affect nurses' intention to leave was not congruent with several previous studies (Chi, 2006; Daniels, 2004; Duffield et al., 2009; Flanagan, 2006; Huang, 2012; Ingersoll et al., 2002; Larrabee et al., 2003; Lu et al., 2007; Tzeng, 2002). One plausible explanation is, nurses worked at Chinese tertiary general hospital have relatively good income and self-recognition comparing to nurses worked at primary level or secondary level hospitals. They may not intended to leave their jobs instead to find the new one. Another possible explanation may be related to the measurement issue. Since the C-ATS combined the positive and negative items, it would confuse Chinese RNs to check the answers. Thus, it may cause a non-significant result.

As hypothesized, nurses' job satisfaction had a significant direct effect on nurse burnout. The finding indicated that nurses' lower job satisfaction can be contributed to higher level of burnout. This was consistent with Chen (2005) study, which revealed an effect of job satisfaction on burnout among 194 nurses across three Chinese cities (Hangzhou, Huzhou, and Wuxi). One possible reason is that, burnout refers to the syndrome of emotional exhaustion, depersonalization, and lower personal accomplishment perceived by Chinese RNs through their working experience. Therefore, when nurse were satisfied with their work or felt valuable for their work, it would reduce nurses' emotional exhaustion or depersonalization feeling and increase their feeling of personal achievement. For example, Chen (2005) stated that when nurses were satisfied with colleagues and reward, their emotional exhaustion would be reduced (β = -.18, p = .005 and β = -.17, p = .011, respectively). When nurses were satisfied with colleague relationship, their depersonalization would be reduced (β = -.27, p = .000). Moreover, when nurses were satisfied with nursing care and their supervisors, their feeling of the personal accomplishment would be increased (β = .39, p = .005; β = .18, p = .011, respectively).

In accordance with what was hypothesized, nurses' job satisfaction indirectly positively affects nurse-assessed quality of nursing care. The results were consistent with hypothesis. In this study nurses' job satisfaction had a significant negative direct

effect on nurse burnout. Nurse burnout had a significant negative effect on nurse-assessed quality of nursing care. Therefore, it was logical to determine that nurses' job satisfaction could pass nurse burnout indirectly positively affect nurse-assessed quality of nursing care. Moreover, the path coefficient of nurses' job satisfaction through nurse burnout affected nurse-assessed quality of nursing care account for only part of the total path coefficient of nurses' job satisfaction indirectly influencing nurse-assessed quality of nursing care. Thus, nurse job satisfaction could pass nurses' intention to leave and indirectly influenced nurse-assessed quality of nursing care. In conclusion, the indirect effect between nurses' job satisfaction and nurse-assessed quality of nursing care was determined through nurse burnout and nurses' intention to leave in this study.

2.4 This study found that nurse burnout had a significance direct negative effect on nurse-assessed quality of nursing care. Nurse burnout had a significant direct positive effect on nurses' intention to leave. In addition, nurse burnout had no significant indirect effect on quality of care. The results were partially consistent with hypothesis 4.

The result of this study showed that nurse burnout had a direct negative affect on nurse-assessed quality of nursing care. This result was not supported by Aiken (2002) NWE-NS-OM, because no relationships among nurse outcome variables were mentioned by Aiken's model. However, this finding was consistent with previous studies (MacDavitt, 2008; Poghosyan et al., 2010). As previous studies presented, when the burnout scores moved from moderate or high to low, nurses reported (1) quality in general as excellent or good, (2) on the last worked shift as excellent or good quality, and (3) unchanged or improved quality over the past year were increased. The increase rates were reported by an odd ratio, which increased 2.26 times ($p < .01$), 2.93 times ($p < .005$), and 2.68 times ($p < .01$) for above three statements, respectively (MacDavitt, 2008). The possible reason is that when people feel more burned out, the components of depersonalization would be decreased and personal accomplishment would be increased. In this study, depersonalization was defined as "the syndrome of a callous response toward patients who are recipients of Chinese RNs' services, care, treatment, or instructions". Thus, when nurse burnout is increased, it will be related to the patient receiving poor nursing services. In addition, personal accomplishment was defined as "feelings of competence and achievement in Chinese RNs' work with people". Thus a

higher burnout will be related to the RNs' low competence in providing nursing services.

The study result showed that nurse burnout significantly, directly, and positively affects nurses' intention to leave. This result was consistent with previous studies such as Estryn-Bêhar et al. (2007) and Spence Laschinger et al. (2009). A plausible reason is, nurses worked in the clinics should make higher physical efforts. In addition, Chinese nurses work in the clinical settings has multiple responsibilities, which are not only related to the requirement of patients care, but also several kinds of personal examinations and hospital evaluations. Moreover, the society does not recognized nurses' work like doctors, since initially most of nurses were graduated from technical schools. Therefore, if nurses cannot stand for those physical and psychological pressure, they may intent to leave their jobs.

According to the result of the present study, nurse burnout had no significant indirect effect on nurse-assessed quality of nursing care. A possible reason is, this study did not found that nurses' intention to leave has a direct negative effect on nurse-assessed quality of nursing care in this study. Therefore, the nurse burnout may not indirect influence nurse-assessed quality of nursing care through intention to leave significantly.

2.5 Nurses' intention to leave had no significant direct effect on nurse-assessed quality of care. It was consistent with Aiken (2002) NWE-NS-OM that did not mention the relationship between nurses' intention to leave and nurse-assessed quality of nursing care. However, this is not consistent with hypothesis 5. This result was not congruent with previous studies. Previous studies revealed that when nurses change their perception from intention to leave to intention to stay, they reported decreased scores in (1) quality of nursing care in general as excellent, (2) quality of nursing care on the last shift as excellent or good, and (3) quality of nursing care over the past year as unchanged or improved. The decrease rate was reported by an OR. The above mentioned three statements' OR decreased 58%, 42%, and 38% (OR, 0.42, $p < .01$; 0.58, $p < .05$; and 0.62, $p < .01$), respectively (MacDavitt, 2008). A possible reason is, although nurses may intend to leave their jobs, they still must do the standard nursing care to patient in order to avoid patients' lawsuit. According to the Chinese Law, if health care providers get sued from patients, they have to provide the evidence that they

did not do the wrong things to patients. In addition, as mentioned above, the C-ATS combined positive and negative items, which make Chinese RNs confused to check the answers.

Limitation

The limitations of this study are presented as follows.

1. This study collected data from participants' self-reports, which may underestimate or overestimate the values of study variables. For example, the nurse-assessed quality of nursing care may be overestimated by participants.

2. Although C-MBI-HSS had the good internal consistency in the instrument testing phase and acceptable goodness fit of the measurement model in the main study phase, C-MBI-HSS combined positive and negative items. This condition may have confused participants and brought more measurement error in the study.

3. Since Ph.D. students had limited budget and time, it was impossible to collect data several times across the country in this study. It would be better to collect more tryout data a second time to test the psychometric properties of instruments by using CFA.

4. Although statistical analysis technique of casual modeling was able to determine the casual relationships among independent variables and dependent variable, it collected data at the same time. Thus, it may be limited to reflect the nature of cause and effect of independent variables on dependent variable.

Implication for Nursing

To improve nurse-assessed quality of nursing care, nursing educators, nursing administrators, nursing policy makers and nursing researchers should work together.

The results of this survey study showed that the dimensions of "psychical environment" and "patient outcomes" received the lowest scores for nurses-assessed quality of nursing care. It provide the evidence for nurse educators to teach nursing students how to facilitate good living environment for patients and how to improve patients' safety in order to get good patient outcomes.

In addition, the results of SEM showed that nurse burnout had the highest direct impact on nurse-assessed quality of nursing care, which is followed by nurse work environment and nurse staffing. In addition, nurses' job satisfaction had an indirect positive effect on nurse-assessed quality of nursing care as well. Therefore, nursing administrators can consider the nurses' emotional reactions to their work. Programs that reduce nurse burnout, nurses' intention to leave and increase nurses' job satisfaction should be considered.

Furthermore, policy makers can implement hospital policies to support nurses' practice based on this research findings. It is essential for policy makers to learn from magnet hospitals' successful experience in western countries. Then, implement the policy to make healthy work environment for nurses. In addition, the nurse staffing plan can be framed under current hospital work environment and Chinese healthcare system to ensure that nurses can work with reasonable number of patients in each shift.

Moreover, the result of this survey studies improved the existing Aiken's Nurse Work Environment, Nurse Staffing and Outcome model that explain nurses-assessed quality of nursing care can be only significantly influenced by nurse staffing and nurse work environment. The researcher determined that nurse burnout, nurses' job satisfaction, and nurses' intention to leave can also influence nurse-assessed quality of nursing care. Therefore, other nursing researchers can test this model again to confirm the significance of variables influence nurse-assessed quality of nursing care.

Recommendations for Future Research

Based on the findings of this study, the following suggestions are recommended for future studies:

1. Research instruments are very important and have high impact on the results. In a further study, nurse staffing indictors such as HPPD or unit level of patient to nurse ratio may be considered to measure nurse staffing. In addition, instruments with all positive items or negative items should be selected first instead of positive items combined with negative items, such as nurse burnout and nurses' intention to leave questionnaire.

2. A replicate of current studying model should be conducted in a diverse setting and a larger sample size by probability sampling to increase generalizability of findings.

3. An effective intervention study to enhance nurse-assessed quality of nursing care should be conducted by considering the predicting factors that were determined in this study, including nurse burnout, nurses' job satisfaction, nurse work environment, nurses' intention to leave, and nurse staffing.

4. A qualitative research should be considered to explore factors influencing nurse-assessed quality of nursing care in Chinese hospitals context due to the fact that Aiken's model may be partially fit in the context of Chinese hospitals.

REFERENCES

Adams, J. S. (1973). Toward an understanding of inequity. In E. E. Lawler (Ed.), *Motivation in work organizations*. Los Angeles: Brooks/Cole.

Aiken, L. H. (2002). Superior outcomes for magnet hospitals: The evidence base. In M. McClure & A. Hinshaw)Eds.), *Magnet hospitals revisited: Attraction and retention of professional nurses* (pp. 61-82). Washington, DC: American Nurses Publishing.

Aiken, L. H., Clarke, S., & Sloane, D. (2002). Hospital staffing, organization and quality of care: Cross-national findings. *Nursing Outlook,* 50(5), 187-194.

Aiken, L. H., Clarke, S. P., Sloane, D. M., Lake, E. T., & Cheney, T. (2008). Effects of hospital care environment on patient mortality and nurse outcomes. *Journal of Nursing Administration,* 38(5), 223-229.

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of American Medical Association,* 288, 1987-1993.

Aiken, L. H., Havens, D. S., & Sloane, D. M. (2000). The magnet nursing services recognition program: A comparison of two groups of magnet hospitals. *American Journal of Nursing,* 100, 26-36.

Aiken, L. H., & Patrician, P. (2000). Measuring organizational traits of hospitals: The Revised Nursing Work Index. *Nursing Research,* 49(3), 146-153.

Aiken, L. H., Sermeus, W., Van den Heede, K., Sloane, D. M., Busse, R., McKee, M., . . . Kutney-Lee, A. (2012). Patient safety, satisfaction, and quality of hospital care: Cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. *British Medical Journal,* 344, e1717. doi: http://dx.doi.org/10.1136/bmj.e1717

Aiken, L. H., & Sloane, D. M. (1997a). Effects of organizational innovations in AIDS care on burnout among urban hospital nurses. *Work and Occupations,* 24(4), 453-477.

Aiken, L. H., & Sloane, D. M. (1997b). Effects of specialization and client differentiation on the status of nurses: The case of AIDS. *Journal of Health &*

Social Behavior, 38, 203-222.

American Association of Colleges of Nursing (Producer). (2002). Hallmarks of the professional nursing practice environment. Retrieved from http://www.mscc.edu/nursing/Sanders1.pdf

American Association of Colleges of Nursing (Producer). (2009). Nursing shortage fact sheet. Retrieved from http://www.aacn.nche.edu/Media/pdf/NrsgShortageFS.pdf

Barlow, K. M., & Zangaro, G. A. (2010). Meta-analysis of the reliability and validity of the Anticipated Turnover Scale across studies of registered nurses in the United States. *Journal of Nursing Management,* 18(7), 862-873. doi: 10.1111/j.1365-2834.2010.01171.x

Bartram, T., Casimir, G., Djurkovic, N., Leggat, S. G., & Stanton, P. (2012). Do perceived high performance work systems influence the relationship between emotional labour, burnout and intention to leave? A study of Australian nurses. *Journal of Advanced Nursing,* 68(7), 1567-1578. doi: 10.1111/j.1365-2648.2012.05968.x

Ben, Y. L., Li, P., & Wang, F. X. (2010). Survey of the job satisfaction of 501 clinical nurses in a 3A—level hospital in Xinjing Uygur Autonomous Region. *Journal of Nursing Administration,* 10(9), 636-640.

Borritz, M. (2006). *Burnout in human service work - causes and consequences (Doctoral dissertation).* National Institute of Occupational Health, Denmark.

Borritz, M., Rugulies, R., Bjorner, J. B., Villadsen, E., Mikkelsen, O. A., & Kristensen, T. S. (2006). Burnout among employees in human service work: design and baseline findings of the PUMA study. *Scandinavian Journal of Public Health,* 34(1), 49-58.

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology,* 1, 185-216.

Burhans, L. M., & Alligood, M. R. (2010). Quality nursing care in the words of nurses. *Journal of Advanced Nursing,* 66(8), 1689-1697. doi: http://dx.doi.org/10.1111/j.1365-2648.2010.05344.x

Burns, T. (1969). Human relations in management: Motivation and human relations. *American Journal of Medical Technology,* 35, 12-23.

Cahill, J. (1995). Making the most of an essential resource: Using skill mix for the benefit of staff and patients. *Professional Nurse,* 10(6), 355-358.

Cao, Y. (1998). *Job satisfaction among nurses in China (master's thesis).* Chiang Mai University, Thailand.

Chen, M. F. (2005). *Study the relationship among nurse burnout, stress and job satisfaction (master's thesis)*. Zhe Jiang University, China.

Chen, X. X., Yang, T., & Xian, S. M. (2014). Job burnout and turnover intention among nurses in hospitals of diferent levels in western Guangdong: A comparative study. *Chinese Nursing Management,* 14(5), 482-484. doi: 10.3969/j.issn.1672-1756.2014.05.011

Cherniss, C. (1980). *Professional burnout in human service organizations*. New York: Praeger.

Chi, J. T. (2006). *Study on the relationship among job satisfaction, organizational commitment and turnover intention in contract nurses (master's thesis).* Shangdong University, China.

Chiang, H. Y., & Lin, S. Y. (2009). Psychometric testing of the Chinese version of nursing practice environment scale. *Journal of Clinical Nursing,* 18(6), 919-929.

Chitpakdee, B. (2006). *Nurse staffing, job satisfaction and selected patient outcomes (doctoral dissertation).* Chiang Mai University, Thailand.

Chitpakdee, B. (2006). *Nurses staffing, job satisfaction and selected patint outcomes.* Chinag Mai University, Thailand.

Cho, S. H., June, K. J., Kim, Y. M., Cho, Y. A., Yoo, C. S., Yun, S. C., & Sung, Y. H. (2009). Nurse staffing, quality of nursing care and nurse job outcomes in intensive care units. *Journal of Clinical Nursing,* 18, 1729–1737.

Choi, S. P. P., Pang, S. M. C., Cheung, K., & Wong, T. K. S. (2011). Stabilizing and destabilizing forces in the nursing work environment: A qualitative study on turnover intention. *International Journal of Nursing Studies,* 48(10), 1290-1301. doi: 10.1016/j.ijnurstu.2011.03.005

Cline, D. D., Rosenberg, M. C., Kovner, C. T., & Brewer, C. (2011). Early career RNs' perceptions of quality care in the hospital setting. *Qualitative Health Research,* 21(5), 673-682. doi: 10.1177/1049732310395030

Comrey, A. L. (1973). *A first course in factor analysis*. New York: Academic Press.

Davis, L. (1992). Instrument review: Getting the most from your panel of experts. *Applied Nursing Research,* 5, 104-107.

Dawis, R. V., England, G. W., & Lofquist, L. H. (1964). *A Theory of Work Adjustment*. University of Minnesota.

Demerouti, E. (1999). *Burnout: Eine Folge Konkreter Abeitsbedingungen bei Dienstleistungs und Produktionstdtigkeiten. (Burnout: A consequence of specific working conditions among human service and production tasks)*. Frankfurt/Main: Lang.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2000). A model of burnout and life satisfaction amongst nurses. *Journal of Advanced Nursing,* 32, 454–464.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology,* 86(499-512). doi: 10.1037/0021–9010.86.3.499

Demerouti, E., Bakker, A. B., Vardakou, I., & Kantas, A. (2003). The convergent validity of two burnout instruments: A multitrait-multimethod analysis. *European Journal of Psychological Assessment,* 18, 296-307.

DeVellis, R. F. (2012). *Scale development: Theory and application* (2nd ed.). Newbury Park, California: Sage.

Diamantopoulos, A., & Siguaw, J. A. (2000). *Introducing LISREL*. London: Sage Publications.

Ding, S. Z., & Jiang, P. (2013). *Head nurse manual*. Beijing: People's Health Press.

Donabedian, A. (1980). *Definition of quality and approaches to its assessment and monitoring*. Ann Arbor, Michigan: Health Administration.

Donmez, Y. C., & Ozbayır, T. (2011). Validity and reliability of the 'good perioperative nursing care scale' for Turkish patients and nurses. *Journal of Clinical Nursing,* 20, 166-174. doi: 10.1111/j.1365-2702.2010.03314.x

Douglass, L. M. (1988). *The effective nurse leader manager* (3rd ed.). Saint Louis: C. V. Mosby.

El-Jardali, F., Alameddine, M., Dumit, N., Dimassi, H., Jamal, D., & Maalouf, S. (2011). Nurses' work environment and intent to leave in Lebanese hospitals:Implications for policy and practice. *International Journal of Nursing*

Studies, 48, 204-214.

Erickson, J. I., Duffy, M. E., Gibbons, M. P., Eitzmaurice, J., Ditomassi, M., & Jones, D. (2004). Development and Psychometric Evaluation of the Professional Practice Environment (PPE) Scale. *Journal of Nursing Scholarship,* 36(3), 279-285.

Estryn-Béhar, M., Van der Heijden, B. J. J. M., Ogińska, H., Camerino, D., Nézet, O. L., Conway, P. M., . . . Hasselhorn, H. M. (2007). The impact of social work Environment, teamwork characteristics, burnout, and personal factors upon intent to leave among European nurses. *Medical Care,* 45, 939-950.

Evans, B., & Fischer, D. (1993). The nature of burnout: A study of the three-factor model of burnout in human service and non-human service sample. *Journal of Occupational and Organizational Psychology,* 66, 29-38.

Faller, M. S., Gates, M. G., Georges, J. M., & Connelly, C. D. (2011). Work-related burnout, job satisfaction, intent to leave, and nurse-assessed quality of care among travel nurses. *Journal of Nursing Administration,* 41(2), 71-77. doi: 10.1097/NNA.0b013e3182059492

Finn, C. (2001). Autonomy: an important component for nurses' job satisfaction. *International Journal of Nursing Studies,* 38, 349-357.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, Massachusetts: Addison-Wesley.

Freudenberger, H. J. (1974). Staff burnout. *Journal of Social Issues,* 30(1), 159-165. doi: 10.1111/j.1540-4560.1974.tb00706.x

Gardner, J. K., Fogg, L., Thomas-Hawkins, C., & Latham, C. E. (2007). The relationships between nurses' perceptions of the hemodialysis unit work environment and nurse turnover, patient satisfaction, and hospitalizations. *Nephrology Nursing Journal,* 34(3), 271-281.

Ge, Y. R., & Zhao, F. M. (2014). Ningxia Yinchuan city tertiary A hospitals staff nurses' turnover intention and influencing factors. *Ningxia Medical Journal,* 35(6), 575-576.

Gong, J. M., Qi, C. L., & Wang, H. X. (2013). Analysis on cognitive status of nurses on high qualityof nursing service and its influencing factors[in Chinese]. *Chinese Nursing Research,* 27, 401-402. doi: 10.3969/j.issn.1009-

6493.2013.05.009

Guo, Y. H. (Producer). (2008). Implementing nurse regulation, protecting nurses' legal rights, and fulfilling nurses' obligations [Chinese language]. Retrieved from http://www.cnabx.org.cn/Article_Show.asp?ArticleID=910

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*. Upper Saddle River, New Jersey: Pearson Education.

Halm, M., Peterson, M., Kandels, M., Sabo, J., Blalock, M., Braden, R., . . . Topham, D. (2005). Hospital nurse staffing and patient mortality, emotional exhaustion, and job dissatisfaction. *Clinical Nurse Specialist,* 19(5), 241-251; quiz 252-244.

Herzberg, F. (1959). *The motivation to work* (2nd ed.). New York: Wiley.

Hinshaw, A. S., & Atwood, J. R. (1984). Nursing staff turnover, stress, and satisfaction: Models, measures, and management. *Annual Review of Nursing Research,* 1, 133-152.

Hinshaw, A. S., & Atwood, J. R. (1985). Testing a theoretical model for job satisfaction and anticipated turnover of nursing staff. *Nursing Research,* 34, 54–65.

Hinshaw, A. S., Smeltzer, C., & Atwood, J. (1987). Innovative retention strategies for nursing staff. *Journal of Nursing Administration,* 17(6), 8-16.

Hinto, S., Partanen, P., & Vehviläinen-Julkunen, K. (2012). The professional nursing practice environment and nurse-reported job outcomes in two European countries: A survey of nurses in Finland and the Netherlands. *Scandinavian Journal of Caring Sciences,* 26, 133-143. doi: 10.1111/j.1471-6712.2011.00920.

Hoffart, N., & Woods, C. Q. (1996). Elements of a nursing professional practice model. *Journal of Professional Nursing,* 12(6), 354-364. doi: 10.1016/s8755-7223(96)80083-4

Hogston, R. (1995). Quality nursing care: A qualitative enquiry. *Journal of Advanced Nursing,* 21(1), 116-124. doi: http://dx.doi.org/10.1046/j.1365-2648.1995.21010116.x

Hou, X. N. (2007). *Study of quality of nursing care evaualtion index in general Chinese hospitals (master's degree).* Peking Union Medical College, China.

Hu, J. C. (2007). *Study on the Nurse Job Satisfaction Scale and its local norm (master's thesis).* The Second Military Medical University, China.

Huang, J., Li, L. Z., Peng, D., Wu, L. J., & Jiang, D. J. (2008). A survey of the

relationship between job satisfaction and intent to leave among the engaging system nurses. *Chinese Journal of Nursing,* 43(6), 527-529.

Idvall, E., & Rooke, L. (1998). Important aspects of nursing care in surgical wards as expressed by nurses. *Journal of Clinical Nursing,* 7(6), 512-520. doi: 10.1046/j.1365-2702.1998.00180.x

Ironson, G. H., Smith, P. C., Brannick, M. T., Gibson, W. M., & Paul, K. B. (1989). Construction of a job in general scale: A comparison of global, composite, and specific measures. *Journal of Applied Psychology,* 74, 193–200.

Janssen, P. P. M., de Jonge, J., & Bakker, A. B. (1999). Specific determinants of intrinsic work motivation, burnout and turnover intentions: A study among nurses. *Journal of Advanced Nursing,* 29(6), 1360-1369. doi: 10.1046/j.1365-2648.1999.01022.x

Jia, X. X. (2014). The study relationship between nurse work environment and nurse job satisfaction. *Inner Mongolia Medical Journal,* 46(7), 891-893.

Johnson, M., Maas, M., & Moorhead, S. (2000). *Nursing outcomes classification (NOC)* (2nd ed.). Saint Louis: Mosby.

Jones, P. S., Lee, J. W., Phillips, L. R., Zhang, X. E., & Jaceldo, K. B. (2001). An adaptation of Brislin's translation model for cross-culture research. *Nursing Research,* 50(5), 300-304.

Jöreskog, K., & Sörbom, D. (1996). *LISREL* 8: *User's reference guide*. Chicago: Scientific Software International.

Kalliath, T., & Morris, R. (2002). Job satisfaction among nurses: A predictor of burnout levels. *Journal of Nursing Administration,* 32, 648-654.

Kane, R., Shamlian, T., Mueller, C., Duval, S., & Wilt, T. J. (2007). The association of registered nurse staffing levels and patient outcomes: Systematic review and meta-analysis. *Medical Care,* 45(12), 1195-1294.

Kelly, L. A., McHugh, M. D., & Aiken, L. H. (2011). Nurse outcomes in magnet and non-magnet hospitals. *Journal of Nursing Administration,* 41(10), 428-433.

Khumyu, A. (2002). *Nurse staffing, nurses' job satisfaction, and patient satisfaction with nursing care in public hospitals in Thailand (doctral dissertation).* University of Alabama, United States.

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. New York:

Guilford Press.

Kramer, M., & Hafner, L. (1989). Shared values: Impact on staff nurse job satisfaction and perceived productivity. *Nursing Research,* 38, 172-177.

Kunaviktikul, W., Anders, R. L., Chontawan, R., Nuntasupawat, R., Srisuphan, W., Pumarporn, O., . . . Hirunnuj, S. (2005). Development of indicators to assess the quality of nursing care in Thailand. *Nursing and Health Sciences,* 2005(7), 273-280.

Kunaviktikul, W., Anders, R. L., Srisuphan, W., Chontawan, R., Nuntasupawat, R., & Pumarporn, O. (2001). Development of quality of nursing care in Thailand. *Journal of Advanced Nursing,* 36(6), 776-784.

Kwak, C., Chung, B. Y., Xu, Y., & Eun-Jung, C. (2010). Relationship of job satisfaction with perceived organizational support and quality of care among South Korean nurses: A questionnaire survey. *International Journal of Nursing Studies,* 47(10), 1292-1298. doi: 10.1016/j.ijnurstu.2010.02.014

Lake, E. T. (2002). Development of the practice environment scale of the nursing work index. *Research in Nursing & Health,* 25(3), 176-188. doi: 10.1002/nur.10032

Lake, E. T. (2007). The nursing practice environment: Measurement and evidence. *Medical Care research and review,* 64(2), 104S-122S.

Lang, N. M., & Marek, K. D. (1990). The classification of patient outcomes. *Journal of Professional Nursing,* 6(3), 158-163.

Langemo, D. K. (1990). Impact of work stress on female nurse educators. *Image--the journal of nursing scholarship,* 22(3), 159-162.

Larrabee, J. H., Janney, M. A., Ostrow, C. L., Withrow, M. L., Hobbs, G. R., Jr., & Burant, C. (2003). Larrabee. *Journal of Nursing Administration,* 33(5), 271-283.

Lee, M. A., & Yom, Y. H. (2007). A comparative study of patients' and nurses' perceptions of the quality of nursing services, satisfaction and intent to revisit the hospital: A questionnaire survey. *International Journal of Nursing Studies,* 44(4), 545-555. doi: http://dx.doi.org/10.1016/j.ijnurstu.2006.03.006

Lee, R., & Ashforth, B. (1990). On the meaning of Maslach's three dimensions of burnout. *Journal of Applied Psychology,* 75, 743-747.

Leech, N. L., Barrett, K. C., & Morgan, G. A. (2005). *SPSS for intermediate statistics: Use and interpretation*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Leino-Kilpi, H. (1990). *Good nursing care: On what basis (Doctoral dissertation).* University of Turku, Finland.

Leinonen, T., Leino-Kilpi, H., Sthlberg, M.-R., & Lertola, K. (2003). Comparing patient and nurse perceptions of perioperative care quality. *Applied Nursing Research,* 16(1), 29-37. doi: http://dx.doi.org/10.1053/apnr.2003.50005

Leiter, M. P., & Laschinger, H. K. S. (2006). Relationships of work and practice environment to professional burnout. *Nursing Research,* 55(2), 137-146.

Li, D. R., & Li, J. Y. (2000). *Role conflicts matrix organizational structure, organizational commitment and turnover intention study.* National Chiao Tung University, Institute of Management Sciences, Taiwan.

Li, X. M., & Liu, Y. J. (2000). Surveyed on the job burnout and work-related stressors in nursing staff. *Chinese Journal of Nursing,* 35, 645-649.

Ling, F. M. (2005). *The study of job stressors and burnout in the nurse (master's thesis).* East China Nornal University, China.

Liu, C., Zhang, L. J., Ye, W. Q., Zhu, J. Y., Cao, J., Lu, X. Y., & Li, F. P. (2012). Job satisfaction and intention to leave: A questionnaire survey of hospital nurses in Shanghai of China. *Journal of Clinical Nursing,* 21(1/2), 255-263. doi: http://dx.doi.org/10.1111/j.1365-2702.2011.03766.x

Liu, K., You, L. M., Chen, S. X., Hao, Y. T., Zhu, X. W., Zhang, L. F., & Aiken, L. H. (2012). The relationship between hospital work environment and nurse outcomes in Guangdong, China: A nurse questionnaire survey. *Journal of Clinical Nursing,* 21, 1476-1485.

Locke, E. A. (1969). What is job satisfaction? *Organizational Behavior and Human Performance,* 4(4), 309-336. doi: 10.1016/0030-5073(69)90013-0

Locke, E. A. (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology*. Chicago: Rand McNally.

Locke, E. A., & Henne, D. (1986). *Work motivation theories. In C. L. Cooper & I. Robertson (Eds.), International review of industrial and organizational psychological*. London: Wiley.

Lu, H., While, A. E., & Barriball, K. L. (2005). Job satisfaction among nurses: A literature review. *International Journal of Nursing Studies,* 42, 211-227.

Lu, K.-Y., Lin, P. L., Wu, C. M., Hsieh, Y. L., & Chang, Y. Y. (2002). The relationships among turnover intentions, professional commitment, and job satisfaction of hospital nurses. *Journal of Professional Nursing,* 18(4), 214-219. doi: 10.1053/jpnu.2002.127573

Lucero, R. J. (2008). *Linking outcomes to the quality of the process of nursing care.* (3328614 Ph.D.), University of Pennsylvania, Ann Arbor. ProQuest Dissertations & Theses Global; ProQuest Nursing & Allied Health Source database.

Lynn, M. M. (1986). Determination and quantification of content validity. *Nursing Research,* 35(6), 382-385.

Lynn, M. R., McMillen, B. J., & Sidani, S. (2007). Including the provider in the assessment of quality care: Development and testing of the nurses' assessment of Quality Scale—acute care version. *Journal of Nursing Care Quality,* 22(4), 328-336. doi: 10.1097/01.NCQ.0000290414.42640.c0

Ma, J. C., Lee, P. H., Yang, Y. C., & Chang, W. Y. (2009). Predicting factors related to nurses' intention to leave, job satisfaction, and perception of quality of care in acute care hospitals. *Nursing Economics,* 27(3), 178-184, 202. doi: 10:1111/j.1475-6773.2006.00651.x

MacDavitt, K. C. (2008). *An examination of the relationship between nurse outcomes and patient outcomes (doctoral dissertation).* Columbia University, United States.

Mallidou, A. A., Cummings, G. G., Estabrooks, C. A., & Giovannetti, P. B. (2011). Nurse specialty subcultures and patient outcomes in acute care hospitals: A multiple-group structural equation modeling. *International Journal of Nursing Studies,* 48(1), 81-93. doi: http://dx.doi.org/10.1016/j.ijnurstu.2010.06.002

Mangold, W. G., & Babakus, E. (1991). Service quality: The front-stage vs. the back stage perspective. *Journal of Services Marketing,* 5, 59-70.

Manojlovich, M. (2005a). Linking the practice environment to nurses' job satisfaction through nurse-physician communication. *Journal of Nursing Scholarship,* 37(4), 367-373. doi: 10.1111/j.1547-5069.2005.00063.x

Manojlovich, M., & Laschinger, H. K. S. (2007). The nursing work life model: Extending and refining a new theory. *Journal of Nursing Management,* 15(3),

256-263. doi: dx.doi.org/10.1111/j.1365-2834.2007.00670.x

Maslach, C. (1982). *Burnout: The cost of caring*. New York: Prentice Hall.

Maslach, C. (1993). Burnout: A multidimensional perspective. In W. B. Schaufeli, C. Maslach & T. Marek (Eds.), *Professional burnout: Recent developments in theory and research* (pp. 19-32). Washington, DC: Taylor & Francis.

Maslach, C., & Jackson, S. E. (1986). *Maslach burnout inventory: Manual* (2nd ed.). California: Consulting Psychologists Press.

Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach burnout inventory manual* (3rd ed.). Palo Alto, California: Consulting Psychologists Press.

Maslach, C., & Leiter, M. P. (1997). *The truth about burnout*. San Francisco: Jossey-Bass.

Maslow, A. H. (1954). *Motivation and personality*. New York: Harper and Rows Publisher.

McClure, M. L., Poulin, M., Sovie, M., & Wandelt, M. (1983). *Magnet hospitals:Attraction and retention of professional nurses*. Kansas City, Missouri: American Nurses Association,.

McCusker, J., Dendukuri, N., Cardinal, L., Laplante, J., & Bambonye, L. (2004). Nursing work environment and quality of care: Differences between units at the same hospital. *International Journal of Health Care Quality Assurance,* 17(6), 313-322.

McHugh, M. D., & Stimpfel, A. W. (2012). Nurse reported quality of care: A measure of hospital quality. *Research in Nursing & Health,* 35(6), 566-575. doi: 10.1002/nur.21503

McKenna, H. P., Keeney, S., Currie, L., Harvey, G., West, E., & Richey, R. H. (2006). Quality of Care: A comparison of perceptions of health professionals in clinical areas in the United Kingdom and the United States. *Journal of Nursing Care Quality,* 21(4), 344-351.

Mertler, C. A., & Vannatta, R. A. (2002). *Advanced and multivariate statistical methods: Practical application and interpretation* (2nd ed.). Los Angeles, California: Pyrczak Publishing.

Michaels, C. E., & Spector, D. E. (1982). Causes of employee turnover: A test of the Mobley, Griffeth, Hand, and Meglino Model. *Journal of Applied Psychology,*

67, 53-59.

Ministry of Health of People's Republic of China (Producer). (2011). Chinese nursing career development plan (2011-2015). Retrieved from http://www.gov.cn/gzdt/2012-01/10/content_2040677.htm

Ministry of Health of the People's Republic of China (Producer). (2010). Good nursing care programs. Retrieved from http://www.moh.gov.cn/mohyzs/s7659/201001/45756.shtml

Ministry of Health of the People's Republic of China (Producer). (2011). Tertiary general hospital accreditation standards regulations (2011 edition). Retrieved from http://www.moh.gov.cn/yzygj/s3585u/201112/06f754a213d8413787904e9e6439d88b.shtml

Ministry of Health of the People's Republic of China (Producer). (2012). Ministry of Health guidance on the implementation of the hospital nurse position management. Retrieved from http://www.gov.cn/gzdt/2012-05/04/content_2130145.htm

Mitchell, P. H., & Shortell, S. M. (1997). Adverse outcomes and variations in organization of care delivery. *Medical Care,* 35(11), NS19-NS32.

Mueller, C. W., & McCloskey, J. C. (1990). Nurses' job satisfaction: A proposed measure. *Nursing Research,* 39, 113-117.

Nantsupawat, A. (2010). *The predictive ability of the nurses' work enivronment and nurse staffing levels for nurse and paient outcomes in public hospitals, Thailand (Doctoral dissertation).* Chiang Mai University, Thailand.

Nantsupawat, A., Srisuphan, W., Kunaviktikul, W., Wichaikhum, O. A., Aungsuroch, Y., & Aiken, L. H. (2011). Impact of nurse work environment and staffing on hospital nurse and quality of care in Thailand. *Journal of Nursing Scholarship,* 43(4), 426-432. doi: http://dx.doi.org/10.1111/j.1547-5069.2011.01419.x

Nation Health and Family Planning Commission of China (Producer). (2013). China Health Statistical Yearbook 2013. Retrieved from http://www.nhfpc.gov.cn/htmlfiles/zwgkzt/ptjnj/year2013/index2013.html

News (Producer). (2014). Chinese wage income distribution gap larger and wage legislation proposed to speed up. Retrieved from

http://www.chinanews.com/gn/2014/09-19/6610930.shtml

Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.

Ott, M. J. (1987). Quality assurance: Monitoring individual compliance with standards of nursing care. *Journal of Nursing Management,* 18, 57-64.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing,* 64(1), 12-40.

Pazargadi, M., Tafreshi, M. Z., Abedsaeedi, Z., Majd, H. A., & Lankshear, A. J. (2008). Proposing indicators for the development of nursing care quality in Iran. *International Nursing Review,* 55(4), 399-406. doi: 10.1111/j.1466-7657.2008.00642.x

Peterson, N., Krebs, J., & Erspamer, H. S. (2004). Texas health resources 2004 nurses' survey. Minneapolis, Minnesota: Satisfaction Performance Research Center.

Pines, A. M., Aronson, E., & Kafry, D. (1981). *Burnout from tedium to personal growth*. New York: The Free Press.

Poghosyan, L., Clarke, S. P., Finlayson, M., & Aiken, L. H. (2010). Nurse burnout and quality of care: Cross-national investigation in six countries. *Research in Nursing & Health,* 33(4), 288-298. doi: 10.1002/nur.20383

Polit, D. F. (2010). *Statistics and data analysis for nursing research* (2nd ed.). Boston: Pearson.

Polit, D. F., & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nurisng practice* (9th ed.). Philadelphia: Wolters Kluwer Health/lippincott Williams & Wilkins.

Porter, L. W., & Lawler, E. E. (1968). *Managerial attitudes and performance*. Homewood, Illinois: Dorsey Press and Richard D. Irwin.

Price, J., & Mueller, C. (1981). A causal model of turnover for nurses. *Academy of Management Journal,* 24, 543–565.

Price, J., & Mueller, C. (1986). *Handbook of organizational management*. Massachusetts: Ballinger.

Price, J. L. (2001). Reflections on the determinants of voluntary turnover. *Journal of International Manpower,* 22(7), 600-625.

Rafferty, A. M., Clarke, S. P., Coles, J., Ball, J., James, P., McKee, M., & Aiken, L. H.

(2007). Outcomes of variation in hospital nurse staffing in English hospitals: Cross-sectional analysis of survey data and discharge records. *International Journal of Nursing Studies,* 44(2), 175-182. doi: 10.1016/j.ijnurstu.2006.08.003

Rahim, M. A., & Psenicka, C. (1996). A structural equations model of stress, locus of control, social support, psychiatric symptoms, and propensity to leave a job. *Journal of Social Psychology,* 136(1), 69-84.

Redfern, S., Hannan, S., Norman, I., & Martin, F. (2002). Work satisfaction, stress, quality of care and morale of older people in a nursing home. *Health & Social Care in the Community,* 10(6), 512-517. doi: 10.1046/j.1365-2524.2002.00396.x

Rentsch, J. R., & Steel, R. P. (1992). Construct and concurrent validation of the Andrews and Withey Job Satisfaction Questionnaire. *Educational and Psychological Measurement,* 52, 357-367.

Rochefort, C. M., & Clarke, S. P. (2010). Nurses' work environments, care rationing, job outcomes, and quality of care on neonatal units. *Journal of Advanced Nursing,* 66(10), 2213-2224. doi: http://dx.doi.org/10.1111/j.1365-2648.2010.05376.x

Rowland, H., & Rowland, B. (1992). *Nursing administration handbook* (3rd ed.(. Sudbury, Massachusetts: Jones and Bartlett.

Sasichay, T. (2001). *The relationship between nurse staffing and patient outcomes (doctoral dissertation).* University of Pennsylvania, United States.

Schaufeli, W. B., & Enzmann, D. (1998). *The burnout cornpunion to study and practice: A critical analysis*. London: Taylor and Francis.

Schaufeli, W. B., & Greenglass, E. R. (2001). Introduction to special issues on burnout and health. *Psychology and Health,* 16, 501-510.

Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). Maslach Burnout Inventory-General Survey. In C. Maslach, S. E. Jackson & M. P. Leite (Eds.), *The maslach burnout inventory-test manual* (3rd ed.). Palo Alto, California: Consulting Psychologists Press.

Schaufeli, W. B., & Van Dierendonck, D. (1993). The construct validity of two burnout measures. *Journal of Organizational Behavior,* 14, 631-647.

Schermerhorn, J. R. (1999). *Management* (6th ed.). New York: John Wiley & Sons.

Schumacker, R. E., & Lomax, R. G. (2010). *A beginner's guide to structural equation modeling* (3rd ed.). New York: Routledge.

Scott, J. G., Sochalski, J., & Aiken, L. (1999). Review of magnet hospital research: Findings and implications for professional nursing practice. *Journal of Nursing Administration,* 29(1), 9-19.

Shader, K., Broome, M. E., Broome, C. D., West, M. E., & Nash, M. (2001). Factors influencing satisfaction and anticipated turnover for nurses in an academic medical center. *Journal of Nursing Administration,* 31, 210-216.

Sheward, L., Hunt, J., Hagen, S., Macleod, M., & Ball, J. (2005). The relationship between UK hospital nurse staffing and emotional exhaustion and job dissatisfaction. *Journal of Nursing Management,* 13, 51–60.

Shirom, A. (2002). Job-related burnout: A review. In J. C. Quick & L. E. Tetrick (Eds.), *Handbook of Occupational Health Psychology* (pp. 245-264). Washington, DC: American Psychological Association.

Sleutel, M. R. (2000). Climate, Culture, Context, or work environment? Organizational factors that influence nursing practice. *Journal of Nursing Administration,* 30(2), 53-58.

Smith, P. C., Kendall, L. M., & Hulin, C. L. (1969). *The measurement of satisfaction in work and retirement*. Chicago, Illinois: Rand McNal.

Sochalski, I. (2001). Quality of care, nurse staffing, and patient outcomes. *Policy, Politics, & Nursing Practice,* 2(1), 9-18. doi: 10.1177/152715440100200103

Sovie, M. D. (1984). The economics of magnetism. *Nursing Economics,* 2(2), 85-92.

Spector, P. E. (1985). Measurement of human service staff satisfaction: Development of the Job Satisfaction Survey. *American Journal of Community Psychology,* 13, 693–713.

Spence Laschinger, H. K., Leiter, M., Day, A., & Gilin, D. (2009). Workplace empowerment, incivility, and burnout: Impact on staff nurse recruitment and retention outcomes. *Journal of Nursing Management,* 17(3), 302-311. doi: 10.1111/j.1365-2834.2009.00999.x

Stamps, P. L., & Piedmonte, E. B. (1986). *Nurses and work satisfaction: An index for measurement*. Michigan: Health Administration Press.

Sullivan, E. J., & Decker, P. J. (1997). *Effective leadership and management in nursing*.

California: Addison-Wesley.

Sullivan, E. J., & Decker, P. J. (2005). *Effective leadership and management in nursing* (6th ed.). Houston: Pearson Prentice Hall.

Sullivan, P. J. (1993). Occupational stress in psychiatric nursing. *Journal of Advanced Nursing,* 18(4), 591-601.

Tafreshi, M. Z., Pazargadi, M., & Saeedi, Z. A. (2007). Nurses' perspectives on quality of nursing care: A qualitative study in Iran. *International Journal of Health Care Quality Assurance,* 20(4), 320-328. doi: 10.1108/09526860710754389

Tan, Z. X., Zou, H. Y., Liu, Y. S., & Hu, X. H. (2014). Job burnout in ICU nurses and its relationship with turnover intention. *Hainan Medical Journal,* 25(11), 1695-1697. doi: doi:10.3969/j.issn.1003-6350.2014.11.0659

Taylor, A. G., & Haussmann, G. M. (1988). Meaning and measurement of quality nursing care. *Applied Nursing Research,* 1(2), 84-88. doi: http://dx.doi.org/10.1016/S0897-1897(88)80007-7

Tervo-Heikkinen, T., Kiviniemi, V., Partanen, P., & Vehvilainen-Julkunen, K. (2009). Nurse staffing levels and nursing outcomes: a Bayesian analysis of Finnish-registered nurse survey data. *Journal of Nursing Management,* 17(8), 986-993. doi: 10.1111/j.1365-2834.2009.01020.x

Thunton, R. L., Bott, M. J., Koehn, M. L., Miller, P., Rindner, E., Pace, K., . . . Dunton, N. (2004). The NDNQI-Adapted Index of Work Satisfaction. *Journal of Nursing Measurement,* 12 (2), 101-122.

Tian, M. X., Yang, S. P., Shao, C. Q., & Liu, N. P. (2008). Quality nursing care management problems and countermeasures. *Journal of Qi Lu Nursing,* 20, 102-103.

Tinsly, H. E. A., & Tinsly, D. J. (1987). Uses of factor analysis in counseling psychology research. *Journal of Counseling Psychology,* 34, 414-424.

Tourangeau, A. E., McGillis Hall, L., Doran, D. M., & Petch, T. (2006). Measurement of nurse job satisfaction using the McCloskey/Mueller Satisfaction Scale. *Nursing Research,* 55(2), 128-136.

Van Bogaert, P., Clarke, S., Vermeyen, K., Meulemans, H., & Heyning, P. V. d. (2009). Practice environments and their associations with nurse-reported outcomes in Belgian hospitals: Development and preliminary validation of a Dutch

adaptation of the revised nursing work index. *International Journal of Nursing Studies,* 46, 55-65. doi: http://dx.doi.org/10.1016/j.ijnurstu.2008.07.009

Vandenberg, R. J., & Nelson, J. B. (1999). Disaggregating the motives underlying turnover intentions: When do intentions predict turnover behaviour. *Human Relations,* 52(10), 1313–1336.

Vroom, V. (1964). *Work and motivation*. New York: John Wiley and Sons.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). *Measurement in Nursing and Health Reserch*. New York: Springler.

Wang, H. (2005). China's fragmented health-system reforms. *The Lancet,* 366(9493), 1257-1258. doi: doi:10.1016/S0140-6736(05)67513-7

Wang, J., Ding, S. Z., Gao, X. Q., & Li, S. S. (2014). Research on the relationship between intent to stay and professional burnout among clinical nurse. *Journal of Nursing Science,* 29(2), 55-56.

Wang, L., & Li, Z. L. (2011). Reliability and validity of Chinese version of the Practice Environment Scale. *Chinese Journal of Nursing,* 46(2), 121-123.

Wang, X. (2008). *Work empowerment and burnout among registered nurses in tertiary general hospitals in Harbin, the People's Republic of China.*

Weiss, D. J., & Dawis, R. V. (1967). *Manual for the Minnesota Satisfaction Questionnaire*. University of Minnesota, Industrial Relations Center.

Williams, A. M. (1998). The delivery of quality nursing care: A grounded theory study of the nurse's perspective. *Journal of Advanced Nursing,* 27(4), 808-816. doi: http://dx.doi.org/10.1046/j.1365-2648.1998.00590.x

Williams, S. A. (1998). Quality and care: Patients' perceptions. *Journal of Nursing Care Quality,* 12, 18-25.

Worf, M. G. (1970). Need gratification theory: A theoretical reformulation of job satisfaction/dissatisfaction and job motivation. *Journal of Applied Psychology,* 54, 87–94.

World Health Organization. (2006). The World Health Report 2006. from http://www.who.int/whr/2006/whr06_en.pdf

Wu, M. L. (2010). *Statistical analysis questionnaire practice: SPSS operation and application*. Chong Qing, China: Chong Qing University Press.

Wu, M. L. (2012). *Structural equation modeling: AMOS practice and application* (2nd

ed.). Chong Qing, China: Chong Qing University Press.

Xue, X. L., Hu, Y. N., Cheng, S. Y., Xing, J., Duan, X. Y., Zhao, S. H., & Yu, C. Y. (2010). Survey on clinical nurses' cognition of high quality care[in Chinese]. *Journal of Nursing Science,* 25, 9-11.

Yam, B., & Rossiter, J. (2000). Caring in nursing: Perceptions of Hong Kong nurses. *Journal of Clinical Nursing,* 9, 293-302. doi: 10.1046/j.1365-2702.2000.00349.x

Yang, T. Z., Xu, Y., & Wang, Y. L. (2005). *Quality of nursing care management implementation manual*. Shanghai: Second Military Medical University Press.

Yoder-Wise, P. S. (2003). *Leading and managing in nursing* (3rd ed.). Saint Louis: Mosby.

You, L. M., Aiken, L. H., Sloane, D. M., Liu, K., He, G. P., Hu, Y., . . . Sermeus, W. (2013). Hospital nursing, care quality, and patient satisfaction: Cross-sectional surveys of nurses and patients in hospitals in China and Europe. *International Journal of Nursing Studies,* 50, 154-161. doi: 10.1016/j.ijnurstu.2012.05.003

Yu, D. S. F., Lee, D. T. F., & Woo, J. (2003). Translation of the chronic heart failure questionnaire. *Applied Nursing Research,* 16(4), 278-283. doi: http://dx.doi.org/10.1016/j.apnr.2003.08.005

Zhang, L. F., You, L. M., Liu, K., Zheng, J., Fang, J. B., Lu, M. M., . . . Bu, X. Q. (2014). The association of Chinese hospital work environment with nurse burnout, job satisfaction, and intention to leave. *Nursing Outlook,* 62(2), 128-137. doi: 10.1016/j.outlook.2013.10.010

Zhao, S. H. (2006). *Quality nursing care as perceived by nurses and patients in the second teaching hospital of Harbin Medical University in the People's Republic of China (master's thesis).* Chiang Mai University, Chiang Mai, Thailand.

Zheng, C. F., & Zhu, H. L. (2007). An analysis on 515 nursing staff's turnover intention. *Chinese Nursing Management,* 7(4), 29-31.

Zhu, X. W., You, L. M., Zheng, J., Liu, K., Fang, J. B., Hou, S. X., . . . Zhang, L. F. (2012). Nurse staffing levels make a difference on patient outcomes: A multisite study in chinese hospitals. *Journal of Nursing Scholarship,* 44(3), 266-273. doi: 10.1111/j.1547-5069.2012.01454.x

จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University

APPENDIX

APPENDIX A
Information Sheet and Ethical Approval

Patient/ Participant Information Sheet

Title of research project: Factors influencing nurse-assessed quality of care in Chinese hospitals

Principle researcher's name: Ying Liu

Position: Doctoral candidate in Faculty of Nursing, Chulalongkorn University, Thailand.

Instructor in School of Nursing, Dalian Medical University, P. R. China.

Office address: 9 Western Section, Lvshun South Street, Dalian, P. R. China. School of Nursing, Dalian Medical University.

Home address: No.48, Chang Zhou Street, Sha He Kou Zone, Dalian City, Liaoning Province, P. R. China.

Telephone (office): 0086-411-86110448 **Telephone (home):** 0086-411-84686406

Cell phone: 0086-15509850598 **E-mail:**chinaliuying2004@gmail.com

I am Ying Liu, nursing candidate in doctoral degree at Chulalongkorn University, doing a doctoral dissertation on the topic of the factors influencing nurse-assessed quality of care in Chinese hospitals. The purpose of this information sheet is the explanation about information and process of the study. You can understand and determine to cooperate as participant in my study. Please take time to read the following information carefully and do not hesitate to ask if anything is unclear or if you would like to know more information.

1. This research project focuses on the examination the causal relationships of factors influencing nurse-assessed quality of care in Chinese hospitals. The objectives of the project were (1) To explore the relationships among nurse staffing, nurse work environment, job satisfaction, burnout, intention to leave and nurse-assessed quality of care in Chinese hospitals. (2) To test the model that explains the influence of nurse staffing, nurse work environment, job satisfaction, burnout, intention to leave and nurse-assessed quality of care in Chinese hospitals.

2. The benefit of this study will provide what factors including nurse staffing, nurse work environment, job satisfaction, burnout, and intention to leave can influence nurse-assessed quality of care in Chinese hospitals. The result of this study will provide the valuable information for health policy maker to mandate appropriate nurse staffing plan, nurse to patient ratio and reform hospital policy for supporting nurse practice in order to attract and retain nurses and improve quality of nursing care.

3. Participants in this study are RNs who worked at Chinese tertiary general hospitals. The following criteria will be used to select participates include (1) Nurses hold RN licenses. (2) RNs were employed by research setting at least one year. (3) Nurses provide direct nursing care to the patients during their hospitalization. (4) Nurses are willing to participate into study. The exclusion criteria is (1) Nurses work at

the administration position, such as vice head nurse, head nurse, nurse supervisor. (2) Nurses work at the operation room, outpatient department, nursing division department, hospitalized department, and supplying room. (3) Inpatient department nurses who in charge of computer response nurse (Wei ji hu shi), office nurse （ban gong shi hu shi）, main classes nurse (zhu ban hu shi）, dressing room nurse (huan yao shi hu shi), therapeutic nurse (zhi liao ban hu shi).

4. *After obtaining hospital permission, data collection will follow those steps. (1)First step: 330 nurses will be randomly selected for instrument psychometric property testing, which include construct validity and/or internal consistency. (2) Second step: 30 RNs will be selected from the first step to test instruments test-retest reliability (3) Third step: 550 nurses will be selected for hypothesis model testing by using SEM.*

5. The participants will receive the informed consent form, which describe participants will receive information related to they will be kept confident. Each questionnaire does not know who completed it. After obtaining complete questionnaire, participants will seal the questionnaire. Do not show the questionnaire to other. The participants will receive the information that there does not effect to any punishment in this study. In addition, the participants **can get the benefits for their future work by truly answering the questionnaire.** This is because the study will give the fundamental information regarding health policy formulation, which makes participants work condition more support their work. The answers do not correct or incorrect. They are just opinions of participants. The questionnaire include (1) demographic data of nurses=12 items, (2) Chinese version of Practice Environment Scale (C-PES)=28 items, (3) Nurse Job Satisfaction Scale (NJSS) in Chinese Language=38items, (4) Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS)=22 items, (5) Chinese version of Anticipated Turnover Scale (ATS)=5items, and (6) Nurse-assessed Quality of Care Scale (NAQCS) in Chinese=44items. *The total number of questionnaire is 149 items.* Participants will take *20* minutes to complete a package of the questionnaire.

6. *There is no any risk for participate.* Participate for this study has the right to withdraw from the study at any time, no need to give any reason, and there will be no bad impact on that participant. *Since participants work at clinical setting, sometime it is not convenient to answer the questionnaire during the busy working time, the questionnaires are allowed to bring home and should be returned on time to research assistant in each hospitals. In addition, the researcher will not provide the souvenirs for the participants, because of limited budget.*

7. Researcher will be available for all participants 24 hours when they need help or in trouble, cell phone 15509850598 or office phone number 0411-86110448 all the time.

8. Information related directly to participants will be kept confidential. Results of the study will be reported in the overall picture. Participants' names are not addressed in the data. A code number is used to ensure confidentiality. Any indirect information which would be able to identity participants or hospital will not appear in the report.

9. If researcher does not perform upon participants as indicated in the information, the participants can report the incident to the Ethics Review Committee for Research Involving Human Research Subjects, Health Sciences Group, Chulalongkorn University (ECCU). Institute Building 2, 4th Floor, Soi Chulalongkorn 62, Phyathai Rd., Bangkok 10330, Thailand, Tel: 662218-8147 Fax: 662218-8147 E-mail: eccu@chula.ac.th.

Form of Informed Consent Form

Address……
Date …….
Code number of participant ……

I who have signed here below agree to participate in this research project

Title: "Factors influencing nurse-assessed quality of care in Chinese hospitals"

Principle researcher's name: Ying Liu

Contact address: 9 Western Section, Lvshun South Street, Dalian, P. R. China. School of Nursing, Dalian Medical University.

Telephone: 0086-15509850598

E-mail:chinaliuying2004@gmail.com

I have read or been informed about rationale and objective(s) of the project, what I will be engaged with in details, risk/harm and benefit of this project. The researcher has explained to me and I clearly understand with satisfaction.

I willingly **agree** to participate in this project and consent the researcher to response to questionnaires about factors influencing quality of nursing care as perceived by RNs in Chinese hospitals. The questionnaire include (1) demographic data of nurses=12 items, (2) Chinese version of Practice Environment Scale (C-PES)=28 items, (3) Nurse Job Satisfaction Scale (NJSS) in Chinese Language=38items, (4) Chinese version of Maslach Burnout Inventory-Human Service Survey (C-MBI-HSS)=22 items, (5) Chinese version of Anticipated Turnover Scale (ATS)=5items, and (6) Nurse-assessed Quality of Care Scale (NAQCS) in Chinese=44items. *The total number of questionnaire is 149 items.* Participants will take *20* minutes to complete a package of the questionnaire.

I have **the right** to withdraw from this research project at any time as I wish with no need to **give any reason**. This withdrawal **will not have any negative impact upon me.**

Researcher has guaranteed that procedure(s) acted upon me would be exactly the same as indicated in the information. Any of my personal information will be **kept confidential.** Results of the study will be reported as total picture. Any of personal information which could be able to identify me will not appear in the report.

If I am not treated as indicated in the information sheet, I can report to *the Ethics Review Committee for Research Involving Human Research Subjects, Health Sciences Group, Chulalongkorn University (ECCU). Institute Building 2, 4th Floor, Soi Chulalongkorn 62, Phyathai Rd., Bangkok 10330, Thailand, Tel: 662218-8147 Fax: 662218-8147 E-mail: eccu@chula.ac.th.*

I also have received a copy of information sheet and informed consent form

Sign ……..……	Sign ……..……
(……..……)	(……..……)
Researcher	Participant
	Sign ……..……
	(……..……)
	Witness

AF 02-12

The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University
Institute Building 2, 4 Floor, Soi Chulalongkorn 62, Phyat hai Rd., Bangkok 10330, Thailand,
Tel: 0-2218-8147 Fax: 0-2218-8147 E-mail: eccu@chula.ac.th

COA No. 116/2014

Certificate of Approval

Study Title No.098.1/57 : **FACTORS INFLUENCING NURSE-ASSESSED QUALITY OF CARE IN CHINESE HOSPITALS**

Principal Investigator : MS.YING LIU

Place of Proposed Study/Institution : Faculty of Nursing, Chulalongkorn University

The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University, Thailand, has approved constituted in accordance with the International Conference on Harmonization – Good Clinical Practice (ICH-GCP) and/or Code of Conduct in Animal Use of NRCT version 2000.

Signature: ..... Signature: .....

(Associate Professor Prida Tasanapradit, M.D.) (Assistant Professor Dr. Nuntaree Chaichanawongsaroj)

Chairman Secretary

Date of Approval : 19 August 2014 Approval Expire date : 18 August 2015

The approval documents including

1) Research proposal
2) Patient/Participant Information Sheet and Informed Consent Form
3) Researcher
4) Questionnaire

Protocol No. 098.1/57
Date of Approval 19 AUG 2014
Approval Expire Date 18 AUG 2015

The approved investigator must comply with the following conditions:

1. *The research/project activities must end on the approval expired date of the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University (ECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the ECCU approval expired date.*
2. *Strictly conduct the research/project activities as written in the proposal.*
3. *Using only the documents that bearing the ECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).*
4. *Report to the ECCU for any serious adverse events within 5 working days*
5. *Report to the ECCU for any change of the research/project activities prior to conduct the activities.*
6. *Final report (AF 03-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.*
7. *Annual progress report is needed for a two- year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.*

APPENDIX B

List of the Interviewed Experts

List of the interviewed experts

Name	organization	address	Personal information
Mrs. Shu-zhen Ding	Faculty of nursing, Zhongshan College of Dalian Medical University	No 28, Ai Xian street, High Technology Zone, Dalian city, Liaoning Province, 116085, China	1. 41st Nightingale Award winner 2. Professor 3. Work at clinical setting more than 30 years 4. Used to be hospital nurse division director 5. Nurse association vice director at Liaoning province and director at Dalian city 6. Nurse Educator
Mrs. Yu-li Gou	Hepatobiliary Surgery department, the second hospital of Dalian Medical University	No467, Zhongshan Road, Sha he kou Zone, Dalian city, 116027 ,China	1. Associate professor 2. Work at clinical setting 26 years. 3. Head nurse 4. Nurse association of infection commission member
Mrs.Ming-ying Yang	Nurse division, the second affiliated hospital of Kunming medical university	No.374, Dianmian street, Kunming city, Yunnan province, china, 650101.	1. Associate professor 2. Work at clinical setting 24 years. 3. Nurse division director 4. Nurse association vice director at Yunnan province 5. Nurse association of rehabilitation commission director at Yunnan province. 6. Hospital association of nursing administrative management commission vice director at Yunnan province
Mrs. Li Zhang	Nurse division, Jinli central hospital of Jilin university affiliated Jilin hospital	No.4,Nanjin street, Chuanying Zone, Jilin city, Jilin province, 132011	1. Associate professor 2. Work at clinical setting 22 years 3. Nurse division vice director. 4. Nurse association of Intensive care commission vice director at Jilin province 5. Nurse association of Geriatric Nursing commission vice director at Jilin province 6. Nurse association of emergency treatment commission member at Jilin province 7. Nurse association of surgical nursing member of the permanent committee at Jilin province
Mrs Xiao-rong Ding	Nurse division, Peijing University Shenzhen Hospital	No 1120,Lianhua road, Futian Zone, Shenzhen city, Guangdong province, 518036	1. Professor 2. Work at clinical setting 29 years. 3. Nurse division director 4. Nursing association Administrative Director 5. Nursing education center vice director of Guangdong province

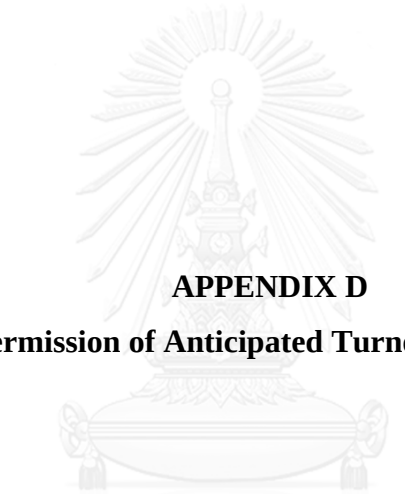
Name	**organization**	**address**	**Personal information**
Mrs. Hong Guan	Nursing department, the second hospital of Dalian Medical University	No467, Zhongshan Road, Sha he kou Zone, Dalian city, 116027,China	1. Professor 2. Nurse expert in clinical setting 22 years 3. Nurse association at Dalian city director 4. Medicine association of Liaoning province member 5. The third appraisal of medical specialists member both Dalian city and Liaoning province 6. The combination of western and eastern professional title promotion medicine evaluation expert

APPENDIX C

List Experts of the Content Validity Testing

List experts of the content validity testing

Name	Organization	Address	Personal information
1.Mrs.Shi-hong Zhao	Brain surgery department, The 2nd affiliated hospital of Harbin Medical University	No 246, Xuefu road, Nangang zone, Harbin city, Helongjiang province, 150001	1. master degree 2. associate professor 3. head nurse 4. 23 years clinical experience
2.Mrs. Zhi-ming Wu	Faculty of nursing, Dalian University	No 10. Xue Fu street, economic and technical development zone, Dalian city, Liaoning province, 116622	1. master degree 2. professor 3. nursing administration educator 4. master student supervisor 5. 46 years' work experience
3.Mrs. Feng-lan Lou	Faculty of nursing, Shandong University	No.44, west culture road, Jinan city, Shan dong province,250012	1. bachelor degree 2. professor 3. nursing administration educator 4. doctoral student supervisor 5. 46 years' work experience
4.Mrs. Li-yan Sha	Nurse division director, The second hospital of Dalian medical university	No467, Zhongshan Road, Sha he kou Zone, Dalian city, 116027,China	1. master degree 2. professor 3. nursing division director 4. 23 years' work experience
5.Mrs.Yi-juan Cheng	Nursing division, West china, hospital Sichuan university.	No 37, Guoxue street, Wuhou Zone, Chengdu city, Sichuan province, 610041	1. associate degree 2. professor 3. master student supervisor 4. nursing association director, Sichuan province 5. 47 years' work experience
6.Mrs. Rong-Hua, He	Nurse division, Taihe hospital (affiliated hospital of Hubei university of medicine)	No 32, South people road, Shi yan city, Hubei province, 010167.	1. bachelor degree 2. professor 3. nurse administration director 4. 20 years' work experience
7.Mrs. Man-hong He	Integrative Medicine department, Shenzhen Second People's Hospital	No.3002, West sun gang road, Futian Zone, Shenzhen city, Guang dong province, 518029	1. bachelor degree 2. professor 3. head nurse supervisor 4. 23 years' work experience
8.Mrs. Chun-yan Hao	Nurse division, the first affiliated hospital of Liaoning medical university	No.2 five section, people road, Guta Zone, Jin Zhou city, Liaoning province.	1. master degree 2. professor 3. nurse administrator 4. master student supervisor 5. 27 years' work experience



APPENDIX D

The Permission of Anticipated Turnover Scale Usage

Liu Ying, RN, MS, Doctoral Student
Email: chinaliuying2004@gmail.com

Dear Doctoral Student Liu Ying:
Thank you for your email regarding information about instruments in the Anticipated Turnover Among Nursing Staff study (R01 NU00908). Dr. Hinshaw and I are pleased to be able to share this information with you.
Attached to the next several emails please find the Anticipated Turnover, Nursing Job Stress Work Satisfaction and Nurse Job Satisfaction Scales, along with the scoring key, validity and reliability estimates obtained on our sample. The copyright information to use in crediting the authorship of the scales is noted in the materials. You have permission for use, and we trust this information will be helpful.
If we can be of any other assistance to you, please let us know. Also, we would request that you share any information regarding the process of using the instrument, your completed research abstract and the results of outcomes of its use. We wish you much success in your research and look forward to working with your research endeavors.

Sincerely,
Jan R. Atwood, PhD, RN, FAAN
Professor Emerita, College of Nursing & C. of Public Health
University of Nebraska Medical Center
email: j.atwood@worldnet.att.net
phone: (520) 360-2369
fax: (520) 825-8298
notified: A.S. Hinshaw, PhD, FAAN
Dean, Tri-services University Graduate College of Nursing
Maryland, USA

JRA/re ATS Instr LiuLing1209.wpd

APPENDIX E

List of Forward/Backward Translators and Monolingual Expert

List of forward/backward translators and monolingual expert

	forward	monolingual	backward
1. Professor Ying Tie Shi, MSN, RN. Nursing division vice director, Dalian Medical University Affiliated first hospital	√		
2. Qin Wen Li, BSN, RN. Master student in nursing administration, Faculty of Nursing, Chulalongkorn University	√		
3. Associate Professor Yue Yu, Bachelor degree in Chinese Language Chinese Teacher, Faculty of Nursing, Dalian Medical University		√	
4. Assistant profession Jian De Zeng, MSN, RN, Nursing educator, Faculty of Nursing, Dalian Medical University			√
5. Assistant profession Wei Jin Sun, Master degree in English Language English Teacher, Faculty of Nursing, Dalian Medical University			√

APPENDIX F
The Example of the Instruments

Demographic data form

Direction: Please provide information by filling in the blanks or putting a mark "√"into □in front of the relevant answer for each item.

1. Born 19□□

2. Gender □ Male □ Female

3. Marital status □ Never married □ Married □ Separated
□ Divorced □ Widowed

4. Education Level □ Secondary Technical □ Associate Degree
□ Bachelor Degree □ Master Degree
□ Doctoral Degree

5. How long have you been worked as a nurse? _____ Years

6. What your current employment status? □ Permanent □ Contract nurse

7. Your one year income (salary, bonus, and annual bonus)
□ less than 40,000 yuan □ 40,000-59,000 yuan □ 60,000-79,000 yuan
□ 80,000-99,000 yuan □ 10,000-119,000 yuan □ more than120,000 yuan

8. Current area of work: □ Surgical □ Medical
□ Gynecology/obstetrics □ Pediatric
□ Intensive Care □ Emergence department
□ eye, ear, nose, & throat (EENT)

9. How long have you been worked there? _____ years

10.Your Professional title:

□ Registered Nurse (Hu shi) □ senior nurse (Hu shi)

□ supervisor nurse (Zhu guan hu shi) □ associate professor nurse (Fu zhu ren hu shi)

□ Professor nurse (Zhu ren hu shi)

11. during the past one month, the number of patients per shift per day you take care (According to your current situation at the department)

Shift name	Shift time	The average number of patients per shift per day to take care	The maximum number of patients per shift per day to take care	The minimum number of patients per shift per day to take care

Nurse Work Environment Scale

Direction: For each item, please indicate the extent to which you agree that the item is PRESENT IN YOUR CURRENT JOB. Indicate your degree of agreement by "√" in the appropriate number. 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Agree (A), 4 = Strongly Agree (SA). Please feel free to select your choice. There is no right or wrong.

No	Item	SD	D	A	SA
1	Adequate support services allow me to spend time with my patients.	1	2	3	4

28	Use of nursing diagnoses.	1	2	3	4

Chinese Nurse Job Satisfaction Scale

Direction: We would like to know your opinion for your current work. Please indicate your degree of agreement by **"√"** the appropriate number. 1= Fully Dissatisfied (FD), 2 = Dissatisfied (D), 3 = Unsure (U), 4 = Satisfied (S), and 5 = Fully Satisfied (FS). Please feel free to select your choice. There is no right or wrong.

No	Item	Score				
		FD	D	U	S	FS
1	My equality opportunity for taking part in professional training.	1	2	3	4	5

40	Trust relationship with the patient or the patient's family.	1	2	3	4	5

Maslach Burnout Inventory-Human Service Survey (MBI-HSS)

Direction: Please read each item carefully, then look at the rating scale and decide how frequently it fit for you. Choose the number that best fit for you and cycle it. Please feel free to select your choice. There is no right or wrong answer for each item, many items looks are similar, do not worry it, please be as honest as you can in filling your feeling. 0 = None (N), 1 = A few times a year (FY), 2 = Monthly (M), 3 = A few times a month (FM), 4 = Every week (EW), 5 = A few times a week (FW), and 6 = Every day (ED).

No	Item	Score						
		N	FY	M	FM	EW	FW	ED
1	Feel emotionally drained from work.	0	1	2	3	4	5	6

22	Feel patients blame for their problems.	0	1	2	3	4	5	6

Anticipated turnover scale (ATS)

Direction: We would like to understand what you are currently point of views, please carefully read each item, tick by "√" for your agreement. 1 = Agree Strongly (AS), 2 = Moderately Agree (MA), 3 = Slightly Agree (SA), 4 = Uncertain (U), 5 = Slightly Disagree (SD), 6 = Moderately Disagree (MD), and 7 = Disagree Strongly (DS).Your options are no right or wrong, please feel free to select your choice.

No	Item	Score						
		AS	MA	SA	U	SD	MD	DS
1	I am quite sure I will leave my position in the foreseeable future.	1	2	3	4	5	6	7

5	I plan to leave this position shortly.	1	2	3	4	5	6	7

Chinese Nurse Assessed Quality of Nursing Care Scale

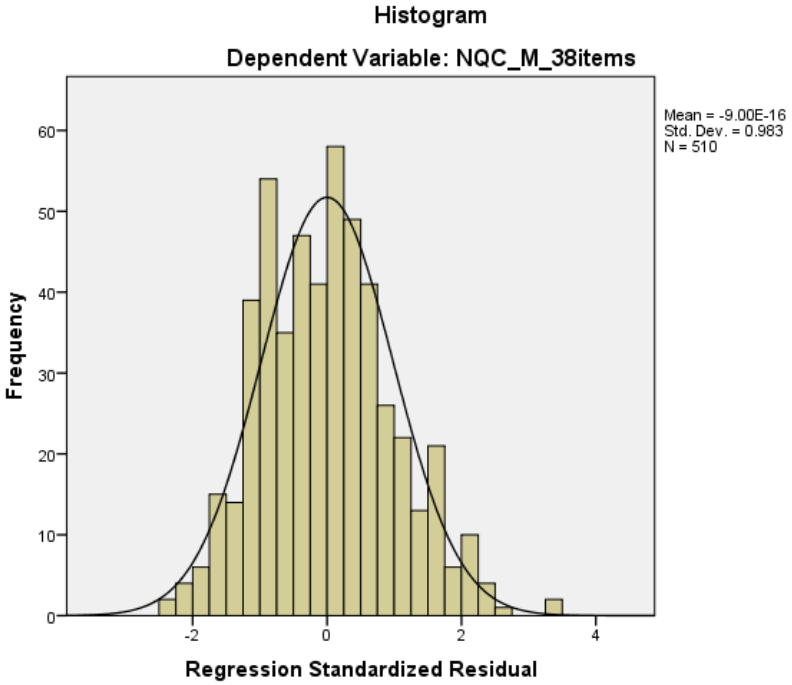
Direction: The following statements describe your nursing service provide to the patients, please carefully read each sentence and tick your ideas with figures "√". 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Unsure (U), 4 = Agree (A), 5 = Strongly Agree (SA). Please feel free to select your choice. There is no right or wrong.

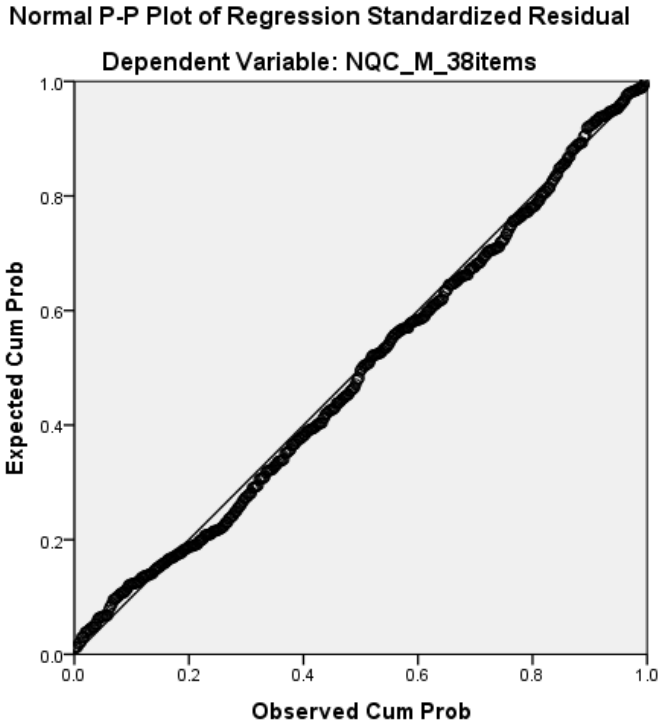
No	Items	Score				
		SD	D	U	A	SA
1	I provide the hygienic room to the patients.	1	2	3	4	5

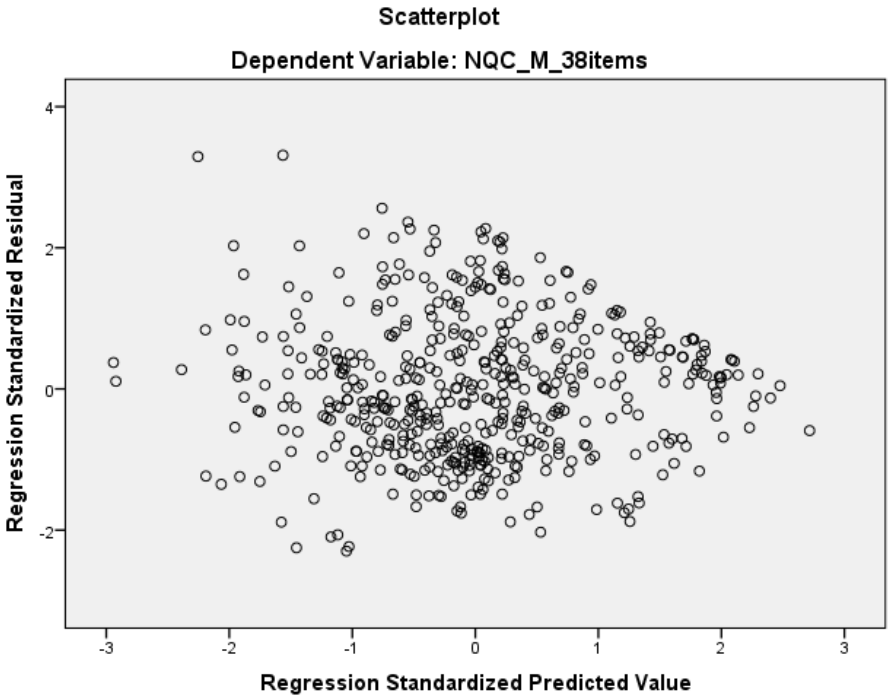
48	I can avoid patient biological damage (such as bacterium, virus, and fungus infection).	1	2	3	4	5

APPENDIX J
Assumptions of Structural Equation Model

Assumptions of structural equation model







VITA

Ms. Ying Liu was born on November 6th, 1981 in Dalian City, Liaoning Province, in the People's Republic of China. In 2004, she received two Bachelor's Degrees, one in Nursing Science and the other in Clinical Psychology from Dalian University in the Liaoning Province of China. She received a Master's Degree in Nursing Science (Nursing Administration) from the Faculty of Nursing at Chiang Mai University in 2007. In addition, she studied in the Doctor of Philosophy in nursing program from 2012 to 2015 in the Faculty of Nursing at Chulalongkorn University. She will receive a Ph.D. degree in Nursing Science from the Faculty of Nursing at Chulalongkorn University in 2015.

Formerly, she was a registered nurse and worked in the emergency department at Affiliated Zhongshan Hospital of Dalian University from 2004 to 2005. She also has had work experience in the medical unit, surgical unit, and intensive care unit at Dalian Municipal Centre Hospital in the Liaoning Province of China. Additionally, from 2005-2006, she taught Chinese at Mandarin Education School in Chiang Mai, Thailand. From 2011 until now, she is a teacher in the Faculty of Nursing at Dalian Medical University.